Articles

Factors Affecting Conversion Rates to Medicaid among New Admissions to Nursing Homes

Vincent Mor, Orna Intrator, and Linda Laliberte

Objective. This study examines conversion to Medicaid as a payment source among a cohort of newly admitted nursing home residents.

Data Source. The longitudinal data used came from regular assessments of residents in the National Health Corporation's 43 for-profit nursing homes in Missouri, Kentucky, South Carolina, and Tennessee. This information system tracked all residents who were discharged, providing a comprehensive record that may have spanned multiple admissions.

Study Design. Using survival analysis methods, Cox regression, and survival trees, we contrasted the effect of state, initial payment source, education, age, and functional status on the rate of spend-down to Medicaid.

Data Extraction Methods. New-admission cohorts were created by linking an admission record for a newly admitted resident with all subsequent assessments and follow-up records to ascertain the precise dates of any payment source changes and other discharge transitions.

Principal Findings. For the 1,849 individuals who were admitted as self-payers and who were still in the nursing home at the end of one year, there is a 19 percent probability of converting to Medicaid. All analytic methods revealed that education, age, and state of residence were predictive of spend-down among residents who were admitted as self-payers.

Conclusions. Our results confirm the effect of education as an SES indicator and state as a proxy for Medicaid policy on spend-down. Future research should model the effects and duration of intervening hospitalizations and other transitions on Medicaid spend-down among new admissions.

Keywords. Nursing home, Medicaid, spend-down, insurance, long-term care

Although nursing home care accounts for more than 8 percent of U.S. health care expenditures, it is financed by a patchwork of sources often

resulting in reliance on Medicaid. In 1987, $40.6 billion was spent for nursing home care, almost one-half of which was financed with federal and state funds, primarily through state-controlled Medicaid programs. Medicaid paid 43 percent of the total nursing home costs in 1984 (Levit et al. 1985) and, according to simulations using the Brookings/ICF Long-Term Care Financing Model, Medicaid's share of nursing home expenditures is expected to increase over the next 35 years (Weiner et al. 1987). Medicare pays for less than 2 percent of nursing home care because of program restrictions such as the required prior three-day hospital stay, the 100-day limit, and copayments. The majority of the balance of the nation's nursing home bill is financed by residents and their families (Liu, Doty, and Manton 1990).

Many elderly nursing home residents who do not meet the Medicare guidelines or the Medicaid program's means test begin their nursing home stays as self-payers. If their income is not sufficient to finance the stay (on average $25,000 per year), they may liquidate assets and use savings, eventually becoming eligible for Medicaid. This process, referred to as "spending down" to Medicaid, results in the individuals' meeting the asset and income tests of their state's Medicaid program. In general, the asset test is met once an individual has liquidated his or her countable resources and assets in excess of the level used to determine eligibility under the Supplemental Security Income (SSI) program (i.e., $2,000 in 1990). Once the asset test has been met, elderly nursing home residents meet the income test in many states as a result of spending all of their income (except for a small personal needs allowance) on medical expenses (including the daily charge in a nursing home). In addition to eligibility for Medicaid under the "medically needy" program, some states offer a special income standard for institutionalized individuals as another option. "Spending-down" can be viewed as a cost-sharing provision under both programs, since the nursing home resident is expected to apply almost all income toward the nursing home bill, with Medicaid covering the balance.

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Address correspondence and requests for reprints to Vincent Mor, Ph.D., Director, Center for Gerontology and Health Care Research, Brown University, Box G, Providence, RI 02912. Orna Intrator, Ph.D. is Visiting Assistant Professor (Research), Department of Community Health, and Linda Laliberte, J.D. is Associate Director of Operations, Center for Gerontology and Health Care, Brown University. Dr. Intrator is also Assistant Professor, Department of Statistics, Hebrew University. This article, submitted to *Health Services Research* on June 10, 1991, was revised and accepted for publication on March 12, 1992.

Common wisdom holds that most persons entering a nursing home will become impoverished and spend down to Medicaid during their stay. A simulation analysis concluded that after 26 weeks in a nursing home 58 percent of single elderly persons would have spent down, depending on their state of residence (Select Committee on Aging 1987). Recent empirically based analyses of the rates of Medicaid conversion in nursing homes reported rates that are substantially lower. Sekscenski (1987) analyzed data from the 1985 National Nursing Home Survey (NNHS) and reported that among nursing home residents staying for six months or longer, 22 percent shifted to Medicaid; this was true of 52 percent of Medicare admissions staying that long and only 19 percent of initially private-pay residents. Using the same data source, Liu, Doty, and Manton (1990) found that, averaging all different lengths of stay, about 10 percent of nursing home discharges converted from private-pay to Medicaid. In contrast, over 50 percent of nursing home residents remain private-pay throughout their stays. Rice (1989) created a synthetic cohort of admissions and discharges from the NNHS that converted residents' individual sequential admissions into "stays" spanning multiple readmissions. He also found the spend-down rate to be relatively low, although higher for residents who were more impaired at admission. Spence and Weiner (1990) estimated that during a single nursing home episode between 10 and 16 percent of all nursing home discharges who started as private payers spent down to Medicaid, and 36 percent of all discharges remained private-pay throughout their stay. While these studies estimate the proportion of discharges who had spent down, the data are insufficient to provide information about the duration of the process, especially as it occurs over multiple admissions.

Longitudinal data have been used in recent studies of the spend-down process in nursing homes in Connecticut and Michigan. Gruenberg, Farbstein, Hughes-Cromwick, et al. (1989) used Connecticut nursing home data in which all cases were traced at least five years, and found that 25 percent of all residents were receiving Medicaid upon admission, 16 percent spent down to Medicaid, and 59 percent remained private-pay. Using a life table model to take into account the large number of short-stay admissions who did not have time to spend down, they found that 22.5 percent of residents privately paying at admission converted to Medicaid within one year, and 37.8 percent converted within two years. Burwell, Adams, and Meiners (1990) analyzed Michigan Medicaid claims data and determined that individuals who had spent down constituted 27 percent of all Medicaid nursing home recipients. In this sample most (38.4 percent) spent down within 90 days of their initial admission, and only 10 percent required two or

more years. The importance of longitudinal data is evidenced in a study that found a strong correlation between the number of admissions and spend-down (Farbstein, Gruenberg, and Pattee 1990). Connecticut residents with more than one admission were approximately 3.5 times more likely to spend down than residents with one admission.

This article presents the results of a study of changes in payment source among a cohort of newly admitted nursing home residents, using a unique longitudinal data base (National Health Corporation—NHC) of all admissions to a chain of nursing homes that tracks residents through multiple admissions and identifies precisely when changes in source of payment occur. Using survival analysis methods, Cox regression, and survival trees, we describe the rate of conversion to Medicaid, contrasting the effect of state, initial payment source, and residents' health and sociodemographic characteristics.

METHODS

DATA SOURCE

The data used in this study come from regular assessments of residents in the National Health Corporation's (NHC) 43 for-profit nursing homes in Missouri (N = 9), Kentucky (N = 4), South Carolina (N = 5), and Tennessee (N = 25). Assessment records include sociodemographic data, diagnoses, physical functioning ratings, and the use of special treatments and services. These data are collected using a standard form completed at the time of admission and periodically thereafter. The actual date of a change in source of payment is recorded on the subsequent assessment. Assessments are reviewed for completeness by NHC corporate staff, and a 10 percent sample is audited quarterly by specially trained nurses. Reliability analyses of these data reveal high congruence between facility and reviewer staff.

This data base is an integral part of the NHC operational management system. Assessments are used within each facility to monitor resident status and to allocate staffing resources. At the corporate level the data base informs management decisions regarding the entire nursing home chain. Consequently, priority is given to obtaining high-quality data, particularly those data items related to resource allocation (e.g., payment source changes, level of care), functional status, and treatments.

The NHC data system also follows all discharged residents who have not returned to the same facility. Three months subsequent to all

live discharges, a telephone follow-up interview is completed. This follow-up focuses on events such as hospitalization, reinstitutionalization, or death that may have occurred since discharge from the nursing home. These follow-up data are incorporated into the NHC data system and included in our analysis.

The specific cohort used for this analysis consists of all newly admitted residents to an NHC home in 1982 or in 1984. A newly admitted resident is defined as one admitted from a place other than a nursing home (i.e., a hospital or the community) who was not a resident of that same facility during the previous year. The new admission cohorts were created by linking an admission record for a newly admitted resident with all of his or her subsequent assessments and follow-up records to ascertain dates of any payment source changes and other discharge transitions. This study examined records for up to three years following admission, that is, 1982–1984 or 1984–1986.

Representativeness of Sample. We compared the payer source mix at admission for the NHC new-admission cohort and short-term (< 30 days) discharges described in the 1985 National Nursing Home Survey (Sekscenski 1987). This group of relatively short-term stayers was selected for comparison in an attempt to minimize the differences between a newly admitted population and a resident population. We found that more patients are covered by Medicare in the NHC cohort (57.2 percent) than in the national discharge group (29.8 percent), and that there are more self-payers in the national group (42.5 percent) than in NHC (20.4 percent). Medicaid was the primary payer source for 22.1 percent of the national sample of discharges and for only 17 percent of NHC new admissions. Finally, "other" private and governmental sources accounted for about 5 percent of both samples. While the presence of individuals in the NNHS sample who are not truly new admissions but were readmitted from a hospital may account for some of the observed difference, it is clear that the NHC population is not perfectly representative of the nation. However, these data have three advantages: (1) information on residents' payment source transitions; (2) an array of patient characteristics at the time of admission for use in modeling spend-down; and (3) a high concentration of Medicare residents, allowing an examination of transitions from Medicare to private pay that is not possible in data from other sources due to the low Medicare rate nationally.

Hypotheses about Factors Affecting Spend-Down Rates. Aside from differences in policy implementation among the states, the rate of Medicaid spend-down and the probability of converting to Medicaid could be related to several other factors: patients' wealth and financial support

(assets, savings, and income, and support by relatives); health—the chronicity of the conditions that stimulated admission and the associated functional dependence; and eligibility for Medicare or other insurance support. We can measure some of these quite well in the NHC data set, while others can only be inferred.

Assets and social and financial support will influence the length of time during which a person can afford to pay privately for nursing home care. While the NHC data set has a wealth of clinical variables, there is a paucity of variables that can serve as proxies for wealth and social resources. Those variables that can be used are education, marital status, and age. Education can be used as a proxy for socioeconomic status among retirees because more educated persons are more apt to have been employed in a field likely to have a generous pension plan (particularly in an older cohort). Being married at admission means possibly fewer resources for the household to devote to nursing home expenses, since the existing household must be maintained.[1] Finally, older individuals among the elderly are less likely to have sufficient wealth to withstand ongoing nursing home charges since they can be presumed to have had a longer history of postretirement health care spending.

Chronicity is characterized by residents with multiple, interacting chronic diseases that in combination result in an overall debility and dependence in activities of daily living. Impairment level at admission is a proxy for the chronicity of the residents' physical health. Those whose conditions are more chronic may have incurred greater medical and long-term care costs prior to admission, suggesting that they will spend down more rapidly.

Medicare or other health insurance coverage at the time of admission can be expected to delay spend-down to Medicaid. As benefits associated with these insurance programs are exhausted, individuals may convert to private-pay status and then begin the spend-down process.

ANALYTIC APPROACH

We use survival analysis techniques to study the rate of conversion to Medicaid. For any resident initially admitted to a nursing home with any form of payment other than Medicaid, we measure the time until the "failure event" (the effective date on which the resident changed to Medicaid) occurred, or until a "censoring event" (death, permanent discharge from the nursing home, or end of the study period) took place.

As in any survival analysis, we have to be sensitive to the effect of

censoring. If the resident dies, or is discharged from the nursing home not to return to it, or is still in the nursing home with any other source of payment three years after admission, the time interval measured from initial admission until the time of loss to follow-up (or death) is defined as censoring time. Censoring due to the end of the study, and censoring due to loss to follow-up are independent of the failure event—conversion to Medicaid. Death, however, is not independent of the failure event, since death prevents a patient from converting to Medicaid. This means that our censoring process is not independent of our failure process.

In this study, we are interested in modeling the factors associated with the conditional event "converted by time T given survived past time T." Let A be the event "converted by time T," and B be the event "survived past time T." The total probability of conversion by time T can be computed by:

$$Pr(A) = Pr(A|B)\, Pr(B) + Pr(A|not\ B)\, Pr(not\ B).$$

But the probability of converting by time T given dying by time T is zero. Thus, the reported conditional probabilities are inflated compared to the total conversion probability. Nonetheless, the point of this study is to identify the factors associated with the (conditional) process of conversion to Medicaid, and to specify the size of their effects. Since this process is independent of the survival process, both model and estimates of the conditional process of conversion are appropriate.

Cox Proportional Hazards Regression. Proportional hazards regression is a semiparametric model where an unknown baseline hazard $\lambda_o(t)$ is estimated nonparametrically, and the regressors are assumed to have a multiplicative effect on the baseline hazard, so that the total hazard $\lambda(t|Z)$, Z being the covariate vector, is defined to be:

$$\lambda h(t|Z) = \lambda_o(t) \exp(B'Z)$$

Cox (1972, 1975) suggested a form of estimation of the regression coefficients B, by *partial likelihood.* The estimation of the regression coefficients allows one to infer the relative importance of the different covariates. However, this model assumes that the hazard rates between levels of variables are proportional. One way to test this assumption is graphically, by plotting the logarithm of the minus logarithm of the Kaplan-Meier survival estimates versus time, for the different levels of a variable, and ascertaining whether the curves are linear with a constant proportion (gradient) between each of the levels (Kaplan and Meier 1958). Other methods that have also been used are presented in Harrell (1986). In conducting our multivariate Cox survival regression, each regressor is first tested for proportionality.

Survival Trees. This method, described in detail in Intrator (1991), extends the Classification and Regression Trees (CART) methodology (Breiman et al. 1984) to survival analysis. Similar work has been reported by Segal (1988) and Gordon and Olshen (1985), and an interesting application was performed by Kwak et al. (1990). Survival trees are based on measures of the difference between survival distributions, such as the Mantel-Haenszel (Mantel 1966) log-rank test, or the generalized Wilcoxon test (Gehan 1965). Since such tests and CART are nonparametric, this method is completely nonparametric.

Binary variables, which can be created from any categorical, ordinal, or continuous variable by partitioning, are used in this method to produce a binary tree. Every node of the tree splits the data according to one of these variables; the splits closer to the root reflect a more prominent effect on the data. In this case the 'data' are the survival distributions estimated for each class of individuals. For example, if we have three possible determining covariates—sex, marital status (married or not), and age (classified as old or young)—we compute which of these variables has the largest effect (based on the log-rank test). If the largest effect is that of sex, then the females may be split by age group, while the males may be split by marital status. Since the split is determined by the variable with the maximal difference between the survival distribution of the two levels, then this tree structure suggests that sex is the first and most important variable; then among females age is important, while among males marital status is more important than age.

According to this method, also termed recursive partitioning, the entire sample is divided into subgroups that are defined by the resident characteristics (age, sex, marital status) that identify the subgroups most dissimilar with respect to the distribution of time to Medicaid conversion. We chose the log-rank test to split groups, since it facilitates comparison of the results of recursive partitioning with the Cox proportional hazards model.

At each node we test all of the available binary covariates. (All possible binary partition dummy variables were created.) The best split is that which rejects the test that the survival distribution is the same for two covariate levels with the lowest error (p-value); this corresponds to the highest chi-square value obtained. Partitioning stops when the number of patients in a node is too small, or the censoring rate too high, thus compromising the power of the log-rank test. After generating the tree, we prune it from bottom up in order to remove those branches that do not sufficiently improve node homogeneity, and may reflect sample specific bias. The pruning mechanism is discussed in detail in Intrator (1991).

Treatment of covariates in regression trees is different from the more traditional adjustment of a model for a covariate level. Once a covariate is entered into the model the analysis is split at that covariate value. For example, if sex is a predictor in the proportional hazards model, then all other variables have the same effect on both males and females except that the overall prediction is adjusted for sex. With survival trees we first split by sex, and may find that different variables in the covariate pool affect male and female "survival." The results of such graphic analysis are easy to read and interpret. Its drawback is that it does not quantify the additional risk of each set compared to a baseline population, as do parametric methods such as proportional hazards or logistic regression. Instead, it gives a full survival description per individual from the same covariate pool.

RESULTS

Table 1 describes the new-admission cohort by initial payment source. The age distributions of patients entering on Medicare or self-pay are similar, but those with an "other" source of payment are substantially younger, suggesting that they are covered by commercial posthospitalization policies. Most patients with an "other" source of payment are males who constitute only one-third of the other groups. Over 20 percent of the Medicaid population is under 65, but they are as likely to be over 85.

Education level is lower for patients entering on Medicare, and somewhat higher for patients entering as self-payers. About 30 percent of the self-pay group and Medicare admissions are married, whereas almost half of the "other" payer source group and fewer than a quarter of the Medicaid admissions are married.

Diagnosis is derived from either a primary or secondary diagnosis on the initial resident assessment. Medicare residents have a higher percentage of hip fractures or strokes. Residents with an "other" payment source also show a relatively high percentage of stroke, suggesting admission for rehabilitation. ADL level is defined as a hierarchical ranking of activities (toileting, dressing, bathing, transferring, and feeding, and also bladder/bowel functioning) according to the Katz Activities of Daily Living Score (Katz, Ford, Moskowitz, et al. 1963; Spector et al. 1987; Rosenstein, Spector, and Freiberger 1988). Patients coded as dependent or independent on the Katz scale score from 1 (less dependent) to 5 (more dependent). As expected because of coverage restrictions (i.e., patient requires skilled nursing), newly admitted Medicare

Table 1: Sample Description by Initial Payment Source

		Self-Pay (N = *1849*)	*Medicaid* (N = *1544*)	*Medicare* (N = *5189*)	*Other* (N = *492*)
Sex	Female	68.9%	65.4%	66.6%	9.4%
Age	<65	8.3	21.8	4.3	48.0
	65-69	5.4	6.5	9.3	16.1
	70-74	12.0	12.1	16.5	12.2
	75-79	20.0	18.3	22.0	6.9
	80-84	24.0	17.5	23.7	5.9
	85-89	19.6	15.7	15.5	7.3
	90+	11.1	8.3	8.7	3.7
Married	Yes	29.8	22.9	31.5	44.5
Living arrangement	Alone	29.6	17.6	27.5	23.2
Education	≤ 8th grade	15.2	23.7	35.4	20.7
	9-12th grade	21.2	12.8	5.0	20.1
	>12th grade	58.9	56.5	55.1	51.4
	Unknown	4.7	7.0	4.5	7.8
Diagnoses	Parkinson's	8.3	4.2	4.5	5.3
	Alzheimer's	5.5	5.0	2.7	3.1
	Hip fracture	3.8	3.9	16.1	2.8
	Stroke	14.1	20.0	32.2	27.4
ADL level	1	22.4	19.9	4.5	23.2
	2	26.2	23.8	24.8	16.9
	3	21.5	20.1	21.1	21.8
	4	14.7	15.3	16.5	16.1
	5	15.1	20.8	33.0	22.0
State	Kentucky	7.0	10.8	6.1	3.5
	Missouri	17.3	43.1	10.7	22.0
	South Carolina	7.9	10.8	7.6	9.2
	Tennessee	60.8	26.8	68.8	58.0
Length of stay, first discharge	Average (days)	144	198	90	162
	Median (days)	44	77	33	99

patients are more likely to be at the more impaired level (33 percent), and less likely to be at the least impaired level (4.5 percent). Tennessee residents comprise about 65 percent of the total cohort, but only 7 percent of these patients are on Medicaid at the time of admission. On the other hand, Missouri, which comprises about 20 percent of the total cohort, has about 40 percent of its patients entering on Medicaid. Missouri also has the highest nursing home bed capacity of the states in this sample.

Because this data set allows us to track patients through multiple discharges and readmissions, we can observe changes in their location

and/or in payment sources (status change). Two payment source and/or discharge transitions are described in detail below. While two transitions subsequent to initial admission characterize most persons, some individuals experience many additional transitions.

Table 2 presents two status (second and third) changes for the cohort of 1,849 patients who initially entered the nursing home as self-payers (initial status). Also presented are the median number of days (subscripts in Table 2) before the change in status occurred. As can be seen in the top part of the table ("Number in Second Status"), 587 residents (32 percent) were discharged to a hospital, 509 (27 percent) went home, and 174 (9.4 percent) moved to another nursing home. Payer status changed to Medicaid for only 119 members of the cohort (6.4 percent), after a median duration of 81 days in self-pay status. Only 47 (2.5 percent) members of the self-pay cohort changed to Medicare after a median duration of six days (presumably pending Medicare eligibility).

The bottom part of the table presents the breakdown of second status (columns) by the third status (rows). Of the 119 residents who initially converted to Medicaid, 42 (35 percent) remained on Medicaid until they were lost to follow-up, and 41 were discharged to a hospital after a median duration of 220 days. Of the 509 patients who went home, 346 (70 percent) remained there and were lost to follow-up; 85 (17 percent) returned to the initial nursing home as self-pay after a median duration of 130 days; 5.5 percent were hospitalized following a median duration of 41 days in the nursing home. Approximately 44 percent of the 587 patients who were initially discharged to a hospital returned as self-pay, while one-quarter (24 percent) died in the hospital. Most (96 percent) of the 174 patients who were initially discharged to another nursing home remained there for at least the three-month follow-up period.

Table 3 displays similar discharge and payer source transitions for the 5,190 individuals who were admitted to NHC nursing homes with Medicare coverage (initial status). The columns represent the second status, and the rows below the line represent the third status of individuals who were admitted with Medicare coverage. After a median stay of 20 days 1,159 patients (22 percent) were discharged to a hospital, and after a median stay of 29 days, 1,577 (30 percent) went home. Within the cohort of individuals who were admitted with Medicare coverage, only 541 (10 percent) converted directly to Medicaid after a median of 86 days; 558 (11 percent) converted to self-pay status after a median of 50 days.

The third status for the 1,577 individuals who were discharged

Table 2: Discharge and Payer Source Transitions and Durations for Self-Paying New Admissions, N = 1,849

	Remain Self-Pay	*Medicaid*	*Medicare*	*Other*	*Home*	*Hospital*	*Other Nursing Home*	*Death*
Number in Second Status	130_{554}*	119_{81}	47_{6}	2_{50}	509_{27}	587_{48}	174_{32}	281_{42}
Number in Third Status								
Self-Pay	—	6_{484}	11_{31}	1_{43}	84_{136}	257_{7}	2_{248}	
Medicaid	—	—	1_{100}	0	5_{165}	32_{9}	2_{429}	
Medicare	—	0	—	0	17_{236}	90_{10}	3_{416}	
Other payer	—	1_{244}	0	—	2_{204}	2_{14}	0	
Home	—	7_{72}	13_{32}	1_{60}	—	27_{9}	0	
Hospital	—	41_{220}	7_{16}	0	28_{41}	—	0	
Other nursing home	—	5_{351}	2_{46}	0	8_{25}	29_{11}	—	
Death	—	17_{163}	12_{53}	0	19_{10}	139_{3}	0	
Remain in second status	—	42_{487}	1_{155}	0	346_{100}	9_{100}	167_{100}	

*Subscripts represent the median number of days spent by residents in a particular status group.

Table 3: Discharge and Payer Source Transitions and Durations for Medicare New Admissions, $N = 5{,}190$

	Self-Pay	*Medicaid*	*Remain Medicare*	*Other*	*Home*	*Hospital*	*Other Nursing Home*	*Death*
Number in Second Status	558_{50} *	541_{86}	56_{142}	100_{100}	1577_{29}	1159_{20}	305_{33}	894_{17}
Number in Third Status								
Self-Pay	—	19_{20}	—	33_{61}	40_{243}	32_{9}	1_{396}	—
Medicaid	85_{88}	—	—	13_{80}	13_{181}	44_{8}	2_{536}	—
Medicare	10_{22}	6_{4}	—	1_{185}	126_{186}	512_{9}	10_{0}	—
Other payer	1_{131}	2_{61}	—	—	3_{130}	3_{9}	0	—
Home	132_{36}	84_{52}	—	18_{36}	—	105_{9}	0	—
Hospital	144_{83}	200_{130}	—	12_{76}	69_{37}	—	0	—
Other nursing home	54_{50}	40_{75}	—	9_{92}	18_{22}	74_{13}	—	—
Death	66_{81}	100_{132}	—	11_{113}	39_{19}	368_{3}	0	—
Remain in second status	65_{418}	90_{566}	—	3_{118}	1269_{100}	19_{100}	292_{100}	—

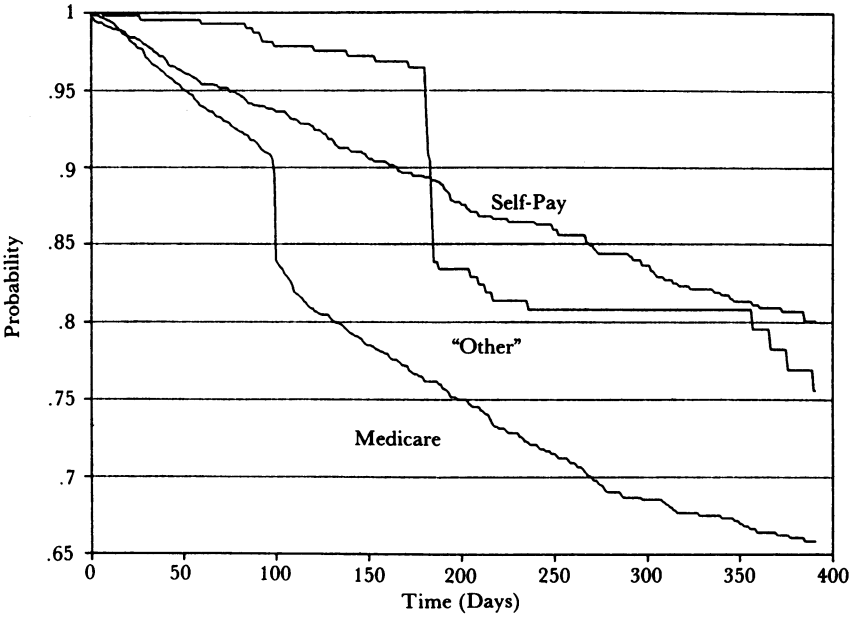
*Subscripts represent the median number of days spent by residents in a particular status group.

home totaled 1,269 (80 percent) who remained at home, 8 percent (N = 126) who were readmitted to the same nursing home with Medicare coverage after a median duration of 186 days at home, and 4.4 percent (N = 69) who were admitted to a hospital after a median of 37 days at home. Of the 1,159 patients whose first transition (i.e., second status) was discharge to a hospital, 512 (44 percent) returned to the original facility on Medicare after a median duration of nine days in the hospital; and 368 (32 percent) died in the hospital after a median stay of three days. Of the 541 residents who converted directly to Medicaid, 90 (17 percent) remained on Medicaid; 200 (37 percent) were discharged to a hospital after a median Medicaid stay of 130 days; and 84 (16 percent) went home after a median of 52 days on Medicaid. Of the 558 patients whose first transition was to self-pay status, 144 (26 percent) were discharged to a hospital after a median duration of 83 days; 85 (15 percent) converted to Medicaid after a median of 88 days; 132 (24 percent) went home after a median stay of 36 days; and 66 (12 percent) died after a median of 81 days. Approximately the same number remained self-pay and were lost to follow-up.

Kaplan-Meier Survival Curves. The size of the sample available for analysis of changes varies over time due to discharge, death, and loss to follow-up. There were 1,849 individuals in the cohort who were classified as self-paying at the time of their initial admission to the nursing home. Sixty percent of this group remained in the nursing home 30 days past admission, but only 34 percent remained at 90 days. At six months 23 percent remained, and after one year only 14 percent had not been censored. The size of the cohort of 5,189 individuals who were admitted on Medicare also changed dramatically over the course of one year. By 30 days only 54 percent remained in the facility, and by 90 days this figure had dropped to 24 percent. At six months only 12 percent remained, and after one year only 7 percent remained in the nursing home.

The number of residents followed in the overall cohort decreases sharply—from 9,000 residents at the beginning of the study to approximately 6,500 after 30 days, 3,500 after 90 days, and 2,700 by the first half-year. Figure 1 presents probabilities of conversion to Medicaid for the total new admission cohort split by initial payment source. Survival analyses consider only those person days that occur before a censoring event such as death or discharge home. The survival distribution for self-pay residents is smooth, and the probability of conversion to Medicaid decreases at a steady rate to about 19 percent after one year. Uncensored Medicare admissions experience a significant additional hazard of converting to Medicaid at day 100, increasing the probability of conversion

Figure 1: Kaplan-Meier Survival Distribution Estimates of Conversion to Medicaid by Initial Payment Source



from around 8 percent just before day 100 to approximately 18 percent just after day 100 (when the Medicare nursing home benefit expires). After day 100 the survival curves of initial self-pay and Medicare admissions are largely parallel. For residents entering with private insurance (any other), the probability of converting to Medicaid increases from approximately 3 percent at day 170 to approximately 17 percent at day 185; this may be when the benefits offered by these private policies are exhausted.

The dramatic increase in the hazard of Medicaid conversion at 100 days among Medicare beneficiaries reflects the powerful effect of coverage and eligibility policy. The median days of Medicare coverage before Medicaid conversion was 86, two weeks shy of the maximum benefit. Clearly, these three payment source levels do not fit the proportional hazards assumptions. Given these factors and the possibility that a substantial proportion of the 541 individuals who converted directly to Medicaid from Medicare may have been dually eligible for both programs at entry, we chose to limit further analyses of the factors associated with Medicaid conversion to the private-pay population.

Cox Proportional Hazards. We computed a Cox proportional hazards model using the stepwise (forward) procedure of selection of covariates in PROC PHGLM. All hypothesized variables were entered into the model. All variables were tested for proportionality using SAS PROC PHGLM (Harrell 1986) "Z:PH" statistic, and were found to maintain the proportionality assumption at the 10 percent level. An analysis of the residuals, as discussed in Kalbfleisch and Prentice (1980) indicates that the model fits the data quite well except for the larger residuals. Estimates of the regression coefficients are presented with their adjusted odds ratio (AOR) and the 95 percent confidence interval of the AOR. An AOR greater than 1.0 signifies an increased rate of conversion to Medicaid, while an AOR less than 1.0 means the covariate is associated with a reduced risk of conversion. The reference group for estimation of relative odds is 77.8-year-old residents who live in Missouri, South Carolina, or Kentucky, and who have no more than eight years of formal education. For these individuals, the probabilities of converting to Medicaid (conditional upon surviving that long) are 10.2 percent by 60 days, 12.9 percent by 90 days, 23.1 percent by 180 days, and 39.4 percent by one year.

Table 4 reveals that having more than an eighth grade education reduces the risk of converting to Medicaid by .44, and having at least a college education reduces the risk by an additional .55. Standardized age reduces the risk of conversion by .82 for every standardized year above the mean age of 77.8 and increases the risk of conversion by .23 for every standardized year below 77.8. Living in Tennessee reduces the risk of conversion by approximately .56. Thus, even controlling for education and age, the risk of converting to Medicaid for individuals who enter NHC nursing homes in Tennessee as self-payers is reduced by one-half compared to similar non-Tennessee residents in this sample.

We entered other variables into the model (e.g., sex, ADL level,

Table 4: Estimated Regression Coefficients for Cox Proportional Hazards Model

Variable	*Coefficient*	*ST.D. Coefficient*	*Adjusted Odds Ratio*	*95% Confidence Interval of Odds Ratio*
>8th grade	-.81	.16	.44	[.32, .61]
Tennessee	-.57	.140	.56	[.42, .74]
(Age - 77.8)/10*	-.20	.07	.82	[.71, .93]
≥College	-.59	.25	.55	[.34, .90]

*Standardized age for this sample - mean age = 77.8 years; standard deviation = 10 years.

married, living alone prior to admission, and diagnoses—Alzheimer's or Parkinson's disease, stroke, or hip fracture). These variables were not significantly predictive of conversion to Medicaid (at 95 percent) in this sample of private-pay admissions after considering the other factors.

Survival Trees. Figure 2 presents the final pruned tree created from the entire sample and pruned in an exploratory fashion. Education, which has a monotonically increasing effect on spend-down, has a greater influence on the tree structure than do other variables. If education is no higher than the eighth grade, then the greatest difference in the Medicaid conversion rate is detected for individuals in Tennessee or Kentucky versus the other states (node 1). Within Tennessee or Kentucky, age greater or less than 80 years is the next strongest predictor (node 3). If education level is higher than eighth grade, the first split is Missouri versus non-Missouri (node 2); those not in Missouri are further split by initial ADL level (node 6), and the more dependent residents (ADL = 3, 4, 5) are then split by age (node 10).

Figure 3 provides estimated probabilities of conversion to Medicaid by day 60, 100, 180, and 365 for residents in the terminating nodes labeled by capital letters A–G. Probabilities of each node are estimated by the Kaplan-Meier method. The less educated individuals (nodes A–C) have strikingly higher conversion probabilities. Tennessee and Kentucky residents (nodes A and B) have lower conversion probabilities than residents in Missouri and South Carolina (node C). Among the less educated group of residents in Tennessee and Kentucky, those who are over 80 years of age (node A) are less likely to convert to Medicaid than

Figure 2: Survival Tree for Conversion to Medicaid (Numbers in Nodes = Sample Size at Node; Capital Letters = Labels of Terminal Nodes)

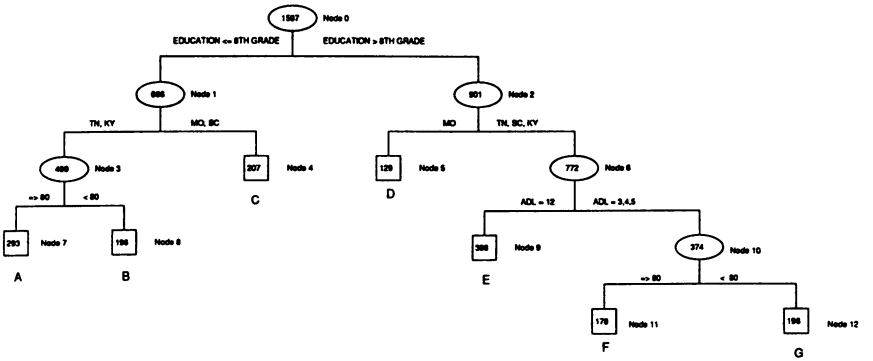
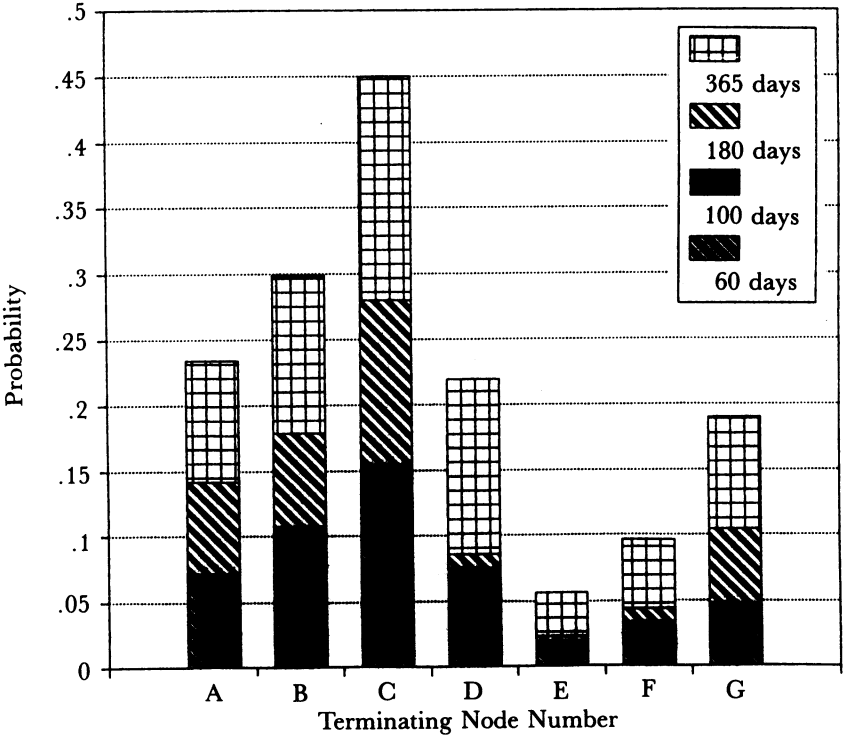


Figure 3: Probabilities of Conversion to Medicaid by 60, 100, 180, and 365 Days from Initial Admission for Individuals in Each Terminal Node



their younger counterparts are (node B). Among the more educated group of residents, Missouri residents are more likely to convert to Medicaid (node D) than are non-Missouri residents. When functional status is considered for the latter group, we see that less dependent individuals are less likely to convert (node E) than their more dependent counterparts are (nodes F and G). Within the dependent group, older patients are less likely to convert (node F) than are their younger counterparts (node G).

DISCUSSION

Using a unique longitudinal data set of new admissions to the National Health Corporation chain of nursing homes in four states, we tracked

residents through multiple transitions of primary payer source and discharge destination over a two-year period. We examined the rate of Medicaid conversion and its associated factors for the periods 1982–84 and 1984–86. Consistent with other studies, we found that most individuals do not remain in the nursing home long before returning home, being hospitalized, or dying. While the timing of these transitions varies somewhat by initial payer source (e.g., Medicare, private pay, etc.), our data demonstrate the transitory nature of nursing home use among initial admissions.

When we examined up to three transitions (payment and discharges) made by the 1,849 residents who were initially self-paying, we found that 8.6 percent converted to Medicaid; for those admitted under Medicare, this figure was 13.4 percent. Despite the substantial differences between the NHC population and the national profile of nursing home residents, our estimates are quite comparable to those developed elsewhere. Liu, Doty, and Manton (1990), who analyzed initial and discharge payment source in the National Nursing Home Survey, found that only 7 percent of all discharges switched to Medicaid. Also, using the 1985 NNHS and excluding Medicaid admissions, Sekscenski (1987) reported that during a given nursing home stay 9.7 percent of initially private-pay admissions convert to Medicaid, while this was true for 15.3 percent of Medicare patients. The longer the duration of the nursing home stay, the higher the proportion converting to Medicaid (e.g., 18.9 percent and 51.9 percent of private-pay and Medicare patients, respectively, for lengths of stays greater than six months).

Estimates of nursing home spend-down are sensitive to the duration of the observation period, whether multiple stays can be linked or not, and to the mix of payers in the admission cohort. Previous empirical studies agree that the proportion of all private-pay nursing home admissions that spend down is fairly low because most people do not remain in nursing homes very long. However, the ability to track patients over multiple admissions is crucial if we want to estimate the rate of spend-down for various groups of long-term institutionalized residents. Relying only on the NNHS, even the synthetic linked stays developed by Rice (1989) might lead one to underestimate the magnitude of spend-down because so many individuals are discharged and readmitted.

The survival approach used in this article, and by Gruenberg, Farbstein, Hughes-Cromwick, et al. (1989), provides an important additional perspective that has heretofore been missing, precisely because we were able to link different admission episodes. The Gruenberg study represents the longest view of Medicaid conversion available to date and has the advantage of limiting "censoring" due to patients'

changing nursing homes. Using a life-table model, they estimated that 22.5 percent of all admissions would convert to Medicaid within one year, and that after two years this figure would be 38.4 percent. Using the same data set, Liu and Manton (1991) recently estimated the incidence of spend-down and the duration of time in a nursing home before spend-down. Rather than using person-specific time to spend down, which requires linking multiple admissions and payer source transitions, they focused on individual admission episodes. Among non-Medicaid admissions they found that the median time to spend down was 11.2 months, and that this occurred for 14.4 percent of the population.

Our study used a survival approach that included intervening readmissions to generate separate estimates of the Medicaid conversion rate for Medicare versus private-pay admissions. We estimated that 35 percent of new Medicare admissions and 19 percent of new private-pay admissions who remain in a facility for one year will convert to Medicaid. These estimates are conditioned on survival. Indeed, all estimates reported to date, using marginal or survival-based approaches, ignore the competing risk of death. Simple estimates of the one-year conversion rate include all cases in the denominator, meaning that estimates will be low if discharge rates are high. Survival-based estimates ignore "informative censoring" (nonrandom attrition), yielding estimates that are high, unless adjusted for the probability of survival. What the "true" spend-down rate is may depend on the question being asked.

Given these obvious insurance policy effects, we chose to concentrate our analyses of the spend-down process on those persons admitted to the nursing home as private-pay. We used the Cox life-table regression approach to model the effect of background and health status factors, as well as state Medicaid policies, on the rate at which private-pay residents converted to Medicaid.

We found that education was the single strongest predictor of conversion. The education variables are proxies for assets and income in this sample. In the absence of direct measures, we hypothesized that individuals without any high school education would have few assets and limited retirement income, while those with at least a high school education may have a retirement income sufficiently large to keep them from having to liquidate their assets on an ongoing basis to pay the nursing home daily rate. This interpretation is consistent with the fact that the rate of Medicaid conversion among those with some high school education was less than half that of those with no high school. College-educated admissions had an additional 45 percent reduction in their Medicaid conversion rate. The strength of both of these educational

attainment indicators in the model remained even after controlling for state of residence and age.

Physical functioning at admission was not strongly related to the likelihood of Medicaid conversion among those admitted as private payers. Bivariate log-rank analyses did reveal, however, that those impaired in all ADLs had the highest rate of conversion, while those with few impairments were the least likely to convert to Medicaid. These results discount the effect of the censoring that occurs due to death, which is also related to functional status at admission. This finding is consistent with the interpretation of Liu and Manton (1991) as well as Rice (1989), who suggest that spend-down due to extensive hospital copayments and long-term care expenses has already begun in the community and is merely accelerated upon nursing home admission. This suggests that physiological condition as measured by ADL level on admission is an indicator of the chronicity of the underlying illnesses that lead to institutionalization.

Tennessee nursing home residents were about one-half as likely to convert to Medicaid as were residents in the other three states. This may be related to this state's Medicaid eligibility rules, which appear to be more restrictive for nursing home residents than are such rules in Missouri, Kentucky, or South Carolina. Nursing home residents in Kentucky and Missouri become eligible for Medicaid through medical expense spend-down, in which medical expenses (including the nursing home daily rate) are deducted from income, allowing the individual to qualify for Medicaid. "Medically needy" programs were not operating in South Carolina's and Tennessee's Medicaid programs during the period covered by this study; these two states relied on a special income standard for institutionalized individuals. Although it is not clear that the latter program is stricter than the medically needy program, the special gross income standard does impose an absolute limit on gross income, a requirement that seems rigid and restrictive. Individuals earning more than the special income standard are not eligible for Medicaid under this program regardless of the amount of their medical expenses.

Tennessee residents had to satisfy an additional requirement to become eligible for Medicaid under this program: an individual's net monthly income must be less than the monthly Medicaid nursing home rate. While this factor alone might not significantly distinguish Tennessee from other states, the fact that the spousal support allowance in Tennessee (prior to enactment of the Medicare Catastrophic Coverage Act of 1988—MCCA) was one of the lowest in the United States must also be considered. This very restrictive spousal support allowance could have had direct and indirect implications for Medicaid conversion rates.

As one of the major allowable exclusions from gross income, a small spousal support allowance could cause a number of potentially Medicaid-eligible individuals in Tennessee to fail the net income test. A more indirect but equally important result of the restrictive allowance could have been the reluctance of couples to consider applying for Medicaid and impoverishing a spouse except under extreme circumstances. If spousal support considerations delay or prevent conversion to Medicaid, we may see in future research an increase in the rate of spend-down for the period following the enactment of the more generous spousal support provisions of the MCCA (effective September 30, 1989).

The effect of payer source on the rate of Medicaid conversion provides a clear picture of the effect of limits of existing forms of coverage. Once Medicare eligibility expires at around 100 days, the hazard rate of conversion temporarily increases dramatically but then levels out at a rate comparable to the underlying private-pay hazard rate. Medicare admissions whose first transition is to Medicaid, without any intermittent discharge home or to the hospital, constitute 10.7 percent of all Medicare admissions and have a median number of 83 covered days. Policy changes that expand the number of covered nursing home days would delay the conversion to Medicaid and thus would reduce the state's obligation for long-term care. Our data do not provide much support for the contention that current Medicare policies significantly delay Medicaid conversion among those who are admitted under Medicare and transfer to private pay. This may be because Medicare copayments are relatively high, so that exclusive reliance on private-pay resources has only a marginal influence on spend-down.

Our use of two multivariate strategies to explore the factors associated with Medicaid conversion provides an added explanatory dimension to the analyses. The effects of education, age, and state of origin were dominant using both approaches. Function provided added differentiation in the regression tree approach. The congruence of the tree structure approach with the Cox multivariate proportional hazards model serves to partially validate the proportional hazards model and greatly enhances its interpretation. Indeed, the advantage of the tree structure is that it clarifies the effect of several variables by using them to define homogeneous groups of individuals, making it possible to identify those groups with the greatest or least likelihood of converting to Medicaid.

Our study adds to the current literature on Medicaid spend-down in several ways. First, like the Connecticut Registry, the NHC data base makes it possible to link the same patient between multiple admissions

and discharges as long as he or she is in the same facility. While this restriction does limit our generalization, only about 10 percent of Medicare and private-pay patients were transferred to another facility within the first three transitions. As in the Connecticut Registry and Michigan Medicaid data, we were able to identify exactly when conversion occurred, facilitating a survival analytic approach. Since the Connecticut data have been used successfully to determine the rate of spend-down in a population of nursing home admissions who have been tracked throughout the state over an eight-year period, their estimate is the most complete to date. Our analysis makes an additional contribution to this literature by examining the determinants of the rate of conversion based on patients' characteristics upon admission.

Future research should track the new-admission cohorts we studied for a longer period of time and, if possible, link these records with Medicaid files to determine whether the 10 percent of patients who left an NHC home for another nursing facility converted to Medicaid. Furthermore, our interpretation of the effect of high and low education levels on conversion rates needs to be tested with more complete information on household income and assets. Securing this type of information is difficult because some families reportedly try to divest themselves of assets. However, only by understanding the dynamics of spend-down both in the nursing home and in the community will we be able to make informed policy recommendations regarding any appropriate alteration of the long-term care policies of Medicare or the states.

NOTES

1. The impoverishment of the community spouse that frequently accompanied an institutionalized spouse's attainment of Medicaid eligibility was a policy concern that was addressed in the Medicare Catastrophic Coverage Act of 1988. Spousal impoverishment provisions, which went into effect on September 30, 1989, allow the community spouse of a Medicaid resident to retain assets and income that previously would not have been available. The period for this study *preceded* enactment of the spousal impoverishment provisions.

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