
Transfer from a home and community-based long-term care program to a nursing home: the Ohio experience

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Abstract: Home and community-based care programs have been growing due to the preferences of elderly clients to remain in their homes. This study examines factors associated with the transfer of the elderly from a home or community-based long-term care program to a nursing home. Data were collected from four suburban counties administered by an agency in the Ohio pre-admission screening system providing options and resources today program. Approximately 14% of participants disenrolled from the program and moved to a nursing home during the study period. Median and mean durations in the program were 7.9 and 8.2 months, respectively. Using the Cox proportional hazard model, we identified age, pre-enrolment nursing home experience, hospital episodes and the need for transportation assistance as important predictors. The program should pay close attention to clients experiencing hospital episodes and the provision of needed services, such as transportation, in order to delay program disenrollment of the elderly.

Keywords: long-term care; nursing home; modifiable factors; hospital episodes; transportation assistance; USA.

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1 Introduction

The basic argument of this paper is that health informatics research can focus on finding factors to inform policy makers. Using a case study of the elderly enrolled in a home and community-based long-term care program in Ohio, we attempt to identify the factors associated with clients' nursing home placement and inform policy makers to develop appropriate strategies. This effort enhances our understanding on the transition behaviour of the frail elderly from home and community-based long-term care programs to nursing homes and can also help public agencies to deliver services to their clients efficiently and effectively.

Studies on predictors of nursing home placement among the elderly population have diverged to two groups. One stream of research focuses on the setting in which the elderly population resides, including nursing home placements from a non-acute geriatric hospital (Aditya and Sharma, 2003), medical centres (Shyu and Lee, 2002), home or community-based programs (Bauer, 1996; Friedman et al., 2005) and general community settings (McCallum et al., 2005; Bharucha et al., 2004). The other strand of literature focuses on the placement of the elderly who have physical limitations such as dementia (Yaffe et al., 2002; Argimon et al., 2005; Gaugler et al., 2004), heart failure (Ahmed et al., 2002) and Huntington disease (Weelock et al., 2003). A comprehensive literature review (Miller and Weissert, 2000) reported predictors associated with the nursing home placement, hospitalisation, functional impairment, or mortality of the elderly.

While the predictors in the studies vary slightly depending upon the setting and sample, it is also found that some variables such as age, race, living alone and previous nursing home experience have been commonly identified as predictors of nursing home

placement among the elderly. These findings have shown that demographic conditions have some predictive power for the nursing home placement of the elderly. However, some of these demographic characteristics are not modifiable even if we know that they are important risk factors. We hope to redirect the current research interest in predictors based on the predisposed characteristics of the client to situational variables in order to help improve the effectiveness of these programs. Therefore, the focus of this study is on the identification of modifiable risk factors with regards to the transfer of the elderly from a home and community-based long-term care program to a nursing home.

2 Background

The Pre-Admission Screening System Providing Options and Resources Today (PASSPORT) program in Ohio provides home care services such as adult day care, home delivered meals and chore services as an alternative to nursing homes for low-income senior citizens. The goal of the program is to maintain the functional independency of low-income elderly clients and help them live independently in their own homes and communities for as long as possible. Therefore, the program can help in preventing or delaying nursing home placement at lower costs. To be eligible, the client must be 60 or older, financially eligible for Medicaid institutional care, frail enough to require a nursing home level of care and be able to remain safely at home with the consent of a physician.

Home and community-based care programs have been growing due to the preferences of elderly clients to remain in their homes (Bauer, 1996). Living independently contributes to the maintenance of the social functioning of the elderly outside the home and community. The majority of PASSPORT program clients have shown high satisfaction with the services they receive each year, with over 90% of clients indicating they were 'extremely satisfied' or 'very satisfied' with the program as a means of helping with independent living in their own homes (Ohio Department of Aging, 2003). Helping the program find an effective service management strategy, this study supports independent living among the elderly as well as cost-saving public spending.

While the issue of cost-effectiveness in the nation's home and community-based programs and nursing homes is a continuous topic of discussion (Chiu et al, 2001; Doty, 2000; Grabowski, 2006), in practice, effective program operation strategies have been limited. A general approach to such issues is to start by obtaining an understanding of the population and the behaviour of individuals in the population. A decade ago, one study investigated the risk of nursing home admission in a home and community-based long-term care program and the role of individual support using the Arizona long-term care system (ALTCS) data from 1989 to 1991 (Bauer, 1996). More recent researchers (Friedman et al., 2005; Temkin-Greener et al., 2006) have identified characteristics associated with nursing home admission in a community-based long-term care program such as the program of all-inclusive care for elderly people (PACE). We extend these studies by examining the disenrollment of clients in the home and community-based long-term care program in Ohio.

This study focuses on the disenrollment of the elderly from the program and transfer to a nursing home. A managed home care population is different in terms of risk for adverse outcomes such as nursing home placement, hospitalisation, death, or functional decline (Chernew et al., 2001). However, the focus of our study is on the transfer to

nursing homes because the prevention of nursing home placement is one of the main goals in the PASSPORT program and there is some room for policy makers to facilitate this outcome with appropriate policy options.

3 Methods

3.1 Study population

Data were collected from the Ohio PASSPORT program focused on the area agency on aging 10B region that covers four counties (Portage, Stark, Summit and Wayne) in the North eastern part of Ohio. The study included a total of 969 clients who newly enrolled in the program between January and December 2003. For the 969 clients, we followed the client's enrolment status until April 30, 2004, which allowed at least four months of observation for those who had enrolled in December 2003. We focused on the early stage of clients in the program because one in every five clients (20.4%) in Ohio PASSPORT disenrolled within six months. Focusing on the time period immediately after client enrolment, there is a high chance of retaining clients for a longer period.

Table 1 Comparison of selected demographic and functional characteristics

	<i>PASSPORT population^a</i> <i>(December 2001)</i>	<i>Study sample</i> <i>(2003)</i>
Total observations	24,488	969
Age ^b (%)		
60–65	11.8	12.9
66–74	29.8	25.2
75–84	37.3	39.9
85+	20.9	22.0
(mean age)	(76.7)	(76.9)
Gender (%)		
Female	80.3	76.3
Race (%)		
White	74.6	77.4
Living arrangement (%)		
Own home/apartment	77.8	81.1 ^c
Average number of activities of daily living (ADL) impairments (total = 8 indicators)	3.0	3.3
Average number of instrumental activities of daily living (IADL) impairments (total = 9 indicators)	6.0	7.5

Notes: a Excerpted from Mehdizadeh and Applebaum (2003).

b In Table 1, age was grouped differently than Table 2 for the purpose of comparison with the study of Mehdizadeh and Applebaum (2003).

c Reported the percentage from usual living arrangement which is different from living arrangement at the time of assessment in Table 2.

Recent studies (Friedman et al., 2005; Fischer et al., 2003; Gaugler et al., 2004) have also discussed site variability and influence. We focused on four neighbourhood counties that were administrated by a single administrative agency in order to minimise the effect of site variability. For the purpose of comparison, we presented Table 1, which shows the selected demographic characteristics between the Ohio PASSPORT program population and the study sample. There is no noticeable difference between the study sample and the program population in Ohio.

3.2 Measures

The outcome measure is the length of time enrolled in the PASSPORT program prior to permanent disenrollment and transfer to a nursing home during the study period. The length of time was calculated from the client's original enrolment date to the disenrollment date. Clients who remained in the program at the end of the study period were considered 'censored' observations. Those who died or were disenrolled due to other reasons were also considered as censored because they were removed from the study before being transferred to a nursing home. Some clients have a temporary nursing home experience while they remain in the program, but we considered only those who were permanently disenrolled from the program and placed in a nursing home as the result of disenrollment.

Based on the literature review, we selected the following variables as potential predictors. Demographic variables included age, gender, race and marital status. Living arrangements were included as a proxy of pre-enrolment nursing home experience. This variable indicated where the assessment was conducted prior to the client's program enrolment, which includes the client's own home, relative or friend's home, nursing home, or other residence. As a measure that shows health status change, hospital episodes of the client while participating in the program were recorded as dummy variables. Medication variables indicated whether the client needed assistance for administering daily medications while they were in the program. Physical impairment variables included problems with language, hearing, vision and confusion. We also included assessment data on activities of daily living (ADL) and instrumental activities of daily living (IADL). Each indicator in ADL and IADL was included separately in the model rather than as an aggregated dependence measure.

3.3 Survival analysis

Survival analysis was used to identify the characteristics of the elderly associated with the length of stay in the PASSPORT program. In survival analysis, research populations are typically followed from the start of the study until they experience the event of interest and the length of time to the event is then studied. In this study, the event of interest was a client's permanent disenrollment from the PASSPORT program and move to a permanent nursing home. The client's duration in the PASSPORT program was defined as the number of months from entry into the program to permanent disenrollment and transfer to a nursing home.

Log-rank tests were first used to test the equality of the survival curves for covariates. The tests calculated the deviation between the observed and expected hazard rates. Using the Kaplan-Meier estimates of the survival function, we also calculated the median

and mean duration estimates. The Cox proportional hazard model was used to identify factors associated with disenrollment to nursing homes. The Cox model, $h_i(t) = h_0(t) \exp(\beta_1 x_{i1} + \beta_2 x_{i2} + \dots + \beta_k x_{ik})$ shows that the hazard for individual i at time t is the product of a baseline hazard ($h_0(t)$) and a linear function of a set of k fixed covariates, which is then exponentiated. The hazard ratio for two individuals is constant over time and the hazard for any individual is a fixed proportion of the hazard for any other individual. For a valid interpretation of the Cox model, the proportional hazards assumption was tested. All of the analyses were conducted using STATA Statistical Software 9.0 (StataCorp, College Station, TX).

4 Results

Among the 969 newly enrolled clients in 2003, 69% of the clients remained in the program at the end of April 2004. Approximately 14% failed to remain and transferred to nursing homes, 15% discontinued due to death and 2% discontinued for other reasons such as hospice institution, transfer and others.

Table 2 Baseline characteristics of samples in the Ohio PASSPORT program

	<i>Observations</i>	<i>Number</i>	<i>%</i>
<i>Demographics</i>			
<i>Sex</i>	969		
Female		739	76.3
Male		230	23.7
<i>Age (mean age = 77)</i>			
60–69		261	26.9
70–79		301	31.1
80–89		319	32.9
90+		88	9.1
<i>Race</i>			
White		750	77.8
Black		190	19.7
Others		24	2.5
<i>Marital status</i>			
Married		207	21.6
Never married		52	5.4
Separate, Divorced		200	20.8
Widowed		501	52.2

Notes: a At the time of assessment (current living arrangement).

b After program enrolment.

c Numbers and percents were reported for ‘need hands-on assistance.’ The 100% of the clients needed hands-on assistance for Chore, House and Yard works among IADL indicators.

Table 2 Baseline characteristics of samples in the Ohio PASSPORT program (continued)

	<i>Observations</i>	<i>Number</i>	<i>%</i>
<i>Living arrangement^a</i>			
	947		
Own home		618	65.2
Relative/friend		173	18.3
Nursing facilities		50	5.3
Others		106	11.2
<i>Health conditions (yes)</i>			
Need assistance for medications? ^a	964	501	52.0
Have hospital episodes? ^b	969	449	46.3
<i>Presence of impairment</i>			
Language problem	969	68	7.0
Hearing problem	969	198	20.4
Vision problem	969	109	11.2
Confusion	969	155	16.0
<i>Activities of daily living (ADL)^c</i>			
Bed	928	40	4.3
Transfer	966	872	90.2
Locomotion	934	316	33.8
Bath	967	940	97.2
Groom	955	99	10.4
Toilet	960	304	31.7
Dress	967	567	58.6
Eat	959	23	2.4
<i>Instrumental activities of daily living (IADL)^c</i>			
Shop	968	957	98.9
Meal	966	880	91.1
Laundry	966	950	98.3
Legal	967	677	70.0
Phone	968	176	18.2
Transportation	966	673	69.7

Notes: a At the time of assessment (current living arrangement).

b After program enrolment.

c Numbers and percents were reported for 'need hands-on assistance.' The 100% of the clients needed hands-on assistance for Chore, House and Yard works among IADL indicators.

Approximately 76% of the clients were female (Table 2). Approximately 78% of the clients were white, 20% were black and 2% were other. Among the clients, 22% were married, 5% were never married, 21% were separated or divorced and 52% were widowed. While most clients were assessed at their own home or apartment (65%) prior to enrolment in the program, 18% were assessed at the home of a relative or friend and

5% were assessed at nursing homes. Of the PASSPORT clients, 46% had at least one episode of hospitalisation while enrolled in the program. Over 50% of the clients needed hands-on assistance for administering their daily medications and in terms of physical impairment, 7% had language problems, 20% had hearing problems, 11% had vision problems and 16% had confusion. Among the ADL indicators, over 90% of the clients needed hands-on assistance for bathing and transfer. Most clients struggled with IADL indicators and all clients needed hands-on assistance with chores, house and yard work.

4.1. Univariate analysis

The median and mean durations in the program were 7.9 and 8.2 months, respectively. Log-rank tests were performed for potential predictors. Predictors that had a p-value of less than 0.15 in the univariate analyses were considered for model building. These include age group, race, sex, marital status, current living arrangement, the need for assistance in taking medication, hospital experience, confusion, ADL (locomotion, groom, toilet and dress) and IADL (meal, legal, phone and transportation). The results of univariate analyses on predictors included in the final model are reported in Table 3.

Table 3 Predictors associated with the disenrollment of the PASSPORT clients

	<i>Unadjusted HR^a</i>		<i>Adjusted HR</i>		
	<i>HR</i>	<i>p-Value</i>	<i>HR</i>	<i>95% CI</i>	<i>p-Value</i>
<i>Age group (base: 60–69)</i>					
70–79	1.25	0.43	1.18	(0.67, 2.08)	0.56
80–89	2.42	0.01	2.42	(1.42, 4.11)	0.01
90+	3.20	0.01	3.15	(1.61, 6.16)	0.01
<i>Race (base: white)</i>					
Black	0.52	0.02	0.65	(0.38, 1.05)	0.11
Others	0.54	0.39	0.52	(0.13, 2.14)	0.37
<i>Marital status (base: married)</i>					
Never married	1.70	0.13	1.98	(0.97, 4.04)	0.06
Separate/Divorced	0.82	0.49	0.78	(0.43, 1.41)	0.42
Widowed	1.23	0.37	0.77	(0.48, 1.27)	0.31
<i>Living arrangement (base: own home)</i>					
Relative/friend	1.70	0.01	0.96	(0.62, 1.49)	0.86
Nursing home	2.84	0.01	2.56	(1.46, 4.49)	0.01
Others	0.76	0.43	0.52	(0.26, 1.06)	0.07
<i>Hospital episodes (base: no)</i>					
Yes	5.34	0.01	5.68	(3.66, 8.82)	0.01
<i>Transportation (base: no need)</i>					
Needs assistance	2.67	0.01	2.58	(1.56, 4.25)	0.01

Note: a Hazard ratio, N = 931.

Graphs representing the Kaplan-Meier survival estimates for the significant predictors such as age group, the presence of hospital episodes and the need for transportation assistance are presented in Figure 1.

Figure 1 Kaplan-Meier survival estimates by age group, hospital episode and need of transportation assistance (see online version for colours)

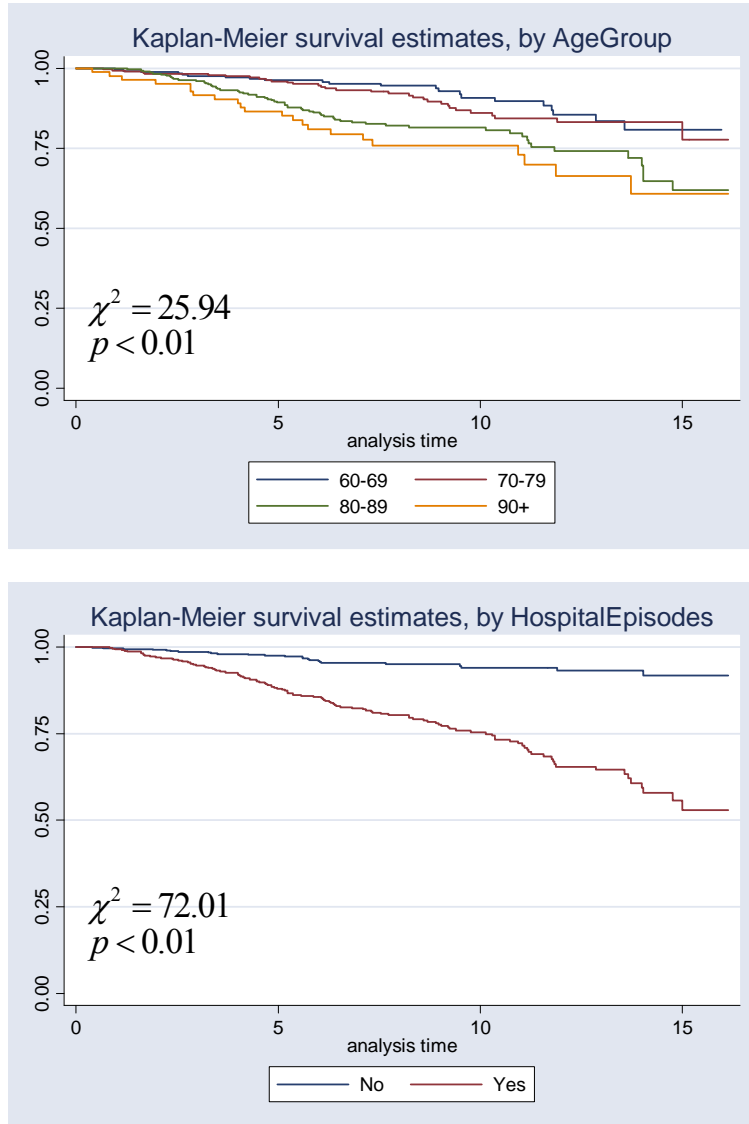
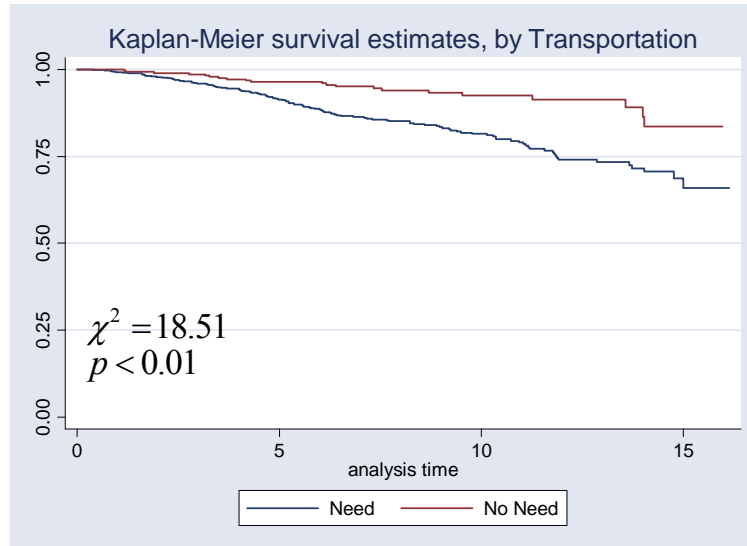


Figure 1 Kaplan-Meier survival estimates by age group, hospital episode and need of transportation assistance (continued) (see online version for colours)

4.2 Cox model

The Cox model shows that, among the demographic variables, age is an important predictor. Clients in age groups from 80–89 years (hazard ratio (HR): 2.42, 95% confidence interval (CI): 1.42–4.11, $p < 0.01$) and 90+ years (HR: 3.15, 95% CI: 1.61–6.16, $p < 0.01$) had an increased likelihood of nursing home placement, holding all other variables constant. Other demographic variables, such as race and marital status, were not significant in the Cox model. Race and marital status are well known confounders and were controlled in the Cox model.

We tested living arrangements at the time of enrolment. Pre-enrolment nursing home experience significantly increased the risk of disenrollment from the program and permanent transfer to a nursing home (HR: 2.56, 95% CI: 1.46–4.49, $p < 0.01$) compared to those who were assessed at their own home or apartment. Since clients must have a certain level of dependency on ADL or IADL to be eligible for the program, it was not expected that the aggregate measure would provide much insight in this sample. When we tested each indicator in ADL and IADL, the need for transportation assistance increased the likelihood of disenrollment to a nursing home (HR: 2.58, 95% CI: 1.56–4.25, $p < 0.01$) in this sample. Finally, the presence of a hospital episode while enrolled in the program also significantly increased the risk of disenrollment and transfer to a nursing home (HR: 5.68, 95% CI: 3.66–8.82, $p < 0.01$). We tested the interaction between age group and hospital episodes, as well as between age group and the need for transportation assistance. The interactions were not significant and were not included in the final Cox model. The model coefficients, along with hazard ratio estimates and 95% confidence intervals, are presented in Table 3.

An important assumption of the Cox model is proportionality of hazard. We checked proportionality by including time-dependent covariates in the model by creating

interactions of the predictors and time. The assumption was not violated ($\chi^2=10.86$, $p \leq 0.62$, for the global test).

5 Discussion

Our study found consistent results on predictors such as age and previous nursing home experience. Previous studies (Bauer, 1996; Ahmed et al., 2002; McCallum et al., 2005; Friedman et al., 2005; Bharucha et al., 2004; Gaugler et al., 2004) have consistently reported that age is one of the most significant factors. Our study showed consistent results with the age variable. As the client gets older, the likelihood of disenrolling from the program and transferring to a nursing home increases. Some studies (Ahmed et al., 2002; Friedman et al., 2005; Shyu and Lee, 2002) have also reported that previous nursing home experience is a strong predictor of nursing home placement for the elderly. Our results were consistent with reports on this variable among the Ohio home and community-based care program clients. Studies have also reported race (Yaffe et al., 2002; Friedman et al., 2005) and living alone (Aditya and Sharma, 2003; Rudberg et al., 1999) to be significant predictors for the nursing home placement of the elderly. However, race and marital status were not statistically significant in the Cox model when other variables were controlled.

Two important findings need to be discussed. First, the presence of a hospital episode after program enrolment, which reflects a change in the client's physical condition, is an important predictor for the nursing home placement of home and community-based care program clients. A few recent studies have reported that hospitalisation may be an independent predictor of nursing home placement among PACE clients (Temkin-Greener et al., 2006) or adult day-care clients with Alzheimer (McCann et al., 2005). Our study provides additional evidence on this relationship, as the results indicate that once clients experience hospitalisation, the likelihood of nursing home placement drastically increases. Unlike other variables, hospital episodes were collected after the clients enrolled in the program. This variable indirectly reflects the physical condition of the clients after enrolment or the change of their physical condition while enrolled in the program.

Second, our study identified an indicator that had not been discussed much by previous researchers, which is the need for transportation assistance. Studies (Friedman et al., 2005; Bharucha et al., 2004; Gaugler et al., 2004) have included ADL and IADL as an aggregated measure that reflects the functional dependency of the clients. Since the PASSPORT program requires a certain level of ADL or IADL as eligibility criteria, we thought that the aggregated measure would not provide much insight. Rather, we tested each indicator and found that the need for transportation assistance was an important predictor in this sample even when other variables were controlled.

In addition, we noticed a general pattern of client transition in the home and community-based long-term care program. Many clients follow this pattern of moving from home to hospital, to a temporary nursing home and finally to a permanent nursing home. Some clients repeat the transition from hospital to temporary nursing home before permanently disenrolling from the program and moving to a nursing home. Therefore, hospital episodes following a temporary nursing home stay are important transitory activities that are closely related to the permanent disenrollment of the clients from the

program and transfer to a nursing home. Attention needs to be paid to this dynamic activity in order to better understand the disenrollment of the elderly in this program.

5.1 Policy implications

Medicaid payment to nursing homes is not only expensive, but is also constantly increasing, while the average daily cost per client in the PASSPORT program has been \$31 for the last ten years. The average daily cost per client for nursing home residents paid through Medicaid increased 73% over this period, from \$85 in 1992 to \$147 in 2001 (Mehdizadeh and Applebaum, 2003). Thus, the PASSPORT program would have saved approximately \$3,500 per client each month in 2001, compared to nursing home support from Medicaid. In this sense, the home and community-based program has been a cost-saving approach for long-term care in Ohio. This implies that public spending on long-term care can be substantially reduced if the program effectively prevents or delays the client's nursing home placement.

Policy makers and practitioners in the home and community-based long-term care program have long looked for ways in which they can improve the program operation and thus achieve their goals of extending the length of stay and maintaining or improving the quality of life of the elderly. The question for policy-makers and practitioners has been how to improve program operations so as to keep the clients in the program longer. Here, we provide some implications that policy makers of the program can consider for interventions based on the results of the study.

One approach is to open the black box. The program can identify clients who have a high risk of disenrollment to nursing homes using these predictors. A comprehensive medical assessment might be an alternative approach to identify those who might have a high risk of nursing home placement. While it may be more desirable, its feasibility is questionable in a setting where resources may be limited. Rather, this type of statistical approach can be a cost-effective and realistic identification approach for public agencies.

A recent study suggests finding modifiable risk factors and providing customised care to clients (Alkema et al., 2006). This is based on an assumption that the current 'one-size-fits all' model, with standardised 'cookie-cutter' care plans prescribed on the basis of bureaucratic program requirements, may be less effective than customised plans. The question is what these modifiable risk factors are and how to provide the customised service and comprehensive care plan. In our case, we suggest that the program pay close attention when the client experiences hospitalisation since hospital episodes make a difference in terms of the likelihood of a client's disenrollment to a nursing home. This calls for adaptive management, depending upon the situation, given to case managers with particular attention paid to hospitalisation. A hospital episode care management plan may help in promptly responding to such a situation.

Another policy implication can be discussed based on the need for transportation assistance found in the current study. Currently, transportation services are provided to PASSPORT program clients who are unable to drive or are otherwise in need of transportation. Transportation services are crucial for maintaining independent living, such as medical appointments, nutrition (meal sites), adult day care and public benefit assistance. However, only 11.6% of PASSPORT clients utilised transportation services in 2000 (Ohio Department of Aging, 2002). While the reason for this lack of transportation utilisation is not clear, this is a significantly lower rate of utilisation compared to other services such as personal care (89.1%) and emergency response systems (68.4%). Since

this is one of the modifiable risk factors for the program, the factors behind less utilisation of this service should be investigated and a more effective provision of transportation needs to be discussed.

While this type of behavioural study has been produced from the beginning of the home and community-based program and a synthetic review (Miller and Weissert, 2000) was also reported, practice has been slow to adapt the benefits of the research in their own contexts. On the other hand, there is increasing recognition that policy-related research needs to be context-specific. There can be substantial variations in the results among states or agencies due to their unique conditions. Disseminations of study results and lessons from individual states or agencies will help reduce the gap and ultimately improve practice.

5.2 Limitations

While recent literature (Yaffe et al., 2002; Gwendolen et al., 2006) has pointed out the importance of caregiver characteristics, we were not able to adjust the role of caregivers to predict nursing home placement due to the incompleteness of data. In our dataset, caregiver data for half of the clients was not recorded. We were not sure whether this reflects the absence of a caregiver for the client or simply missing data. Thus, we decided not to include these variables.

Most variables reflected pre-existing conditions of the clients, with the exception of hospital episodes. The client's living, health and environmental conditions could drastically change after enrolment in the program, especially at the end of life. In this study, we focused on the early time after the client enrolled in the program. This allowed us to focus on a critical period for the client's length of stay in the program. However, this approach did not allow us to follow events over a longer period.

Hospital episodes are a proxy to show a client's changing physical conditions. However, we only focused on the presence or absence of hospital episodes. We did not consider the length, count, or reasons for hospitalisation because such information was not available to use at the moment. Depending upon which aspects we delve into, there could be some variation on the final results. Therefore, future study is needed with richer datasets.

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