Scripps Gerontology Center

Scripps Gerontology Center Publications

Miami University *Year* 2001

Predicting nursing home length of stay : implications for targeting pre-admission review efforts

Shahla Mehdizadeh* Robert Applebaum†

Jane Straker‡

*Miami University, commons@lib.muohio.edu

†Miami University, commons@lib.muohio.edu

‡Miami University, commons@lib.muohio.edu

Predicting Nursing Home Length of Stay: Implications for Targeting Pre-Admission Review Efforts

Shahla Mehdizadeh, Ph.D.
Robert Applebaum, Ph.D.
Jane Karnes Straker, Ph.D.

Scripps Gerontology Center
Miami University, Oxford, Ohio

Technical Report Series
2-01
February 2001

ABSTRACT

The work for this paper grew out of an evaluation of Ohio's efforts to modify the state's approach to delivering long-term care. As part of that study we examined length of stay for those individuals ultimately admitted to a nursing home. A cohort of newly admitted nursing home residents was tracked for two years using the nursing facility minimum data set (MDS+). We found that during the first six months a large proportion of residents are released from nursing homes back to the community. After nine months almost all discharges were the result of death. By using demographic, functional, behavioral characteristics, payment source and the setting that the residents were referred from, the paper predicts the resident length of stay. Because Ohio and most other states are attempting to screen residents prior to nursing home admission, this finding can have important implications for state and federal policy.

Introduction

As a result of rising Medicaid expenditures, an increasing older population, and concerns about the quality of care in nursing homes, both the federal government and the states have attempted to alter their approaches to delivering long-term care. Strategies have included a range of initiatives, such as an expansion of in-home services, a moratorium on nursing home construction, reimbursement for informal caregivers, the development of assisted living and congregate housing with services, and the implementation of alternative payment systems for nursing homes.

One of the common state reform activities involves the effort to control access to nursing homes through a pre-admission review process. Efforts to develop a pre-admission review began during the 1970s. At that time nursing homes were used as both health care settings and retirement housing, and several studies indicated that as high as 40% of residents were inappropriately placed in nursing facilities (Seidl et al., 1983). As a response, experts suggested that a review prior to admission to a nursing facility would help ensure that individuals would find the most appropriate setting. By the end of the 1970s about half of the states had developed some type of pre-admission review system. As home care expanded and more pressure was placed on state Medicaid budgets the interest in pre-admission review programs increased. By 1983 the number of states implementing a program had risen to 42, and by 1990 every state had a program in place (Harrington and Curtis, 1996). Thirty-one of the states complete the review prior to nursing home entry, while the remainder complete a review immediately after admission (Snow, 1995).

Although the nursing home pre-admission review is designed to ensure that only those individuals who meet eligibility criteria are allowed admission, little is known about the effectiveness of these programs. In fact, despite being implemented across the nation, there is only limited information about such efforts. For example, when asked in a national survey, a majority of states were unable to report either the number or rate of denials by the pre-admission review program or the costs of such a review (Harrington & Curtis, 1996; Pepe et al., 1997). This paper examines issues surrounding the effectiveness of pre-admission review, with a particular emphasis on using research evidence to improve state efforts in this area.

Study Background

This study is part of larger evaluation effort completed to examine the pre-admission review process in the state of Ohio. In 1993, the state enacted legislation that required individuals requesting long-term care services to be evaluated for eligibility and appropriateness of placement prior to admission. The policy assumes that consumers and their families should have access to information about long-term care services before making a decision about the location and type of services they would receive. An in-person assessment is required for all nursing facility applicants living in the community, and for select hospital and nursing home applicants. The remaining applicants are subject to a record review. The primary goals are to assure

functional eligibility and to identify potential nursing facility applicants who could be "diverted" to community-based care settings prior to admission.

Ohio's pre-admission review implementation included an evaluation component. Results from this study presented a mixed review of the effort (Applebaum et al., 1995). The evaluation found the process to be administered efficiently and useful in providing decision-making information to long-term care applicants, particularly those living in the community. The reviews were completed quickly, and hospitals and nursing homes had few complaints about the process. Consumers and their families reported high levels of satisfaction with the review process. On the other hand, the evaluation identified three key factors that affected the initial program as implemented: the number of pre-admission reviews was higher than anticipated; individuals admitted to nursing homes stayed for a shorter time period than expected; and there were few pre-admission review denials.

The pre-admission review was initially implemented with individuals requesting Medicaid funded long-term care. All individuals requesting nursing facility admission must also undergo the federally required pre-admission screen for mental health needs. In 1994, Ohio had 79,500 applicants for nursing home care. A majority (57.1%) of these individuals were in hospitals. About one-quarter of the applicants were already residing in nursing homes, and either required Medicaid assistance or were moving to another nursing facility (3.2%). The remainder, about 14%, were individuals from the community. With just under 95,000 nursing home beds in Ohio, this volume of pre-admission reviews was higher than expected; and because it was necessary to complete them in a timely manner, adequate staffing was essential in order to successfully implement the program.

As evidenced by the volume of reviews, the length of stay data indicate that, for many who were screened, nursing home care was not necessarily long-term care. A review of nursing home admissions to Ohio facilities in 1994 found that 47% of all those admitted were no longer in the nursing home after three months; and after six months almost six out of ten (59%) of those admitted were no longer residents (Mehdizadeh, Applebaum, Straker, 1997).

The number and rate of pre-admission review denials was low. For example, of the almost 9,000 Medicaid applicants to nursing homes from hospitals in 1994, 29 or .32% were denied admission based on the pre-admission review, and about one-third of these were reversed on appeal. The denial rates for those in nursing homes (.71%) and those in the community (.95%) were also under one percent.

The cost of the pre-admission review process was estimated at $300 for an in-person review and $32 for a record review. Given, these cost estimates, the high volume of referrals, the short length of stay for residents, and the low number of denials, the program could become more efficient if it were better able to target pre-admission screening resources. To this end, this paper will examine the characteristics of those admitted to nursing homes, with an attempt to identify those who are likely to be long stayers. If the pre-admission review process were able to

concentrate its efforts on individuals with a long length of stay, it could maximize the cost-effectiveness of the program.

Study Approach

To address the issue of targeting we identified three key questions to be examined in the study:

(1) How do resident stay patterns differ by referral setting and payment source?

(2) In what ways and to what extent do demographic and functional characteristics and care needs differ between long and short stay residents?

(3) Can we predict at admission who will be a short stay resident, and who will become a long stay resident?

The data for this study came from two statewide databases: the Pre-Admission Review (PAR) database created by the PASSPORT (Ohio's 2176 Medicaid waiver home and community care program) Administrative Agencies and compiled by the Ohio Department of Aging, and the Nursing Facility Case Mix Assessment Instrument: Minimum Data Set Plus (MDS+) from the Ohio Department of Human Services.

Ohio's Pre-Admission Review (PAR) database was started in January 1994. Information about the long-term care applicants' requested long-term care setting, the location of the applicants at the time of referral, and their payment status is recorded. Applicants requesting Medicaid payment for their long-term care services receive additional financial and functional eligibility assessments. Each record represents an application review. An applicant can appear several times in the PAR database.

The Ohio Nursing Facility Minimum Data Set Plus (MDS+) contains assessment data for residents in Medicaid certified facilities. Data are collected for each resident in a Medicaid certified bed who is physically present in the facility on the last day of each quarter. In addition, the facilities assess residents who are temporarily absent but are paying for a bed to be held (for example, those who are out for hospital stays, visits with friends or relatives, or participation in therapeutic programs). Only those residents who entered the facility and are still there at the end of the quarter will be present in each quarterly database. Short stay residents, who may have entered a nursing facility and left within the same quarter, are not represented in this database. Data on demographic characteristics as well as physical and mental functioning are included in this database.

To examine the length of stay of the new nursing facility residents, and to determine where residents came from prior to admission we combined data from these two sources. Residents

were then examined over a two year time period for the length of stay analysis. Date of discharge is not included in Ohio's Nursing Facility Minimum Data Set.

To estimate date of discharge we identified those discharged during each quarter by not finding them in the subsequent quarterly MDS+ database. A three months mapping of daily admissions showed that the admission patterns were very similar for comparable days of the week, throughout the entire three months. To predict length of stay in number of days we assumed that discharges mirror admissions and were randomly distributed over the 90 day quarter.

Findings on Resident Length of Stay

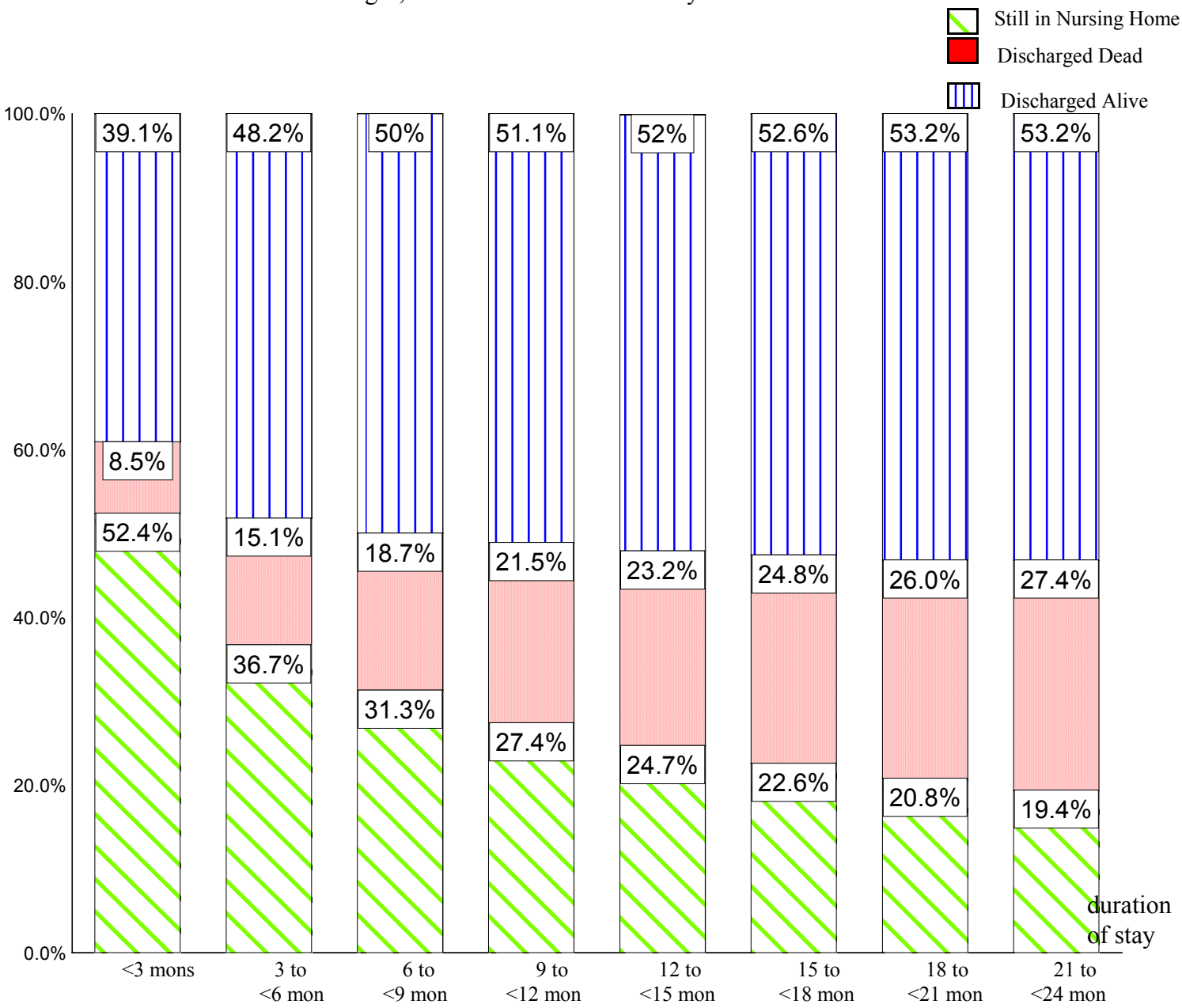
Figure 1 presents the length of stay patterns for newly admitted residents to Ohio nursing homes in 1994. As noted earlier, 47% of residents were no longer there after three months, and almost 60% were no longer residents after six months. The rate of discharge/death slows considerably after the initial six months, and after one year 72% of those admitted were no longer residents. The majority of those discharged returned to the community, although about one-fifth of discharges over the one year time period were due to death.

Nursing home applicants came from three referral settings: hospital, community, or nursing home. About 6 of every 10 referrals came from a hospital setting and of all referral sources this group had the shortest length of stay. Half of those admitted to nursing homes from the hospital were no longer residents at the end of the first quarter, two-thirds were no longer residents after six months, and more than three quarters were no longer there at the end of one year (See Table 1).

Individuals entering a nursing facility from the community also had high rates of discharge, although lower than hospital applicants. As shown in Table 1 the proportion of individuals that were no longer residents after the first three months was 39%, after six months about half of the residents no longer remained, and after one year 59% were discharged. As might be expected those already in a nursing facility, but either changing payment status or moving to a different nursing home, had a longer length of stay. After three months 94% of this group remained, and after one year two-thirds of this group continued to be nursing home residents.

Figure 1

Percent Distribution of Nursing Home Discharges, Deaths and Duration of Stay



Source: Ohio's MDS+ database, 1994 to 1996.
Ohio's Vital Statistics, Mortality Data.

Table 1

Percent Distribution of Nursing Home Discharges by Setting and Length of Stay

Time of Discharge	Admitted From Community	Admitted From Hospital	Admitted From Nursing Home to a New NF
	(Percent)	(Percent)	(Percent)
Less than 3 months	39.0	50.5	6.2
Less than 6 months	49.5	67.8	15.9
Less than 12 months	58.6	77.1	33.5
Less than 18 months	64.7	81.5	46.0
Less than 2 years	68.7	85.2	56.0
Population	3,211	9,995	1,148

Source: Ohio's MDS+ data base 1994 to 1996.

Demographic and Functional Differences between Long and Short Stay Residents

The comparison of the demographic characteristics of those who stayed a very short time, one quarter or less, with those who stayed into the fourth quarter, showed that short stay residents are younger, (33% of short stayers over age 85 versus 42%) are more likely to be male (37% of short stayers versus 29%), more likely to be married (26% of short stayers versus 20%), and are less likely to have come from another long-term care facility (8% of short stayers versus 16%) (See Table 2). As anticipated Medicare is the primary source of payment for the short stay residents (57% versus 35%), while Medicaid was the dominant payer for longer stay residents, (40% long stayers versus 25%). The growth of Medicare as a funding source was demonstrated by the finding that over one-third of the long stay resident group received Medicare support during their initial quarter.

When we examined the functional characteristics by length of stay we found that the short stay residents are more impaired at admission than the long stay residents. Each of the activities of daily living showed higher levels of disability for the short stay group with the largest differences recorded in transfer (79% versus 64%), locomotion (75% versus 60%), bed mobility (59% versus 45%), and using the toilet (81% versus 71%), (See Table 3). Among the long stay residents there was more cognitive impairment (55% versus 40%).

Another indicator of level of disability is the Resource Utilization Groups (RUGS) score for these residents. The RUGS score create an index representing the intensity of care that an individual needs based on physical, functional, and behavioral characteristics. As displayed in Table 4, a higher percentage of short stay residents were classified as in need of extensive care (5.6% versus 2.1%). Twice as many of the short stay residents were identified as needing rehabilitation services and a higher percentage needed special care. On the other hand a smaller proportion were identified as complex, impaired, or having physical problems. The need for extensive care and rehabilitation among the new applicants appears to be additional evidence of the effects of the hospital prospective payment system on nursing homes.

Table 2
Comparison of the Demographic Characteristics of Ohio's Newly Admitted Nursing Home Residents at the End of the 1st Quarter of Their Admission by Length of Stay

	1 Quarter	2 Quarters	3 Quarters	4 Quarters
Age	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**
=<45	2.6	3.8	2.0	2.4
46-59	5.1	5.4	3.7	3.4
60-65	4.4	3.8	3.7	3.1
66-74	18.3	16.3	15.7	13.4
75-84	37.0	36.3	36.5	36.1
85-90	19.5	20.9	21.9	23.5
90+	13.1	13.4	16.5	18.0
Average Age	77.8	77.7	79.4	80.0
Gender				
Male	37.1	38.2	36.0	28.6
Female	62.9	61.8	64.0	71.4
Race				
White	89.6	87.9	86.9	89.3
Nonwhite	10.4	12.1	13.1	10.7
Marital Status				
Never married	9.8	12.7	9.9	10.5
Married	26.0	26.5	26.3	20.4
Widowed/Divorced/Separated	64.2	60.8	63.8	69.1
Previous Living Arrangement				
Lived alone				
No	57.0	59.3	62.5	55.0
Yes	35.5	28.5	25.7	28.7
In another facility	7.5	12.1	11.8	16.3
Payment Source				
Medicaid	24.9	35.0	37.7	39.9
Medicare	57.9	43.4	40.9	35.0
Self/Insurance pay	17.2	21.6	21.4	25.1
Referral Setting				
Community	550	194	153	1,391
Hospital	2,799	725	476	2,473
Nursing Facility	191	88	83	813
Population	3,540	1,007	712	4,677

[a] Percentages are adjusted to reflect only those residents for whom information was available on each variable.
Source: Ohio's MDS+ database for 1994.

Table 3
Comparison of the Functional Characteristics of Ohio's Newly Admitted Nursing Home Residents at the End of the 1st Quarter of Their Admission by Length of Stay

	1 Quarter	2 Quarters	3 Quarters	4 Quarters
Activities of Daily Living (ADL) Needs assistance in:	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**
Bathing	93.9	93.3	94.7	92.5
Dressing	86.2	83.9	87.2	81.5
Transfer	79.4	71.8	75.1	63.8
Toileting	80.5	77.6	80.6	71.2
Eating	34.4	33.4	38.8	29.0
Grooming	82.0	83.1	84.7	80.6
Bed Mobility	58.5	54.9	54.6	44.6
Locomotion	75.2	67.0	71.9	60.0
Number of ADL Impairments[b]				
0	4.7	5.8	4.1	6.0
1	4.7	5.4	5.7	8.1
2	4.1	4.4	4.0	5.4
3	6.5	7.4	6.4	9.4
4	8.9	9.8	7.8	11.2
5	38.2	35.5	36.2	32.7
6	32.9	31.6	35.9	27.2
Average ADL Impairments	4.6	4.4	4.6	4.2
Incontinence				
Bladder or Bowel	41.1	47.0	48.5	45.9
Cognitive Impairment	39.6	50.0	54.5	55.2
Population	3,540	1,007	712	4,677

[a] Percentages are adjusted to reflect only those residents for whom information was available on each variable.
[b] Only the first six activities from the list above were included.
Source: Ohio's MDS + database for 1994.

Table 4
Comparison of the Resource Utilization Grouping (RUGS) of Ohio's Newly Admitted Nursing Home Residents at the End of the 1st Quarter of their Admission by Length of Stay

	1 Quarter	2 Quarters	3 Quarters	4 Quarters
Resource Utilization Group (RUGS)	**(Percent)**	**(Percent)**	**(Percent)**	**(Percent)**
Extensive	5.6	5.0	2.8	2.1
Rehab very high	11.9	8.4	9.3	4.4
Rehab high	7.3	4.8	3.4	3.5
Rehab medium	12.4	10.1	9.3	7.8
Rehab low	1.3	1.4	1.0	1.4
Special care	11.5	10.5	12.4	7.4
Complex	35.7	37.9	40.5	39.6
Impaired	3.5	7.5	7.6	14.2
Behavioral	0.3	0.7	0.3	0.9
Physical	10.5	13.8	13.5	18.8
Population	3,540	1,007	712	4,677

Source: Ohio's MDS+ database for 1994.

Medicaid Status and Length of Stay

Because of the importance of Medicaid in funding nursing home care, we examined length of stay for those entering nursing homes as Medicaid residents and those who became Medicaid recipients after admission. About two-thirds (65%) of those completing the pre-admission review and entering Ohio nursing homes during the first quarter of 1994 used private funds, private insurance, or Medicare to finance their nursing home care. The remaining admissions (35%) entered as Medicaid recipients. The majority of the Medicaid group (68%) were not new admissions, but had spent down to Medicaid and were requesting a change in payment status.

Table 5 shows the proportion of those shifting from non-Medicaid to Medicaid as well as length of stay for all nursing home applicants over the one year time period following admission. By the end of the first quarter almost 16 percent of those admitted as non-Medicaid residents had depleted their resources and relied on Medicaid to fund their care. This proportion did not change much throughout the year, after one year about 17 percent of all applicants admitted during the first quarter had converted to Medicaid. However, because of the high discharge rate about half (52%) of all those admitted who were still in a nursing home at the end of the first year, were Medicaid recipients. Thus, the majority of those admitted (84%) do not rely on Medicaid for assistance. However, for those individuals that remain in nursing homes for longer than six months, almost half receive Medicaid support.

Table 6 expands the analysis to include location prior to admission. The duration of stay for those nursing home residents that were admitted from the community remained about the same irrespective of their initial payment status. Almost 70% of the newly admitted residents from the community were still in the nursing home at the end of the first quarter and about 41% continued to be residents by the end of the fourth quarter. Again, just over 18% of those entering as a non-Medicaid resident required Medicaid assistance during the fourth quarter. This however, was 42% of the fourth quarter residents.

Examining length of stay for residents admitted from the hospital shows that the length of stay for Medicaid and non-Medicaid residents did not vary over the first quarter, with about 36% of those admitted no longer residents, regardless of payment status. After one year however, non-Medicaid residents were more likely to be discharged (76.3%) than Medicaid recipients (71.4%). About 12% of those entering as non-Medicaid residents required Medicaid assistance in the fourth quarter. This proportion was 53% of the remaining residents.

As noted earlier nursing facility residents who changed either their nursing home or payment status had to complete the pre-admission review process. For those non-Medicaid residents who changed their nursing home almost half (45.8%) changed from non-Medicaid to Medicaid during the first quarter. The rate remained abut 45% throughout the year, although 63% of all remaining residents were Medicaid recipients.

Table 5
Spend Down to Medicaid by Length of Stay

	Admitted as Non-Medicaid		Admitted as Medicaid or Change Payment Status to Medicaid	
	Number	**(Percent)**	**Number**	**(Percent)**
Total Admissions + Conversion to Medicaid	12,560		6,661	
End of 1st Quarter				
% Remained in NF as Non-Medicaid		52.2		0.00
% Spent down to Medicaid		15.6		82.7
% No Longer in a Facility		32.1		17.3
On Medicaid as % of those remaining		23.1		
End of 2nd Quarter				
% Remained in NF as Non-Medicaid		28.8		0.00
% Spent down to Medicaid		14.4		69.6
% No longer in a Facility		56.8		30.0
On Medicaid as % of those remaining		33.3		
End of 3rd Quarter				
Remained in NF as Non-Medicaid		19.6		0.00
% Spent down to Medicaid		17.3		61.9
% No Longer in a Facility		63.1		38.1
On Medicaid as % of those remaining		46.9		
End of 4th Quarter				
Remained in NF as Non-Medicaid		15.4		0.00
% Spent down to Medicaid		16.6		55.8
% No Longer in a Facility		67.9		44.2
On Medicaid as % of those remaining		51.8		

Source: PAR system 1994.
MDS+ database 1994.

Table 6
Spend Down To Medicaid by Referral Setting

	Payment Status			
	At the End of 1st Quarter		At the End of 4th Quarter	
Referral Setting	**Medicaid**	**Non-Medicaid**	**Medicaid**	**Non-Medicaid**
Community				
New Admissions during 1st Quarter	704	2,560	704	2,560
% Remained in N.F. as Non-Medicaid	0	54.2	0	25.3
% Spent down to Medicaid	69.6	15.5	41.1	18.1
% No longer resident	30.4	30.3	58.9	56.6
Hospital				
New Admissions during 1st Quarter	1,306	8,852	1,306	8,852
% Remained in N.F. as Non-Medicaid	0	51.7	0	11.2
% Spent down to Medicaid	63.6	11.8	28.6	12.5
% No longer resident	36.4	36.5	71.4	76.3
Nursing Home				
New Admissions/Payment Charges	4,651	1,148	4,651	1,148
% Remained in N.F. as Non-Medicaid	0	51.6	0	26.7
% Spent down to Medicaid	90.1	45.8	65.7	44.5
% No longer resident	9.9	2.6	34.3	28.8

Source: PAR system 1994.
MDS+ database 1994.

Length of stay does vary by the initial payment status with about one-quarter of the short stay group entering on Medicaid, compared to 20% of the long stay group. A review of characteristics shows differences by payment status (See Table 7). For example, Medicaid short stay residents were on average five years younger than long stay Medicaid residents. The Medicaid short stay residents were more likely to be men (40% versus 29%) and more likely to be non-white (21% versus 13%). As was the case for the overall population of nursing home residents, short stay Medicaid residents were more impaired on the basic activities of daily living than the long stay Medicaid residents (See Table 8). In particular short stay Medicaid residents were considerably more impaired in transfer (74% versus 54%), getting to the toilet (75% versus 64%), locomotion (67% versus 51%), and dressing (83% versus 76%). Long stay residents experienced a higher degree of cognitive impairment (54% versus 43%).

Table 7
Comparison of the Demographic Characteristics of Ohio's Newly Admitted Nursing Home Residents at the End of the 1st Quarter of Their Admission by Length of Stay and Payment Source

	1 Quarter		4 Quarters	
	Medicaid	Non-Medicaid	Medicaid	Non-Medicaid
Age	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**
=<45	8.8	1.8	6.4	1.4
46-59	19.3	3.3	9.4	1.9
60-65	10.2	3.6	7.5	2.1
66-74	17.4	18.4	14.9	13.1
75-84	22.7	38.8	32.7	37.0
85-90	11.0	20.6	15.4	25.5
91+	10.5	13.4	13.6	19.0
Average Age	**69.4**	**78.9**	**74.5**	**81.3**
Gender				
Male	40.2	36.7	29.1	28.4
Female	59.8	63.3	70.9	71.6
Race				
White	78.8	87.9	86.9	91.0
Non-white	21.2	12.1	13.1	9.0
Marital Status				
Never married	18.5	8.7	16.0	9.2
Married	18.8	27.0	16.3	21.3
Widowed/Divorced/Separated	62.7	64.3	67.7	30.5
Previous Living Arrangement				
Lived alone				
No	61.3	56.4	58.3	54.4
Yes	27.8	36.5	21.5	30.4
In another facility	10.9	7.1	20.2	15.2
Referral Setting				
Community	194	356	305	1,086
Hospital	605	2,194	402	2,071
Nursing Facility	81	110	204	609
Payment Source				
Medicaid	100.0	0.0	100.0	0.0
Medicare	0.0	65.4	0.0	43.5
Self/Insurance pay	0.0	34.6	0.0	56.5
Population	880	2,660	911	3,766

[a] Percentages are adjusted to reflect only those residents for whom information was available on each variable.

Source: MDS+ database for 1994.

Table 8
Comparison of the Functional Characteristics of Ohio's Newly Admitted Nursing Home Residents at the End of the 1st Quarter of Their Admission by Length of Stay and Payment Source

	Medicaid		Non-Medicaid	
	1 Quarter	4 Quarters	1 Quarter	4 Quarters
Activities of Daily Living (ADL)	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**	**(Percent)[a]**
Needs assistance in:				
Bathing	92.0	89.6	94.2	93.2
Dressing	82.7	75.7	86.7	82.8
Transfer	73.6	54.2	80.2	66.1
Toileting	74.8	64.0	81.2	72.9
Eating	32.8	25.9	34.6	29.7
Grooming	81.4	77.0	82.0	81.4
Bed Mobility	51.9	36.8	59.4	46.5
Locomotion	67.4	51.1	76.3	62.1
Number of ADL Impairments[b]				
0	6.8	8.7	4.4	5.4
1	5.0	9.6	4.7	7.8
2	5.5	7.1	3.9	4.9
3	8.0	10.1	6.3	9.2
4	8.3	14.2	9.0	10.5
5	35.3	27.0	38.6	34.1
6	31.1	23.3	33.2	28.1
Average ADL Impairments	4.4	3.9	4.6	4.3
Incontinence				
Bladder or bowel	44.9	45.3	40.6	46.1
Cognitive Impairment	42.9	54.4	39.2	55.3
Population	880	911	2,660	3,766

[a] Percentages are adjusted to reflect only those residents for whom information was available on each variable.
[b] Only the first six activities of daily living from the list above is included.
Source: MDS+ database for 1994.

Predicting Length of Stay

The comparison of demographic and functional characteristics indicates that measurable differences do exist between short and long stay residents. In addition the referral setting of the residents and their payment status seems to play a role in the residents' length of stay. In this section we attempt to develop a model that would allow us to predict whether an applicant will be a short or long stay resident.

Discriminant analysis is used to identify the resident characteristics that will best differentiate lengths of stay. This statistical technique examines the characteristics of long-term care applicants requesting placement in nursing home in relation to a dependent variable--short stay versus long stay in a nursing facility. The length of stay variable, measured as the difference between admission date and the end of the quarter that the resident last appeared in the MDS+ database, is coded into two mutually exclusive categories, 90 days or less, and greater than 90 days. This analysis includes all nursing home applicants, even those requesting that their payment status be changed to Medicaid (25% of all nursing home applicants). The length of stay for these residents will be the difference between when their payment status is changed and the last quarter that they appeared in the MDS+ database. Table 9 shows the variables included in the analysis. During the first quarter of 1994 there were 19,107 applications that were reviewed for nursing home placement. About two percent of the cases either withdrew, had more than one application or decided not to enter a nursing home after a review was completed. Another 31% (4,436) were admitted to the nursing home and discharged before the end of the first quarter. There were 12,954 residents with complete information on length of stay and all the discriminating variables. Less than 30 percent of these residents had a length of stay less than or equal to 90 days.

The univariate test for the equality of group means for each of the discriminating variables are presented in Table 10. The high values of the lambda's (ranging 0 to 1) reflects that there is a considerable amount of variability within each length of stay category, as well as between them. The variables with significantly different means for the two length of stays are; if the applicant was referred from hospital, if Medicare was the primary payer, transfer limitations, cognitive impairment, if the applicant was referred from the community, gender, continence problems, grooming limitations and impairment in using the toilet.

Table 11 presents the standardized coefficients from a stepwise forward discriminant analysis. The variables included in the model contributed significantly in accurately grouping the residents. Two variables, bowel control and using the toilet, did not meet this test and were excluded from the final model. Among the remaining variables referred from hospital, Medicare as payer, ability to transfer, and level of cognitive impairment contributed the most to correctly predicting length of stay. To a lesser degree referral from the community, continence, gender, and age assisted in grouping the residents. While the positive values of the coefficients identified the variables that were best determinant of short stay, the negative values were pointed to indicators of possible long stay. The referral setting as a whole, specifically hospital referrals, plus payment status are the most influential indicators of length of stay. Diminished cognitive skills,

incontinence, old age, and being female seems to point in the direction of long stay. This model accurately predicted the length of stay for two-thirds of the residents.

Ohio's pre-admission review is structured such that all referrals from the community receive an in-person review. The in-person review costs about $300, compared to a record review that costs about $30 (Pepe, et al. 1997). Because of the high cost of the pre-admission review for community applicants, in this section we examined community referrals to determine if the indicators of length of stay are any different.

There were 1,725 residents referred from the community, and 412 of them were identified as short stayers. Although the level of significance varied, the same variables that were significant in classifying residents earlier were also significant here. Again, transfer, Medicare as payer, cognitive impairment and gender were the most significant variables. Incontinence and age were also significant in predicting length of stay, although to a lesser degree. Table 13 presents the results of this analysis. Using this model, 62.7% of the residents were classified correctly.

Table 9
Description of the Variables in Analysis

The Activities of Daily Living (Transfer, Bed Mobility, Locomotion, Eating, Using Toilet, and Grooming):

0 = Independent
1 = Supervision
2 = Limited Assistance
3 = Extensive Assistance
4 = Total Dependence
8 = Activity did not occur

Bowel and Bladder control had these values:

0 = Continent
1 = Usually continent
2 = Occasionally incontinent
3 = Frequently incontinent
4 = Incontinent

Age: actual age.

RUGS score: were coded ranging from 1.00 to 7., one is the least resource usage.

Sex 0 = Male
1 = Female

Referred from Community 1 = Resident was referred from community setting
0 = Referral was from hospital or nursing home

Referred from Hospital 1 = Resident was referred from hospital
0 = Referred was from community or nursing home

Private Pay 1 = Self, family or insurance is the sole payment source
0 = All other payment sources

Medicare 1 = Medicare is the sole payment source
0 = All other payment sources

Race 1 = Black
0 = All others

Length of stay: short stay 1 = Up to 90 days
long stay 2 = More than 90 days

Cognitive Skills for Daily Decision Making

0 = Independent
1 = Modified independent
2 = Moderately impaired
3 = Severely impaired

Source: MDS+ database for 1994.

Table 10
Test for Univariate Equality & Group Means
for all Nursing Home Applicants

Variables	Wilk's Lambda	F Statistic	Sig. Level
Transfer	0.9898	133.20	0.0000
Eating	0.9998	2.85	0.0913
Using Toilet	0.9984	20.44	0.0000
Grooming	0.9995	6.04	0.0140
Bowel Control	0.9995	2.02	0.0080
Bladder Control	0.99003	130.50	0.0000
Cognitive Skills for Daily Decision Making	0.9807	254.80	0.0000
Age	0.9922	101.90	0.0000
RUGS Score	0.9998	2.72	0.0990
Sex	0.9943	74.51	0.0000
Referred From Community	0.9982	23.53	0.0000
Referred From Hospital	0.9088	1300.00	0.0000
Private-Pay	0.9999	1.15	0.2835
Medicare Pay	0.9318	947.00	0.0000
Race	1.0000	0.011	0.9180

Source: MDS+ database for 1994.

Table 11
Standardized Discriminant Function Coefficients
for All Nursing Home Applicants

Discriminating Variables	Coefficients	Sig. Level
Hospital	0.5882	0.0000
Medicare	0.4258	0.0000
Transfer	0.3343	0.0000
Cognitive Skills ...	-0.3136	0.0000
Home	0.1698	0.0000
Sex	-0.1622	0.0000
Age	-0.1494	0.0000
Bladder Control	-0.1472	0.0000
Private Pay	0.1444	0.0000
Grooming	-0.1292	0.0000
Eating	0.0840	0.0000
RUGS Score	0.0823	0.0000
Race	-0.0324	0.0000

Source: MDS+ database for 1994.

Table 12
Classification Results for all Nursing Home Applicants

Actual Length of Stay	Number of Residents[a]	Predicted Length of Stay	
		Short Stay	Long Stay
		(Percent)	(Percent)
Short stay	732	71.2	28.8
Long stay	9,222	33.9	66.1

[a] Only residents with no missing values for length of stay or the discriminating variables were included in the analysis.

Table 13
Standardized Discriminant Function Coefficients for Applicants Referred from Community

Discriminating Variables	Coefficients	Sig. Level
Medicare	0.3528	0.0000
Cognitive Skills ...	-0.3514	0.0000
Sex	-0.3475	0.0000
Bladder Control	-0.2862	0.0000
RUGS Score	0.2160	0.0000
Private Pay	0.1955	0.0000
Age	-0.1564	0.0000
Eating	0.1496	0.0000
Transfer	0.6250	0.0000

Source: MDS+ database for 1994.

Summary and Implications

The comparison of the residents pointed to some differences in characteristics between short stay and long-stay residents. A model was developed to identify predictors of length of stay at admission. We found that hospital referrals, Medicare payment status and inability to transfer pointed to short stay, while cognitive impairment, nursing home referral/payment status change, being female, and old age were indicators of long stay. The model based on these indicators was able to accurately predict length of stay for two thirds of the residents. The indicators of length of stay for community referrals alone was not much different than those for hospital or nursing home referrals.

These research findings present mixed results for policy makers. On one hand it is clear that the cost, volume, and denial rate indicate that the pre-admission review program could be more cost-effective if it were better able to target the pre-admission review resources. Under the current program design expenditures are spread across a wide range of applicants. Research efforts described in this paper are somewhat encouraging, with a discriminant model successfully classifying about two-thirds of the applicants into short stay or long stay categories. However, the model is still incorrect in one-third of the cases. What then are the implementation options facing a state? Should a state focus its pre-admission resources on the long stay group identified in the model? What is an acceptable error rate for prediction? The answers to these questions are not clear. The current approach needs to build on these findings as the pre-admission review program attempts to target resources more effectively. State efforts in this area might lend itself well to research experiments, where different approaches can be tested. As health and long-term care resources continue to be shifted to the states, it is imperative that states continue to develop a more extensive research and evaluation data base to inform decision makers.

Acknowledgments

This research was funded by the Ohio Department of Aging as part of the Evaluation of Community Based Long-Term Care in Ohio.

REFERENCES

Applebaum, R., Mehdizadeh, S., Straker, J. K., & Pepe, C. Evaluating Long-Term Care Initiatives in Ohio. Scripps Gerontology Center, Miami University, 1995.

Harrington, C. & Curtis, M. (1996). State Variations and Trends in Preadmission Screening Programs. The Journal of Applied Gerontology: 15 (4), 414-432.

Mehdizadeh, S., Applebaum, R., & Straker, J. Deja-Vu All Over Again--Or Is It? Nursing Home Use in the 1990's. Scripps Gerontology Center, Miami University, 2001. Technical Report Series 1-01.

Pepe, M.C., Applebaum, R., Straker, J. K., & Mehdizadeh, S. (1997). Evaluating The Effectiveness of Nursing Home Pre-Admission Review: A State Example. Pride Institute Journal of Long Term Home Health Care. 16(3).

Seidl, F., Applebaum, R., Austin, C., Mahoney, K. Delivering In-Home Services, The Wisconsin Community Care Organization Experience. Lexington Press. Boston, MA, 1983.

Snow, K. I. How States Determine Nursing Facility Eligibility For The Elderly: A National Survey. AARP: Washington, D.C. (1995).