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The Influence of Integration on the Expenditures and Costs of Mental Health and Substance Use Care: Results from the randomized PRISM-E Study*

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Abstract

We compared the healthcare costs associated with an integrated care model to an enhanced referral model for the treatment of depression, anxiety, and at-risk drinking from the randomized Primary Care Research in Substance Abuse and Mental Health for the Elderly study. We examined total healthcare costs and cost components, separately for Veteran's Affairs and non-VA participants. No differences in total health expenditures were detected between study arms. No differences in behavioral health expenditures were detected for non-VA sites, but the VA integrated arm had slightly higher (\$38; $p < 0.05$) behavioral health costs. Differences in other types of services use were detected.

Keywords

cost; integrated care; depression; anxiety; elderly

I. Objective

Depression, anxiety, and at-risk drinking are common in older adult primary care users (Unützer, et al, 2003; Levkoff, et al, 2004), although barriers to effective mental health and substance abuse treatment exist. The barriers include the under-recognition of behavioral health problems in primary care (Schulberg, et al, 1996; Selden, 1995) and the fact that older adults are less likely to use specialty mental health services (Harwood, et al 2003). Total health care costs for patients with anxiety or depressive disorders are higher than those for patients without those disorders, generally due to their higher medical rather than mental health treatment costs (Simon, Ormel, VonKorff, Barlow, 1995; Unützer, et al, 1997; Luber, et al, 2001).

The willingness to implement innovative mental health programs is dependent upon cost. Interventions to improve recognition and management of mental health disorders in primary care have shown mixed results in terms of changes costs and cost offsets of care (VonKorff, et al, 1998; Lave, Frank, Schulberg & Kamlet, 1998; Weisner, et al, 2001; Fleming, et al, 2000; Freeborn, Polen, Hollis & Senft, 2000). Little research exists on the costs of the spectrum of depressive and anxiety disorders or on alcohol abuse conditions that typically present in the elderly in primary care settings.

Several studies have examined the use of collaborative care models for the treatment of psychiatric disorders in primary care. Typically these studies have used “usual care” as a comparison to the study intervention, where usual care is defined as not having access to the study intervention (Levkoff, et al, 2004). Collaborative care models vary regarding the type of collaborating mental health specialty providers. Most studies demonstrate that providing access to mental health services produces better clinical outcomes at a greater cost than usual care (VonKorff, et al, 1998; Simon et al, 2001; Liu, et al, 2003; Schoenbaum, et al, 2001; Pyne, et al, 2003; Lave, Frank, Schulberg & Kamlet, 1998; Katon, Roy-Byrne, Russo & Cowley, 2002; Fleming, et al, 2002), but long-run and external benefits may outweigh these costs (Fleming, et al, 2002). The collaborative care model has been extended to older adults (Unützer, et al, 2001). Although specialty care may provide more adequate clinical treatments for depression (Krahn, et al, 2006), it may be associated with greater barriers such as lower rates of insurance coverage and greater stigma (Wang, Simon & Kessler, 2003).

The Primary Care Research in Substance Abuse and Mental Health for the Elderly (PRISM-E) study was designed to compare access, clinical outcomes and costs between participants randomized to an integrated care model (IC) or an enhanced specialty referral model (ESR) in a large sample of older adult primary care patients. IC consisted of mental health and alcohol intervention services co-located in the primary care setting. ESR consisted of mandatory referral to participating specialty mental health and/or substance abuse clinics. Both models were enhanced by rapid scheduling of appointments, assured transportation, rescheduling of a missed first appointment, and a communication link back to the primary care provider (PCP). The PRISM-E study differs from other studies in that the control arm is “enhanced referral” rather than usual care.

A previous report from PRISM-E found that IC participants were significantly more likely to engage in care in both the non-Veterans Affairs and VA settings (Bartels, et al, 2004). Subsequent reports found significant reductions in depression symptom severity as measured by the Center for Epidemiological Studies Depression Scale (CESD) and remission rates over the six-month study period, but no significant differences overall between the two arms of the study (Krahn, et al, 2006). However, for the sub-group with major depression, ESR was associated with a greater reduction in depression severity compared to IC. Although the mean number of drinks per week and the mean number of binge drinking episodes declined both in the integrated and referral arms, there were no statistically significant differences in outcomes (Oslin, et al, 2006). These clinical findings demonstrate that, with the exception of major depression, integrated treatment achieves results similar to enhanced referral care and results in greater engagement.

The goal of the present study is to examine the *expenditures* and *costs* of health services associated with each of the models. Our primary study outcome is total expenditures or costs, but components of total costs (e.g., behavioral health costs, outpatient costs) are also examined. Expenditures can differ from costs due to restrictions imposed by the payment system. For example, a health system might incur a positive cost to provide a health service, but if neither the participant’s health insurance program nor the individual provide payment for the service, the level of expenditure is zero. Expenditures, then, represent the transaction cost of the service

to the payors, but not necessarily the full cost to the service system. We sought to capture the cost of the two PRISM-E study arms from the perspective of payors, including Medicare, private insurance, and consumers. While the societal perspective is generally recommended for most economic evaluations (Gold, et al, 1996), we chose to examine the payor perspective in order to contribute to the policy debate on the financing of mental health and substance abuse (MH/SA) services for seniors. This perspective is used in other studies of depression treatment in the elderly (e.g., Katon et al., 2005), facilitating comparisons. Since four of the nine study sites included in the present analysis are VA sites for which expenditure data do not exist, we used the VA's own cost estimation system for outpatient services; therefore costs for the VA sites in this study reflect only costs to the VA system of services provided.

II. Methods

The PRISM-E study is a multi-site randomized comparative trial examining two models of care for older persons with major depression, dysthymia, minor depression, depression not otherwise specified, panic disorder, generalized anxiety disorder or at-risk drinking. The overall goal of the study was to compare the effectiveness of IC and ESR in terms of engagement, participation, patient clinical outcomes, and cost. All participating sites adopted a common set of criteria to define these care models. IC models had a behavioral health professional co-located in primary care, an integrated staff approach, and continued participation of the PCP in the MH/SA care of the patient. IC participants saw either masters or doctoral level MH/SA specialists. ESR models required direct referral to a participating behavioral health specialty provider located outside of the primary care setting; the behavioral health specialty provider then had primary responsibility for MH/SA care. Both models were required to facilitate access to the behavioral health provider by making first appointments available within four weeks, providing follow-up for a missed first appointment, having a process in place for urgent/emergency consults, and providing transportation.

There were 11 original PRISM-E study sites. One rural site did not participate in the multi-site study because it could not adhere to the study's randomization procedures; a second site was not included in this analysis because the institutional review board of the affiliated hospital would not release administrative data. This analysis, therefore, is based on data from nine of the eleven PRISM-E sites, which consist of 30 primary care clinics and 19 MH/SA specialty clinics. The study sites represent a diversity of clinic settings and include four Veterans Affairs medical centers, two community health centers and three hospital networks. Participating clinics serve communities across nine states and provide care in urban, suburban and rural settings. Annual clinic volume ranges from 500 to 76,000 patients for primary care sites and from 150 to 170,000 for referral sites.

At each site, persons aged 65 and older who had primary care appointments at participating clinics were eligible for screening and recruitment into the study. Patients could either screen positive for significant psychological distress (GHQ-12), suicidal ideation and/or excessive alcohol consumption (over seven drinks per week or greater than two binge episodes in the past three months), or were referred to the study by their PCP (Figure 1). Exclusion criteria included significant cognitive impairment, receiving adequate MH/SA treatment, participation in another MH/SA treatment study, and screening positive for psychotic, manic or hypomanic disorder. Study procedures and protocols were explained to eligible individuals who then supplied written consent for randomization to integrated or referral care, and completed baseline, three- and six- month follow-up assessments. The baseline assessment evaluated participants for depression, anxiety, and at-risk drinking. The follow-up assessments ascertained participant progress with respect to their initial target condition(s) as well as other parameters of interest, such as physical functioning (SF-36) and stigma. The study period began March 1, 2000 and ended March 30, 2002. The PRISM-E study enrolled 1,460 participants

with depression or anxiety, 414 with at-risk drinking levels, and 148 at-risk for alcohol and mental health co-morbidity. Sixty percent were between ages 65 and 74 years and forty percent were 75 years and older.

Persons were included in the present analyses if they participated in the multi-site study, consented, had complete data from all three assessments and were enrolled in a site for which we had access to administrative data. The final sample consists of 1177 individuals. Participants for the present study were compared to the full set of baseline participants using a logit model that models participation in the present study as a function of study arm assignment, age, gender, baseline diagnostic categories, physical condition at baseline, and, separately for each of the three study target conditions (i.e., depression, anxiety, and at-risk drinking), measures of severity. None of the characteristics listed above was a statistically significant predictor of cost study participation except baseline alcohol and major depressive disorder diagnoses, both of which positively predicted inclusion; severity level in each condition was not associated with study participation.

Health Care Utilization, Expenditures, and Costs

Health care utilization and costs were determined from a combination of administrative data and enrollee self-report. All treatment sites contributed administrative data on all outpatient expenditures and their sources of payment for each visit for non-VA sites, and costs for VA-sites (the details of the VA cost assignment can be found elsewhere (Wagner, Chen, Barnett, 2003; Yu, Wagner, Chen & Barnett, 2003; Phibbs, Bhandari, Yu & Barnett, 2003). Outpatient visits were identified from the administrative data for the six months following randomization. *Expenditures* in the non-VA outpatient data represent payments from all sources, including: consumers, through copayments, coinsurance and deductibles; private insurers; Medicare; and Medicaid. *Costs* in the VA outpatient data represent costs only to the VA system; any direct payments from consumers for using these services are not included. The term *cost* is used for brevity throughout the remainder of the paper, but this distinction between expenditures at the non-VA sites and costs at the VA sites should be noted. Analyses were run separately for VA and non-VA sites both because of the dissimilarity of the outpatient analysis variables in each system as well as the *a priori* belief that the factors that predict costs will differ between systems. Costs of all types are expressed in 2002 dollars.

At each of the three study assessments, enrollees responded to questions regarding the number of inpatient hospital stays, emergency room visits, nursing home stays, and prescription drug use over the prior three months. Self-report measures of utilization have been shown to be reliable for short recall periods (Hennessy & Reed, 1992; Cannell, Miller & Oksenberg, 1981; Clark, Ricketts & McHugo, 1996; Ungar & Coyte, 1998), as is the case here, and have a distinct advantage over administrative data in that they are not limited to one administrative service system.

Non-VA outpatient expenditures—Information on the actual expenditures from any payor source was used where available (75.8% of claims). The large percentage of expenditures that are missing were due to the timing of the download of administrative data, which was close to the time of service use for many study participants and therefore did not allow adequate time for payments to be received. For claims with missing data on expenditures, a two-step process was used. First, average reimbursement rates for claims with the same procedure code and valid expenditure amounts at each site were used (12.7% of claims). If no procedure code matches were available at the site, the Medicare facility reimbursement rate for each procedure code was used (5.5% of claims). Finally, if no valid procedure code was available, the reimbursement rate for a 20-minute office visit, the modal visit in our sample, was used (6.0% of claims).

VA outpatient costs—Costs for all types of outpatient service utilization were obtained from the VA Health Economics Resource Center (HERC) Average Cost Database from October 1, 1998 – September 29, 2001. Five individuals were removed from the VA sample because randomization occurred after the last service date in the VA data. Other individuals for whom administrative data were available for less than the full six month study period were retained (n=305); an explanatory variable controlled for the percent of the study period which was censored. The HERC cost method matches CPT codes with Medicare and other private sector payment rates and aggregates the VA budget data to estimate the cost to the VA system of every VA ambulatory encounter (Phibbs, Bhandari, Yu & Barnett, 2003).

Hospital inpatient, Nursing home, Emergency room, and Drug costs—

Administrative data were not available from all study sites on inpatient, emergency room, and prescription drugs, so self-reported data from VA participants as well as non-VA participants were used instead to maintain consistency across sites and because the study sought to capture out-of-system use of these higher-cost services, which would not be available from administrative data. We sought to obtain Medicare claims data from the Center for Medicare and Medicaid Services (CMS), but a match rate of 61% with self-reported Medicare IDs would have meant throwing out 39% of the present sample, so self-reported data was used for all services other than outpatient visits. Each unit of service was assigned a dollar amount based on estimated reimbursement rates obtained from a variety of sources. The number of hospital days reported was multiplied by the average amount paid per day at the specific hospital from Medicare cost reports. Similarly, an average per diem rate of \$162.05 for nursing home stays was used from Medicare cost reports for skilled nursing facilities (AHCA report, 2004). Per visit costs for emergency room visits were developed from the 2001 Medical Expenditure Panel Survey (AHRQ, Puf Main Data Results, 2004) for individuals 66 years and older and represented average payments by census region from all sources per emergency room visit. Prescription drugs were assigned the average cost paid by Medicaid fee-for-service programs in 2001 for drugs of that particular chemical entity for psychotropic medications, or for drugs in the therapeutic class for all other medications. This method likely understates total drug expenditures, both since the elderly have been shown to pay higher prices for some prescription drugs (Berndt, et al, 1998) and since brand name drug prices are reduced by averaging across brand name and generic prices when multi-source agents are available. Under reporting of medications will also lead to the understatement of prescription drug expenditures, and the magnitude of this bias is unknown, but not expected to vary across study arms. Since the VA has been noted to purchase psychotropic drugs at lower costs than those available to Medicaid (DHHS report, 2003) and may have higher nursing home costs (Yu, Wagner, Chen & Barnett, 2003), we reran the relevant models modifying the unit costs for these two service types in the VA only. No differences were found from the results reported here.

Cost of Behavioral Health Services—Separate analyses were run on costs for behavioral health services, identified from diagnostic and procedure codes in the administrative data. While this method attributes all costs for a visit that had at least some behavioral health component to MH/SA costs, over-counting MH/SA costs, it probably underestimates the total costs attributable to MH/SA conditions, since the incentive to record MH/SA diagnoses on outpatient claims is weak. Costs for drugs in psychotropic sub-classes were also analyzed separately. Total MH/SA costs sum outpatient, psychotropic medication and inpatient psychiatric costs into one overall measure. Separate costs for MH/SA components of ER visits and nursing home stays were not available and are therefore not included in this measure.

Empirical Analysis

Data were collapsed into a single observation per individual, reflecting utilization and costs during the six-month study period, and analyzed using two-part models (Duan, Manning,

Morris & Newhouse, 1983), which address statistical problems commonly occurring in health expenditure data. The first part of the model was specified as a linear probability model with site fixed effects, specifying whether there was any use of each service type during the study period.

The second part of the two-part model examined the intensity of use given any strictly positive level of use. Total cost and prescription drug cost models were run using one-part standard ordinary least squares (OLS) regression since more than 97% of the study sample had some costs of these types during the study period. Logged dependent variables were used for all cost models; this reduced the skewness although the normality of the residuals is still rejected in almost all of the logged dependent variable models. Explanatory variables at both levels included: (i) integrated arm assignment, (ii) age at baseline, in quadratic form to capture nonlinear effects, (iii) female (non-VA only), (iv) diagnosed conditions at baseline, (v) Physical Health Summary Scale of the SF-36, validated in elderly populations (Lyons, Perry & Littlepage, 1994; McHorney, Ware, Lu & Sherbourne, 1994) and (vi) site fixed effects to control for differences across the study sites, but constant among individuals at each site, such as the cost of living in the area, or treatment preferences in the region. Standard errors were clustered at the site level to control for serial correlation. Because of the relatively small sample size and the low relative use of some service types, we indicate differences at the 0.10 level.

Marginal effects are calculated by retransforming the logged models using a smearing factor (Duan, 1983), given the non-normality of the residuals; these marginal effects combine results from both parts of the two-part model. When heteroskedasticity was detected as a linear function of the exploratory variables, a heteroskedasticity-adjusted smearing factor was used (total costs, drug costs, MH/SA costs and psychotropic medications cost models; the specific variables used to differential smearing factors varied across models). Statistical significance in the marginal effects column indicated that the marginal effect was significantly different from zero based on 1000 bootstrapped replications, using bias-corrected confidence intervals.

III. Results

At baseline, there were no statistically significant differences ($p=0.05$) in age, gender, baseline diagnosis, or VA status between participants in integrated care versus those in enhanced referral care (Table I), consistent with the full PRISM-E sample as reported elsewhere (Levkoff, et al, 2004). Most participants reported having insurance coverage through Medicare (88%), and one-fourth of the sample (26%) had Medicaid coverage. Forty percent of participants had coverage from the VA or other sources, each. Almost 80% reported having prescription drug coverage from any source. Only 1% of the sample reported no insurance coverage.

No differences in total expenditures or MH/SA expenditures unadjusted for covariates were detected between the two study arms for participants in the non-VA sites (Table II). Total expenditures during the six month study period averaged just over \$3200, and MH/SA expenditures comprised a small fraction of these costs (11%). The average participant had seven outpatient visits during the study period, two of which had MH/SA diagnoses or procedure codes. Psychotropic medication represented 32% of total MH/SA expenditures. As would be expected in an elderly population, inpatient expenditures accounted for almost half of total expenditures (38–48%).

Total costs for VA participants (Table II) averaged just over \$5,000 and MH/SA costs amounted to 9% of that total. Psychotropic medication costs in the VA sites represented 20% of total MH/SA costs. Although no differences in costs were detected for total costs and MH/SA costs unadjusted for covariates between the study arms, VA integrated care participants

had a greater number of outpatient MH/SA visits than did enhanced referral participants (3.2 vs. 4.3; $p<0.01$).

Total cost, outpatient costs, and outpatient MH/SA costs are further broken down by baseline diagnosis in Table III; no statistically significant differences ($p=0.05$) were detected in total costs between study arms for any of the subpopulations examined.

The integrated was less costly than the ESR model for both VA and non-VA participants, but this result was not statistically significant at conventional levels. Controlling for baseline covariates, we found no statistically significant difference in the probability of accessing MH/SA services or in the level of MH/SA service use between study arms non-VA participants. We did detect a lower probability of using inpatient services (2.9 percentage point decrease; $p=0.088$) and emergency room services (6.2 percentage point decrease; $p=0.068$). However, only the differential marginal effect for emergency room services was statistically significant at $p<0.10$.

We did find a statistically significant difference in MH/SA costs between IC and ESR arms among VA participants, but the magnitude of the difference was small (\$38; $p<0.05$). The integrated condition was associated with a greater probability of using outpatient services (4.3 percentage point increase; $p=0.059$), but no change in the average level of use for users. Combining both parts of the two-part model, we find that among VA participants, those in the integrated arm experienced higher outpatient costs (\$77; $p<0.05$) and greater outpatient behavioral health costs (\$30; $p<0.10$). No other components of total cost demonstrated a statistically significant difference.

Further analyses of total and MH/SA costs were conducted separately by study site. There were no significant differences between the IC and ESR arms of the study in the cost of total cost at the site level; two sites had better access to MH/SA care in the integrated arm, two sites had greater MH/SA costs for integrated behavioral health care users as well.

IV. Conclusions

Older adult patients in primary care have an array of mental health and substance abuse conditions requiring intervention and treatment. The set of results from the PRISM-E study to date points out that effective treatments, including both IC and ESR models, are available (Levkoff, et al, 2004; Krahn, et al, 2003; Olsin, et al, 2006). Analyses in this manuscript find no difference in total health costs or expenditures between the two models, although integrated care is associated with greater behavioral health service costs in the VA settings.

One of the most important implications of this study revolves around the context of mental health and substance abuse services and the comparison of care models. Integrated care programs are expected to add cost over usual care, which is often equivalent to only modest amounts of treatment. The integrated MH/SA intervention assessed here was similarly costly than care delivered by mental health specialists working in specialty settings; we know from other work that the clinical outcomes are also similar (Krahn, et al, 2003; Olsin, et al, 2006). PRISM-E differed because access was enhanced in both the referral as well as integrated arm of the study. Despite this difference, our findings are surprisingly consistent with analyses from the IMPACT study (Katon et al., 2005), which at 24 months found that the depression intervention was associated with lower outpatient mental health costs, but no difference in total outpatient or overall total costs. Our results are also relatively consistent with Liu and colleagues (Liu, et al, 2003) who also enhanced usual care but still found higher behavioral health costs associated with the integrated intervention side, although these differences were likely not statistically significant.

Another key finding of this study is that the IC intervention was at worst budget neutral from a payor perspective in contrast with ESR care. There may be a variety of causes for this finding. First, although the intervention increased behavioral health costs, especially in the VA arm, the lack of increase in total costs may represent the cost-offset that is frequently hunted for, but seldom found (Fleming, et al, 2002; Simon, Ormel, VonKorff & Barlow, 1995; VonKorff, Katon, Bush & Lin, 1998). That is, the provision of integrated MH/SA services may have translated to lower use of the general medical system. Much of the decrease in total expenditures among non-VA participants may be due to decreases in hospital inpatient and emergency system use. These expenditures represent a greater percentage of total expenditures in the non-VA sample. The intervention services may be better at deterring the use of excess hospital services in the non-VA sample, possibly explaining the contrast in total cost between study arms which varied between the non-VA and VA samples.

It is not clear why the integrated arm had higher outpatient costs among VA participants only. Other analyses from this study showed a greater rate of engagement in MH/SA treatment by integrated participants in both the VA and non-VA settings (Bartels, et al, 2004). Greater engagement should increase outpatient costs in both settings. The ability of integrated medical records and a more comprehensive data system which may more accurately capture an increase in use in the VA cannot be ruled out as a possible explanation.

These findings may be of particular interest to Medicare Advantage managed care plans. Enrollment in these plans is again growing (KFF, 2005) as payment rates are increased and beneficiaries are faced with incentives to join. Their administrators will need to make decisions about their mental health service delivery strategy. Findings supporting budget neutrality may encourage examination of an integrated approach to providing mental health services within the plan's primary care setting.

The PRISM-E study has several important strengths. This study included 49 clinics across the country. The study adopted a relatively real-world implementation strategy, involving a diverse set of clinics that allowed providers to follow their typical practice style. PRISM-E was thus implemented in more naturalistic practice conditions than most clinical trials that rely on strict research protocols in academically affiliated research settings. Patient populations contained a wide range of ethnic and socioeconomic groups and individuals with a large number of co-occurring medical conditions were included in the study. The cost study has the further advantage of relying in part on administrative data. This reliance allows the study to document all of the MH/SA and total health care costs, not just those related to the intervention. According to our data, 15 of the 576 integrated patients (2.6%) reported seeing a psychiatrist, psychologist, or social worker out of network. Many intervention studies only document the costs directly related to the interventions themselves, thus missing an opportunity to explore extra-study costs.

The findings from the PRISM-E study are important because they complement two recently-completed large trials of integrated care among older adults, IMPACT and PROSPECT (Hegel, et al, 2002; Bruce, Ten Have & Reynolds, 2004). Their findings raised concern that since integrated care is more costly on an outpatient basis, Medicare and other payors will be unlikely to compensate the extra care. PRISM-E documents that total and MH/SA costs are actually similar in integrated versus enhanced referral care where patients are expected to receive more treatment than in usual care.

The use of expenditures, rather than costs, in the non-VA sample yields important implications. Expenditure data capture actual amounts spent by all payors, but omit costs attributed to services that do not receive reimbursement from payors (including consumers). These omitted costs include very real costs associated with the receipt of health care services, including time

and travel expenses and care-giving expenses, as well as health clinic costs that are under-reimbursed by health insurers and other payors. Integrated services, as operationalized in the PRISM-E analysis, may not meet current restrictions by insurers, if, for example, those services are offered by providers not approved by payors (such as psychiatric nurses), or are offered concurrently with primary care services and not adequately reimbursed at the margin. For example, Medicare reimbursement rules currently do not allow mid-level providers, those without a doctoral degree, to be reimbursed in a primary care setting without onsite supervision by a physician. Variation in actual expenditures also reflect not only differences in the intensity of services as captured by different CPT codes, but also differences in payor generosity even for standardized procedures. Hospital average per diem costs used for this analysis may smooth out variation in expenses for this particular sample. In addition, the primary care setting receives no financial incentive to screen or refer patients to specialty care. In VA clinics, this may be less of a problem since both the treatment arms are located inside the same hospital system.

The study has several important limitations. First, the PRISM-E sample is not generalizable to all primary care settings. Some primary care clinics are not large enough to financially support an integrated care model. Moreover, the PRISM-E population differs from the general elderly population as the participants in this study were older, more likely to be male (69%) and hailed from lower socio-economic backgrounds than the elderly in general (Levkoff, et al, 2004). Second, this study relied upon the use of CPT and diagnosis codes, as well as administrative codes in the VA, to identify mental health and substance abuse visits. Missing data on actual payments made for claims awaiting payment had to be imputed: twenty-four percent of visits from the non-VA sites had imputed reimbursement costs based on CPT codes. It is also difficult to make comparisons to the PROSPECT and IMPACT studies. Those studies had a lower percentage of male participants and a lower percentage of persons from ethnic minority groups. Finally, the short study period, while likely to capture individuals during the acute phase of their conditions, will not fully capture expenditures or costs for the full course of illness.

The finding that neither integrated nor enhanced referral is clearly superior from a cost or clinical perspective supports the recommendations of the New Freedom Commission that older adults be encouraged to select the setting that works best for them; furthermore, the Commission reports that a transformation of the existing mental health system must begin with care that engages the consumer fully and considers individual patient preferences. It also supports Department of Veteran Affairs' policy to provide patients with this choice. Previous findings for PRISM-E show that there are substantially varying preferences between the two models of care, although there was a slightly greater preference for integrated care on behalf of participants over the six month study period (Chen, et al, 2006). As clinicians and physicians continue to work with the older adult population and develop policies and programs, it is critical to consider the advantages and disadvantages of treatment models, be they integrated care or enhanced specialty referral.

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Figure 1.
Flowchart of Randomized Participants in the PRISM-E Trial

Table I

Descriptive Statistics (n=1177)

Variable	Overall mean (std dev)/ proportion	Mean / proportion in integrated sites (n=576)	Mean / proportion in referral sites (n=601)
Age	73.4 (6.1)	73.4 (6.1)	73.5 (6.1)
Female	32.0%	31.9%	32.1%
Race⁺			
White	61.1%	61.5%	60.8%
African-American	13.8%	13.5%	14.0%
Asian/Pacific Islander	6.7%	5.7%	7.7%
Hispanic/Latino/a	16.9%	17.7%	16.2%
Baseline Diagnoses			
	44.9%	45.5%	44.4%
MDD			
Other Depression	28.5%	28.6%	28.3%
Any Anxiety	25.5%	26.2%	24.8%
Any At-risk Drinking	29.1%	28.1%	30.1%
SF-36 Physical Health Summary Scale	39.3 (10.8)	39.5 (11.0)	39.1 (10.5)
Integrated Participant	48.9%	100% [*]	0%
Insurance Status (not mutually exclusive)			
Medicare	88.4%	87.3%	89.5%
Medicaid	26.3%	24.8%	27.6%
VA	40.7%	39.2%	42.2%
Other insurance	40.0%	39.9%	40.1%
Prescription Drug Coverage	79.6%	79.4%	79.8%
No Insurance Coverage	1.4%	1.6%	1.2%

⁺ Race is self-reported and multiple responses allowed. Race not available for one participant who was otherwise not excluded from the analyses.

^{*} No statistically significant differences in baseline characteristics between study arms were detected at the 90% confidence level, except in study arm assignment, in t-tests with unequal variances for continuous variables and chi-squared tests for categorical variables.

Table II
Expenditure/Cost⁺ Measures (standard deviations) during six month study period, unadjusted for covariates

Variable	Overall mean (std dev)	Percent with any use	Mean in integrated sites (n=576)	Mean in referral sites (n=601)
<i>Non-VA study sites (n=576)</i>				
Total MH/SA costs	359 (1451)	67.4	299 (469)	421 (2008)
Total costs	3206 (6366)	99.8	3145 (6600)	3268 (6129)
Outpatient visits	6.7 (5.5)	95.1	6.8 (5.9)	6.5 (5.2)
Outpatient costs	546 (582)	95.1	537 (549)	554 (615)
Outpatient MH/SA visits	2.0 (3.4)	56.1	2.1 (3.3)	1.9 (3.5)
Outpatient MH/SA costs	183 (366)	56.1	166 (279)	200 (437)
IP costs	1524 (5714)	14.6	1486 (6004)	1563 (5412)
IP MH/SA costs	62 (1356)	0.4	12 (207)	114 (1917)
Drug costs	808 (615)	97.1	802 (597)	815 (634)
MH/SA Drug costs	114 (216)	36.3	121 (204)	107 (228)
ER costs	300 (1124)	23.4	292 (1424)	308 (699)
NH costs	28 (242)	1.6	28 (223)	28 (259)
<i>VA study sites (n=601)</i>				
Total MH/SA costs	617 (1976)	79.4	678 (2388)	562 (1514)
Total costs	5024 (7756)	99.8	4764 (6432)	5260 (8784)
Outpatient visits	14.0 (16.8)	92.9	15.3 [*] (18.1)	12.8 (15.4)
Outpatient costs	1774 (3503)	92.9	1904 (3688)	1656 (3330)
Outpatient MH/SA visits	3.2 (6.2)	69.9	4.3 ^{***} (8.3)	2.2 (3.0)
Outpatient MH/SA costs	455 (1687)	69.9	563 (2374)	358 (566)
IP costs	1885 (6216)	18.3	1463 (4474)	2266 (7433)
IP MH/SA costs	40 (991)	0.2	0 (0)	77 (1366)
Drug costs	1072 (725)	97.7	1069 (737)	1076 (715)
MH/SA Drug costs	122 (208)	38.9	115 (200)	128 (215)
ER costs	250 (607)	23.5	253 (585)	247 (627)
NH costs	43 (529)	1.0	74 (746)	16 (169)

⁺ Cost measures differ between the VA (costs) and non-VA (expenditures) sites as described in the manuscript and therefore should not be compared along this dimension;

p<0.01

**
p<0.05

*
p<0.10 from t-tests with unequal variances

Table IIIExpenditures/Costs⁺ by Baseline Diagnosis

Study Diagnoses	<i>Non-VA Study Sites</i>		<i>VA Study Sites</i>	
	Mean in IC	Mean in ESR	Mean in IC	Mean in ESR
Total costs				
All depressed participants	\$3416	\$3304	\$5799	\$6429
Participants with Major depression	\$3694	\$3822	\$6554	\$5858
Participants with Anxiety	\$4180	\$3322	\$6565	\$7257
At-risk drinkers	\$2577	\$3823	\$2997	\$3970
Comorbid depression and at-risk drinkers	\$6154	\$5108	\$4021	\$7131
Total outpatient costs				
All depressed participants	\$582	\$573	\$2449	\$2035
Participants with Major depression	\$670	\$643	\$2901	\$2388
Participants with Anxiety	\$549	\$642	\$2206	\$2229
At-risk drinkers	\$311	\$292	\$1098	\$1124
Comorbid depression and at-risk drinkers	\$633	\$307	\$1949	\$1857
Total outpatient mental health costs				
All depressed participants	\$184	\$210	\$769	\$457
Participants with Major depression	\$218	\$248	\$1005	\$487
Participants with Anxiety	\$158	\$282	\$587	\$397
At-risk drinkers	\$117	\$93	\$254	\$240
Comorbid depression and at-risk drinkers	\$299	\$156	\$537	\$534

⁺ Cost measures differ between the VA (costs) and non-VA (expenditures) sites as described in the manuscript and therefore should not be compared along this dimension;

* no differences were detected at the 5% level in sample means between IC and ESR, separately for non-VA and VA sites on any of the measures reported above.

Table IVTwo-part linear regression model expenditure/cost⁺ model estimates of the effect of the integrated study arm

<i>Dependent Variable</i>	<i>Coefficient on Integrated indicator from first part LP model (any use)</i>	<i>Coefficient on Integrated indicator from second part of model (log of use for users)</i>	<i>Marginal effects in dollars[‡]</i>	<i>Number of observations for continuous regression</i>
<i>non-VA sites (n=576)</i>				
Total expenditures	--	−0.122 (0.067)	−396.48	576
Total MH/SA expenditures	0.031 (0.064)	0.049 (0.154)	18.67	388
Outpatient expenditures	−0.006 (0.012)	0.01 (0.11)	−3.31	548
Outpatient MH/SA expenditures	0.038 (0.070)	0.01 (0.20)	11.32	323
Inpatient expenditures	−0.029 [*] (0.013)	−0.21 (0.16)	−302.38	84
Emergency Room expenditures	−0.062 [*] (0.025)	0.030 (0.036)	−66.48 [*]	135
Prescription Drug expenditures		0.030 (0.080)	28.47	559
Psychotropic medication expenditures	−0.018 (0.049)	0.37 (0.23)	−5.92	209
<i>VA sites (n=601)</i>				
Total costs	--	−0.035 (0.080)	−177.12	601
Total MH/SA costs	0.055 (0.045)	0.05 (0.15)	37.83 ^{**}	477
Outpatient costs	0.043 [*] (0.014)	0.090 (0.090)	76.54 ^{**}	558
Outpatient MH/SA costs	0.056 (0.081)	0.06 (0.19)	30.38 [*]	420
Inpatient costs	−0.005 (0.021)	−0.31 (0.26)	−49.10	110
Emergency Room costs	0.012 (0.012)	−0.04 (0.14)	12.56	141
Prescription Drug costs	--	−0.22 (0.15)	−266.65	587
Psychotropic medication costs	−0.009 (0.061)	−0.12 (0.29)	−2.64	234

⁺ Cost measures differ between the VA (costs) and non-VA (expenditures) sites as described in the manuscript and therefore should not be compared along this dimension;

p<0.01;

**
p<0.05;

*
p<0.10;

Each reported coefficient is from an indicator of the integration condition. All models control for age in quadratic form, gender, presence of major depression, other depression, alcohol, or anxiety diagnoses at baseline, general health status at baseline, and site fixed effects. VA models additionally

control for the percent of the six-month study period for which VA data was available. VA models do not control for gender. Robust standard errors are adjusted for clustering at the site level.

[†] Marginal effects are calculated from retransformed models using a smearing factor. When heteroskedasticity was detected as a linear function of the exploratory variables, a heteroskedasticity-adjusted smearing factor was used (for total MH/SA costs and psychotropic medications costs). Statistical significance in the marginal effects column indicates that the marginal effect was significantly different from zero based on 1000 bootstrapped replications using bias-corrected confidence intervals.