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Publisher Routledge

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Home Health Care Services Quarterly

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t792306861>

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To cite this Article Shannon, George R. , Yip, Judy Y. and Wilber, Kathleen H.(2004) 'Does Payment Structure Influence Change in Physical Functioning After Rehabilitation Therapy?', Home Health Care Services Quarterly, 23: 1, 63 – 78

To link to this Article: DOI: 10.1300/J027v23n01_04

URL: http://dx.doi.org/10.1300/J027v23n01_04

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Does Payment Structure Influence Change in Physical Functioning After Rehabilitation Therapy?

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ABSTRACT. *Purpose.* To determine if there are differences by payment structure (Medicare managed care versus fee-for-service) in the duration and intensity of geriatric rehabilitation therapy treatments and measure their effect on change in physical functioning at discharge.

Methods. Sixty-eight Medicare managed care (MCO) and 32 fee-for-service (FFS) subjects from 3 skilled nursing facilities (SNFs) in Southern California answered the physical functioning dimension of the Sickness Impact Profile (SIP-PFD) before and after rehabilitation therapy. Patient characteristics at admission, therapy treatments, and discharge physical functioning were compared by payment structure using chi-square and t-tests; logistic and ordinary least squares (OLS) regressions were employed to determine significant predictors of enrollment in managed care and change in physical functioning at discharge.

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The authors wish to thank Lisa Sugarman, Gretchen Alkema, Michelle Olo, and Ann Swanson for their valuable assistance in editing various drafts of this article.

The research reported in this article was supported by a grant from the John Randolph Haynes and Dora Haynes Foundation.

Home Health Care Services Quarterly, Vol. 23(1) 2004
<http://www.haworthpress.com/web/HHC>

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Digital Object Identifier: 10.1300/J027v023n01_04

Results. Payment structure yielded no significant differences in patient characteristics (physical functioning, socio-demographics, and clinical characteristics) at admission to rehabilitation. Compared to MCO subjects, FFS subjects received significantly more minutes per day (intensity) of rehabilitation therapy (Mean difference = - 16.90; t-test = - 4.504; $p = .000$). On average, all subjects reported significant, positive change in physical functioning from admission to discharge after rehabilitation (Mean change = 7.98, SD = 12.96; t-test = 6.157; $p = .000$); but change in physical functioning between MCO and FFS subjects was not significant.

Conclusions. Payment structure did not significantly influence change in physical functioning at discharge. Future studies, using a larger sample-size, should consider the effects of structural elements, process, and patient behavior on therapy treatments and physical functioning outcomes. [Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <<http://www.HaworthPress.com>> © 2004 by The Haworth Press, Inc. All rights reserved.]

KEYWORDS. Rehabilitation therapy, physical functioning, rehabilitation outcomes, managed care

INTRODUCTION

The geriatric rehabilitation industry is a \$27 billion-a-year business that, since the mid-nineteen eighties, has become an essential component of post-acute care for older Americans (Wheatley, DeJong, & Sutton, 1997). Rehabilitation medicine is a medical specialty that functions to return impaired and disabled persons to as normal and fruitful a life as possible (Flax, 2000). Rehabilitation theory posits that the objectives of reacquiring old skills or compensating for skills lost are a function of the frequency of supervised rehabilitation therapy days (Joseph & Wanlass, 1993). Accordingly, it is widely held that persons with better access to health care services, who receive more rehabilitation therapy, should report higher levels of physical functioning at discharge from rehabilitation therapy (Kane, 1997; Porell & Miltiades, 2001).

Building on current literature, it was anticipated that, compared to traditional fee-for-services subjects, those in managed care would prove

younger, more likely male, more likely married, report higher levels of physical functioning at admission, and have fewer co-morbidities (Baker, Fiedler, Ottenbacher, Czynny, & Heinemann, 1998; Heinemann, Hamilton, Linacre, Wright, & Granger, 1995; Johnson, Kramer, Lin, Kowalsky, & Steiner, 2000; Kramer et al., 2000; Morgan, Virnig, DeVito, & Persily, 1997). Further, it was expected that managed care subjects will receive fewer therapy encounters and significant reductions in intensity of therapy provided (Angelelli, Wilber, & Myrtle, 2000; R. L. Kane, 2000). Finally, reductions in the duration and intensity of therapy treatments were expected to manifest less physical functioning improvement for managed care subjects at discharge from rehabilitation (Kane et al., 1998; Kramer et al., 2000). While rehabilitation treatments may be physical or psychiatric, this article focuses on physical rehabilitation.

This article compares patient characteristics at admission to rehabilitation therapy, the duration and intensity therapy treatments provided, and discharge physical functioning by payment structure. It seeks to determine if physical functioning outcomes differ by payment structure in this sample of older adults, controlling for baseline physical functioning, socio-demographics, first diagnoses, and therapy treatments at discharge from rehabilitation therapy.

METHODS

Patient Sampling and Characteristics

This study used a convenience sample of 100 Medicare subjects receiving rehabilitation therapy from one of three skilled nursing facilities located in the Los Angeles area providing post-acute care for subjects enrolled in Medicare managed care and traditional fee-for-service. Data collection took place between March 24, 1998 and September 30, 1999. The skilled nursing facilities were part of a family-owned chain accredited by the Joint Commission for Health Care Organizations (JCAHO). In addition to standardized treatment protocols, procedures for data gathering and storage were the same across the three facilities by payment structure.

One of five trained and experienced interviewers visited each rehabilitation SNF on a daily basis and studied admission sheets for possible study subjects. They conducted brief interviews with potential candidates, screened out subjects who did not meet study criteria, and provided additional information to eligible subjects who agreed to participate in

the study. All participants signed an institutional review board (IRB) approved consent form. Researchers screened eligible subjects and collected data based on the following criteria:

1. Community dwelling prior to their acute event
2. Newly admitted into the facility for rehabilitation (within 7 days)
3. Age 65 years old or above
4. Receiving physical, occupational, and/or speech rehabilitative therapies
5. Physically and cognitively competent to give consent to their participation and to being interviewed
6. English-speaking

Interviewers surveyed subjects at admission, tracked them through the natural course of rehabilitation treatments, and re-interviewed them at discharge from rehabilitation therapy. They extracted data from facility records for information on subjects' socio-demographic characteristics and enrollment by Medicare payment structure. First diagnoses, determined from ICD-9 codes and extracted from SNF medical records, were reduced to orthopedic (codes 710-739), stroke (codes 800-839), or other (all other diagnoses). Duration of therapy treatments represented the total of all physical and occupational therapy days. Total minutes of therapy were calculated and divided by duration to obtain intensity (number of minutes per day) of rehabilitation therapy.

Measure of Physical Functioning

Interviewers administered the 45-item Sickness Impact Profile: Physical Functioning Dimension (SIP-PFD) at admission and discharge from rehabilitation therapy. Each of the 45 questions describes a unique way that sickness may change day-to-day behavior. The SIP-PFD combines ambulatory, mobility, and body care and movement scales to assess the physical impact of illness on subjects' lives.

Previous studies have encountered measurement difficulties with older adults who received rehabilitation therapy after reporting high or low levels of physical functioning at admission. The SIP-PFD has demonstrated particular sensitivity to "floor" and "ceiling" effects in extensive testing (Carod-Artal, Egido, Gonzalez, & Varela de Seijas, 2000; Lurie, 2000; van Straten, de Haan, Limburg, & van den Bos, 2000). Studies comparing the SIP-PFD to other clinical and self-report measures of physical functioning have found the SIP-PFD to be valid, reli-

able, sensitive to clinically significant changes, economically feasible, and easily understood by subjects (Barr, 1995; Lipsett et al., 2000).

A score of 100 points on the SIP-PFD indicates maximum sickness-related impact on physical functioning and a 0 score, the least impact; therefore, subjects who report positive change from admission to discharge will have lower SIP-PFD scores. To facilitate clearer interpretation of findings, SIP-PFD scores were multiplied by negative one (-1) to change the direction of scoring. Then, the highest possible score (100) was added to the negative product. Thus, higher scores indicated better physical function.

Research Model

Kane (1997) presented a model of outcomes research with outcome a function of baseline functioning, risk factors, treatment, and environment [Outcomes = f (Baseline, Risk Factors, Treatment, Environment)]. For this study, discharge physical functioning was the outcome variable and admission physical functioning was baseline functioning; risk factors were socio-demographics (age, female gender, married, white race, and high school education or more) and clinical characteristics (number of comorbidities at admission, and admission diagnosis of stroke, orthopedics, or a condition other than stroke or diabetes). Treatment was duration (number of therapy days) and intensity (number of minutes per day) of rehabilitation therapies. The environmental factor was payment structure (managed care versus fee-for-service).

Statistical Analysis

The SPSS (Version 10.01) statistical program generated descriptive statistics for each variable. Cronbach's Alpha measured the reliability of the SIP-PFD instrument at admission and discharge. Chi-square tests determined significant differences in admission characteristics for discrete variables by payment structure. Where the distribution of a variable was normal and continuous, t-tests determined significant differences in admission characteristics, duration and intensity of therapy treatments, and discharge physical functioning. Logistic regression was employed to determine predictors of enrollment in Medicare managed care versus fee-for-service.

Change in physical functioning was determined by subtracting admission SIP-PFD scores from discharge SIP-PFD scores. Positive differences in physical functioning from admission to discharge indicated

improvements and negative differences indicated worse functioning (MacKenzie, Charlson, DiGioia, & Kelley, 1986; Ware, Bayliss, & Rogers, 1996). Ordinary least squares regression (OLS) analysis estimated the effects of risk factors, therapy treatments, and payment structure on discharge physical functioning. Significance for all analyses was determined at $\alpha = .05$.

RESULTS

Internal Reliability

Cronbach's Alpha measured the internal reliability of the SIP-PFD physical dimension at admission ($\alpha = .8253$) and discharge ($\alpha = .8308$). These reliability estimates are consistent with findings of other studies using the SIP-PF (Lipsett et al., 2000; MacKenzie et al., 1986). Reliability estimates of 0.70 or higher are adequate for group analysis; a measure of .83 suggests that over 80% of the total variance measured is true, as opposed to random error (Ware, Kosinski, & Keller, 1994).

Bivariate Correlations

Table 1 presents bivariate correlations of all study variables. Reporting only significant correlations, admission physical functioning correlated strongly with discharge physical functioning ($r = .649$; $p = .000$). Lower physical functioning at admission was associated with greater duration of therapy treatments ($r = -.247$; $p = .013$). Managed care was associated with reduced intensity ($r = -.393$; $p = .000$) of therapy. Stroke correlated with lower physical functioning at admission ($r = -.205$; $p = .041$), lower physical functioning at discharge ($r = -.247$; $p = .013$), and more days of therapy ($r = .550$; $p = .000$). Diagnosis of orthopedic conditions was associated with lower physical functioning ($r = -.200$; $p = .046$) and being white ($r = .247$; $p = .013$, diagnosis of "other" was associated with higher physical functioning at admission ($r = .328$; $p = .007$), discharge ($r = .251$; $p = .012$), fewer encounters ($r = -.328$; $p = .001$), and being non-white ($r = -.247$; $p = .010$). Being white was associated with being older ($r = .355$; $p = .000$), orthopedic disease ($r = .247$; $p = .013$), higher levels of education ($r = .236$; $p = .018$), and lower discharge physical functioning scores ($r = -.227$; $p = .023$).

TABLE 1. Bivariate Correlations of Study Variables

Variable Name	Admiss. SIP-PFD	Age	Female	Married	White	H.S.+	MCO	Ortho	Stroke	Other	Duration Intensity	Disch. SIP- PFD	
Admission SIP-PFD	1.000												
Age (65+)	.034	1.000											
Female	-.091	-.029	1.000										
Married	-.248*	.096	-.253*	1.000									
White	-.157	.355**	-.034	-.020	1.000								
High School+ Ed.	-.102	-.118	-.085	-.071	.236*	1.000							
MCO	-.010	.001	-.084	-.066	.035	-.069	1.000						
Orthopedic	-.081	.095	.129	.183	.247*	.113	.023	1.000					
Stroke	-.205*	-.194	-.092	-.135	.028	-.005	.028	-.446**	1.000				
Other	.269**	.070	-.025	-.014	-.257*	-.093	-.031	-.547**	-.476**	1.000			
Duration (PT,OT,ST)	-.247**	.019	-.011	-.015	.078	.053	-.135	-.200*	.550**	-.328**	1.000		
Intensity (PT,OT,ST)	.171	.020	.106	-.064	-.073	-.179	-.393**	-.084	-.078	.160	.008	1.000	
Discharge SIP-PFD	.649**	-.041	-.133	-.119	-.227*	-.028	.026	-.025	-.247*	.251*	-.252**	-.176	1.000

*p < .05; **p < .01; ***p < .001

Admission Characteristics

Table 2 compares two categories of independent variables following Kane's (1997) outcome model: baseline health status (admission physical functioning) and risk factors (socio-demographics and clinical characteristics) by environment (Medicare managed care versus traditional fee-for-service). T-test and chi-square analyses revealed no significant differences in either baseline health status or risk factors. Further, there were no significant differences in physical functioning scores at admission by payment structure (MCO = 42.39; FFS = 42.70; $p = .924$). The mean age of subjects in both managed care and fee-for-service groups was approximately 79 years. Women comprised 81% of fee-for-service subjects; whereas, subjects in managed care were about 74% female. Managed care and fee-for-service subjects were about two-thirds white, with about three quarters of study subjects having at least a high school education. Diagnoses showed no significant differences by payment structure in orthopedic (MCO = 37%; FFS = 34%), stroke (MCO = 30%; FFS = 28%), or other (MCO = 34%; FFS = 38%).

Enrollment in Managed Care versus Fee-for-Service

Logistic regression was employed to determine the likelihood of patient enrollment in managed care versus fee-for-service ($-2LL = 124.331$;

TABLE 2. Comparison of Admission Characteristics by Payment Structure

Variables	MCO N = 68	FFS N = 32	Statistical Tests		
			t-tests	chi-sq.	p-value
SIP-PFD	42.39(14.70)	42.70(15.89)	-0.096		0.924
Age	79.21(6.79)	79.28(7.54)	-0.050		0.960
Female	50(74%)	26(81%)		0.711	0.461
Marital Status	21(31%)	12(37%)		0.431	0.649
White	47(69%)	21(66%)		0.122	0.819
High School education	51(75%)	26(81%)		0.480	0.613
Comorbidities	1.45(.98)	1.53(1.08)	-0.354		0.724
Ortho	25(37%)	11(34%)		0.054	0.816
Stroke	21(30%)	9(28%)		0.095	0.779
Other	23(34%)	12(38%)		0.095	0.758

* $p < .05$; ** $p < .01$; *** $p < .001$

$\chi^2 = 1.043$; Nagelkerke $R^2 = .049$). As shown in Table 3, none of the admission variables explained enrollment in Medicare managed care versus fee-for-service. The lack of model significance ($\chi^2 = 3.544$; $df = 9$; $p = .939$) suggested that if selection bias existed, factors outside the scope of this study were responsible.

Therapy Treatments

Table 4 shows the estimates of Ordinary Least Squares (OLS) regression models of intensity and duration of therapy treatments. For intensity of therapy, OLS regression indicated that subjects in managed care received, on average, about 17 minutes less therapy per day, controlling for admission physical functioning, age, managed care vs. fee-for-service, number of comorbidities, first diagnosis of orthopedic, and first diagnosis of stroke. Subjects in managed care received, on average, about seven fewer days of therapy than those in fee-for-service and, controlling for admission physical functioning, age, managed care vs. fee-for-service, number of comorbidities, and first diagnosis of orthopedic, subjects with stroke as first diagnosis received about 17 more days of therapy than those with other first diagnoses.

TABLE 3. Logistic Regression: Predictors of Enrollment in Managed Care

Independent Variables	beta	MCO versus FFS	
		p-value	Odds Ratio
Intercept	2.834	0.367	17.021
Admission SIP-PFD	-0.009	0.604	0.992
Age (65+)	-0.006	0.868	0.994
Sex (Female)	-0.756	0.201	0.469
Married	-0.628	0.242	0.533
Race (White)	0.160	0.778	1.174
High School +	-0.656	0.268	0.519
Comorbidities	-0.11	0.624	0.896
Orthopedic	0.299	0.596	1.348
Stroke	0.082	0.884	1.086

-2LL = 124.331; $\chi^2 = 1.043$;

Nagelkerke $R^2 = .049$

Model: $\chi^2 = 3.544$; $df = 9$; $p = .939$

Differences in Physical Functioning from Admission to Discharge

Table 5 presents change in physical functioning at discharge from rehabilitation therapy. Significant positive differences in physical functioning from admission to discharge in all three groups indicated that, on average, subjects in managed care and fee-for-service showed positive changes in physical functioning after rehabilitation therapy; however, there were no significant differences between managed care and fee-for-service groups (average between group change = 1.200, SD = 2.420; t-test = .447; p = .656).

TABLE 4. Ordinary Least Squares (OLS) Models of Intensity and Duration of Therapies

Variables	Intensity of Therapy			Duration of Therapy		
	beta	t-test	p-Value	beta	t-test	p-Value
(Constant)	95.520	4.308	0.000	7.210	0.353	0.725
Admiss. SIP-PFD	-0.157	-1.303	0.196	0.220	1.980	0.051
Age	-0.125	-0.494	0.622	0.136	0.600	0.550
MCO	-16.830	-4.548	0.000	-7.341	-2.163	0.033
Comorbidities	-3.139	-1.765	0.081	-2.555	-1.559	0.123
Orthopedic	-6.728	-1.618	0.109	1.002	0.262	0.794
Stroke	-3.882	-0.882	0.380	17.668	4.354	0.000
Adjusted R ²	0.188			0.244		
F-Value	4.828			6.338		

TABLE 5. Change in Physical Functioning After Rehabilitation Therapy

	<i>Payment Structure</i>			
	All Participants	MCO	FFS	(MCO/FFS)
Admission Physical Functioning	42.49 (15.01)	42.39 (14.70)	42.70 (15.89)	-
Discharge Physical Functioning	50.47 (15.87)	50.76 (14.68)	49.86 (18.39)	-
Change Admission to Discharge	7.98 (12.96)	8.36 (13.73)	7.16 (11.31)	1.200
t-test (2-tailed)	6.157***	5.024***	3.582***	0.447
p-value	0.000	0.000	0.000	0.656

*p < .05; **p < .01; ***p < .001

Predictors of Physical Functioning at Discharge

Hierarchical OLS regression was employed to determine predictors of physical functioning after rehabilitation therapy using the Kane outcome model (R. L. Kane, 1997). In Table 6, Model 1 shows that baseline functioning (admission physical functioning) accounted for more than 41% of the variation in discharge physical functioning. Model 2, indicates an increase of 3.4% in the variation explained. After controlling for risk factors, only admission physical functioning was significant. Admission diagnosis, age and stroke were included in Model 3, which added treatment variables (duration and intensity). After controlling for treatment and stroke, only admission physical functioning and age were significant to physical functioning at discharge. The adjusted R^2 in Model 3 was .450, a one percent increase in the variation explained. In Model 4, the environment variable (managed care versus fee-for-service) was included, controlling for treatment (duration and intensity), age, stroke, and admission physical functioning. In this final model, only admission physical functioning and age remained significant.

TABLE 6. OLS Regression Models: Predictors of Discharge Physical Functioning

Independent Variables	Discharge Physical Functioning			
	Model 1	Model 2	Model 3	Model 4
Intercept	21.298***	63.541***	56.997***	54.258
SP-PFD	0.687***	0.640***	0.637***	0.645***
Age		-0.419*	-0.432**	-0.448*
Gender (Female)		-3.051		
Married		0.446		
Race (White)		-2.206		
High School+		0.659		
Comorbidities		-1.247		
Orthopedic		-1.138		
Stroke		-5.478	-4.344	-4.601
Duration			-0.011	-0.011
Intensity			0.055	0.076
Managed Care				2.342
Adjusted R2	0.416	0.440	0.450	0.449
F-value	71.393***	9.657***	17.220***	14.424***

* $p < .05$; ** $p < .01$; *** $p < .001$

DISCUSSION

There is a potential for selection bias when comparing treatment and outcome differences between payment structures (Robert L. Kane et al., 1998). According to the theory of favorable risk selection, managed care organizations, with profitability as a primary goal, actively enroll younger, healthier subjects and screen out those who may be at greater risk of health care service utilization (Freeborn & Pope, 1999; John E. Ware et al., 1996). Conversely, adverse risk selection theory posits that consumers in poorer health prefer fee-for-service, seeking the payment structure that offers greatest benefits at the lowest possible price (Rothschild & Stiglitz, 1976).

Contrary to expectations, no significant differences were found in admission characteristics (physical functioning, age, marital status, or education) by payment structure. To the same end, logistic regression analysis was employed to determine predictors of enrollment in Medicare managed care versus fee-for-service. None of the independent variables was significant to payment structure. There was some targeting of study participants, for example, subjects were physically and cognitively competent to grant consent to their participation. Targeting may have neutralized some of the effect of selection bias in the study by excluding sicker subjects.

Subjects enrolled in managed care were expected to receive significantly fewer days (duration) and minutes per day (intensity) of rehabilitation therapy. As expected, enrollees in traditional fee-for-service received about 7 days more therapy, on average, than those in managed care and about 16 additional minutes, on average, of rehabilitation therapy per day. It was anticipated that differences in therapy treatments (duration and intensity) by payment structure would yield significant differences in physical functioning by payment structure at discharge. Contrary to expectations, although subjects in both managed care and fee-for-service, on average, showed significant overall positive change in physical functioning from admission to discharge; payment structure did not yield significant differences in physical functioning after rehabilitation therapy.

Policy Implications

This study profiled two diverse payment approaches to the provision of rehabilitation therapy treatments for Medicare beneficiaries. Fee-for-service providers maintain that, all things being equal, more rehabilita-

tion therapy will optimize recovery from an acute event (R. L. Kane, 2000; John E. Ware et al., 1996; Wheatley et al., 1997). Managed care organizations contend that utilization review and close monitoring can successfully target subjects who are most likely to benefit from extended rehabilitation therapy (Angelelli et al., 2000; N. M. Kane, Turnball, & Schoen, 1996; Kramer, 1997; Resnick, 1996; Wheatley et al., 1997). Although, on average, there were no significant differences by payment structure in physical functioning from admission to discharge, subjects in both managed care and fee-for-service reported significant improvements in physical functioning at discharge. Thus, both approaches appeared to be similarly effective.

The current study found that, contrary to some research findings, more therapy was not necessarily better and a more cost-effective method of providing therapy treatments was to proactively target those subjects deemed most likely to benefit from additional treatments. On the other hand, in determining how much therapy is enough, health care providers must remember that the timing, type, and amount of therapy required for optimum outcomes are contingent upon the specific needs of the individual (Hoenig, Nusbaum, & Brummel-Smith, 1997; Johnson et al., 2000; R. L. Kane, 1997).

Limitations

This was a natural experiment using a convenience sample of 100 Medicare subjects. A study sample of this size cannot generalize to a larger population; yet, we believe that other researchers, using larger samples, should attempt verification of these findings given their implications to rehabilitation therapy utilization and cost. The term “managed care organization” was limited to a universal expression, denoting a generic Medicare risk HMO. Future studies may wish to use a larger patient sample, taking into account the variation within Medicare HMOs, e.g., staff models versus independent practice association (IPA) models, and differences in managed care by structure, organization, benefit packages, payment policies, and practice protocols (Riley, Potosky, Klabunde, Warren, & Ballard-Barbash, 1999).

Moreover, there are factors not included in this study that might have contributed to a more complete understanding of change in physical functioning from admission to discharge: (1) structural elements such as facilities, staff, and equipment; (2) process factors related to the prac-

tices and standards of providers; and (3) measures of patient behavior through the course of therapy treatments. Patient behavior reflects intrinsic characteristics such as motivation, attitude, and spontaneous recovery. This study controlled, at least partially, for structural elements and process factors by using the same health care providers, who offered specific, consistent treatment protocols for subjects enrolled in Medicare managed care and consistent treatment protocols for subjects enrolled in traditional fee-for-service (Barr, 1995; Heinemann et al., 1995; Jette, 1997; Kramer, 1997; Resnick, 1996).

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