Integrated Medical Care for Patients With Serious Psychiatric Illness

A Randomized Trial

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Background: This randomized trial evaluated an integrated model of primary medical care for a cohort of patients with serious mental disorders.

Methods: A total of 120 individuals enrolled in a Veterans Affairs (VA) mental health clinic were randomized to receive primary medical care through an integrated care initiative located in the mental health clinic (n=59) or through the VA general medicine clinic (n=61). Veterans who obtained care in the integrated care clinic received on-site primary care and case management that emphasized preventive medical care, patient education, and close collaboration with mental health providers to improve access to and continuity of care. Analyses compared health process (use of medical services, quality of care, and satisfaction) and outcomes (health and mental health status and costs) between the groups in the year after randomization.

Results: Patients treated in the integrated care clinic were significantly more likely to have made a primary care visit and had a greater mean number of primary care visits than those in the usual care group. They were more likely to have received 15 of the 17 preventive measures outlined in clinical practice guidelines. Patients assigned to the integrated care clinic had a significantly greater improvement in health as measured by the physical component summary score of the 36-Item Short-Form Health Survey than patients assigned to the general medicine clinic (4.7 points vs –0.3 points, $P<.001$). There were no significant differences between the 2 groups in any of the measures of mental health symptoms or in total health care costs.

Conclusion: On-site, integrated primary care was associated with improved quality and outcomes of medical care.

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A N EXTENSIVE literature has demonstrated a link between availability of primary care services and improved quality and outcomes of medical care.[1,2] Primary medical care may be particularly important for vulnerable populations, for whom geographic and socioeconomic disadvantage may make it difficult to successfully obtain access to appropriate medical care.[3] Patients with mental illness constitute one such vulnerable population. Socioeconomic disadvantage,[4] difficulties in obtaining and maintaining health insurance,[5] symptoms such as cognitive limitations and lack of motivation, and physician discomfort in treating these patients may all combine to limit these individuals' ability to obtain medical care.[6]

For patients with mental illnesses treated in the public sector, specialty mental health clinics are likely to be the first, and often the only, points of contact with the health care system.[7] During the mid-1970s, mental health care policymakers began to advocate for public sector psychiatrists to be designated as primary care providers.[8,9] More recent proposals have suggested providing psychiatrists with additional medical training to permit them to provide their patients with a full range of medical services.[10] However, public sector mental health care facilities rarely devote substantial time or resources to their patients' medical care.[11] When researchers have taken medical histories and administered physical examinations to patients treated in these clinics, fewer than half of the medical illnesses had previously been recognized.[12,13]

There is almost no literature describing or evaluating programs for improving the medical care of patients with mental illnesses. To our knowledge, only one previous article[14] in the literature described a program integrating medical treatment for patients with serious mental disorders; the authors of that article concluded that such models appeared feasible and warranted systematic study using randomized designs.

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SUBJECTS AND METHODS

SUBJECTS

Subjects were recruited from a Veterans Affairs (VA) mental health clinic treating approximately 5000 outpatients at an academic medical center. All mental health care providers were asked to refer any patients whom they thought would benefit from primary care to be assigned a medical treater. All patients were eligible for enrollment in the study except for those who had a current primary care provider or an urgent or multiple serious chronic problems. Patients who already had a primary care provider listed in VA electronic records (approximately half of the clinic's 5000 patients) were not eligible for enrollment. The family practitioner prescreened referrals to the clinic, which was authorized to treat routine but not urgent or complex medical problems. Patients determined by the family practitioner to have had a medical hospitalization in the past 6 months or 4 or more serious chronic conditions were referred to the general medical clinics.

A research assistant obtained informed consent from all eligible referrals who agreed to participate in the study. Participants were then randomized to receive care in either the integrated care clinic or the VA general medicine clinic (usual care), using computer-generated random numbers. The recruitment and study procedures were approved by local VA and university institutional review boards.

INTEGRATED CARE

The psychiatry service assumed clinical responsibility for the primary medical care of all patients randomized to the integrated care intervention and paid the salaries of all clinic staff through clinical funds. The clinic was located contiguous to the mental health clinics.

The clinic was staffed by a nurse practitioner (1 full-time equivalent [FTE]), a part-time family practitioner (0.5 FTE), a nurse case manager (1 FTE), and an administrative assistant (0.5 FTE). The medical nurse practitioner was the main provider of basic medical care. The family practitioner supervised the nurse practitioner and acted as a liaison to physicians in the psychiatry and medical services. The registered nurse provided patient education, liaison with mental health care providers, and case management services. The administrative assistant scheduled appointments and took telephone messages for the clinic.

Clinic staff emphasized patient education, preventive services, and close contact with mental health care providers, including e-mail, telephone, and face-to-face discussion about patients. Patients were prompted with telephone reminders the day before appointments, and whenever possible, clinic appointments were scheduled immediately following mental health visits to minimize barriers to attendance. When appointments were missed, clinic staff made active efforts to reschedule visits through contacting patients, their family members, and/or mental health care providers.

One provider from the integrated clinic served as a liaison to each of 3 mental health teams, attending weekly team meetings. Mental health care providers were notified about patients' medical status, were asked to keep the integrated care clinic abreast of changes in patients' psychiatric status, and were encouraged to coordinate efforts with the integrated care clinic to ensure that patients attended medical appointments and followed through with needed medical tests.

USUAL CARE

Veterans randomized to the usual care group in this study were referred to the VA general medicine clinic, located in a building adjacent to the mental health clinic. For each patient randomized to usual care, a referral form was sent and verbal contact was made with the clinic administrator. This process ensured that all veterans referred for care were provided a primary care provider, following the referral pattern that was available before introduction of the integrated care clinic.

Twenty-nine veterans assigned to the general medicine clinic were treated by a medical attending physician, 28 by a nurse practitioner or physician assistant, and 11 by a medical resident. Similar to findings in larger studies,[15] we did not find significant differences in process or outcomes of care across provider types in the general medicine clinic (although there was limited statistical power for these subanalyses).

MEASURES

Service Use

Use of the following categories of service was assessed at baseline and then for each 6-month period after entry into the study: for medical visits, primary care visits (ie, visits to usual source of care as identified in VA administrative records), visits to specialty or consultant providers, inpatient days, and number of emergency department visits; for psychiatric visits, outpatient visits, inpatient days, and emergency department visits.

Data on VA service use were gathered from the hospital's administrative records. Data on service use outside the VA for the same types of services were collected in

This study compares the delivery of integrated medical care provided in a mental health clinic with usual care in a general medicine clinic for patients with serious mental disorders. We test the hypothesis that integrated care can increase access to primary care services, raise quality of preventive care, and improve health-related quality of life.

RESULTS

SCREENING AND ENROLLMENT PROCESS

Of 211 patients referred for primary care medical services, 181 were eligible for randomization (**Figure**). Altogether, 30 patients had multiple chronic conditions or urgent needs

interviews at baseline, 6-month, and 12-month follow-up. Non-VA services comprised 14% of outpatient specialty visits and 8% of inpatient days across the treatment conditions.

Quality of Preventive Care

Indicators of quality of preventive care were drawn from US Preventive Services Task Force[16] and VA[17] guidelines. Because of the cohort's low socioeconomic status, high levels of substance use, and lack of primary care at baseline, all participants were considered high risk and thus eligible for interventions such as influenza vaccine and hepatitis screening, which are generally targeted toward such high-risk populations. Compliance with these services were drawn from review of electronic and paper medical records every 6 months.

Satisfaction

Satisfaction with medical care was rated using a 47-item questionnaire that covered the following subdomains: access, provider characteristics (information, attention to patient preferences, emotional support, and courtesy), coordination, continuity of care, and overall care.[18,19] The score for each subscale was calculated as the mean number of questions in that domain for which the individuals reported difficulties during either the 6-month or 12-month follow-up.

Physical and Mental Health Status

The 36-Item Short-Form Health Survey (SF-36) is a well-validated measure of health status constructed for use in the Medical Outcomes Study.[20-22] The physical component summary[23] was the primary clinical outcome measure for the study. For patients with serious mental disorders, the physical subscales have been demonstrated to have good internal consistency, test-retest reliability, and concurrent and discriminative validity.[24,25] Because the SF-36 mental subscales are less useful in this population,[24] we instead mainly relied on the Symptom Checklist–90[26] and the Addiction Severity Index[27] to assess mental symptoms at baseline at follow-up. These were assessed in unblinded interviews at baseline and every 6 months after randomization. The interviews were conducted by a research assistant with master's degree–level training and extensive interview experience.

Costs

Costs were calculated by multiplying the number of units of each type of service by the mean unit costs for those services. Local VA unit costs were drawn from the cost distribution report, a facility-by-facility accounting of inpatient and outpatient expenditures that identifies both direct and indirect costs of care, including staff salaries, equipment costs, and depreciation costs.[28,29]

Direct costs for the integrated care clinic were calculated based on staff salaries and benefits and other expenditures, including equipment. Unit costs for the integrated care clinic were calculated by multiplying those costs by the ratio of direct to indirect costs for the psychiatry service and then dividing the clinic expenditures by the typical number of clinic visits during the period of study, following a method described previously.[28]

For non-VA services, inpatient mental and general medical unit costs were based on national inpatient expenditure data published by the American Hospital Association.[30] Outpatient unit costs (general medical, specialty medical, and mental health) were based on mean US fees for office visits by specialty.[31]

STATISTICAL ANALYSIS

All analyses were conducted as intention to treat. To ensure that randomization was successful, bivariate tests were first used to compare baseline demographic, diagnostic, and health status variables between the 2 groups. Bivariate tests were also used to compare the baseline characteristics of dropouts to the remainder of the sample.

Dichotomous service use, satisfaction, and quality of preventive care variables were analyzed as comparisons between groups during the year after randomization. Since there were no significant baseline differences between the 2 groups in demographic, diagnostic, or health status variables (**Table 1**), bivariate tests were used to compare each of these variables between groups.

Random regression was used for analyses of primary outcomes (health status and costs) during the study period. This method makes it possible to compare the difference in change between groups over time and to conduct intention-to-treat analyses that include subjects with missing data at 1 or more follow-up periods.[33] Each equation modeled the dependent variable as a function of randomization group, period (baseline, 6-month, or 1-year follow-up), and the group × time interaction, which represents the difference in change between the 2 groups over time.

Because cost estimates are highly nonnormally distributed, cost differences were modeled using censored normal models for log-transformed cost plus $1. Means were retransformed from the log scale using the smearing estimator technique developed by Duan.[34,35]

Analyses were conducted using the SAS system, version 8.0 (SAS Institute Inc, Cary, NC). All tests of statistical significance were 2-tailed and used an α level of P<.05.

that required direct referral to the general medicine clinic. A total of 120 patients consented to participate (Figure). Of the 61 veterans who declined, most (51%) opted out of randomization to be assigned directly to the integrated care clinic.

Of the 120 veterans who were initially randomized, 76.3% completed the 6-month follow-up survey, 69.2% completed 12-month follow-up, and 66.7% completed both 6- and 12-month surveys. There were similar rates of attrition in the 2 clinics (Figure). There were no statistically significant differences in demographic, diagnostic, or health status variables between those with and without missing 6- or 12-month survey data. Because VA utilization, quality, and cost measures were collected via administrative and chart review, data for these

Table 1. Baseline Characteristics of Study Sample*

Characteristics	Integrated Care (n = 59)	Usual Care (n = 61)
Demographics		
Age, mean (SD), y	45.7 (8.4)	44.8 (8.0)
Female	0	1 (1.6)
White	45 (76.3)	39 (63.9)
Married	19 (32.2)	20 (32.8)
High school graduate	55 (93.2)	50 (82.0)
Currently employed	26 (44.1)	31 (50.8)
Income, in thousands, mean (SD), $	17.0 (11.8)	18.0 (13.4)
Primary psychiatric diagnosis (chart based)		
Schizophrenia	13 (22.0)	12 (19.7)
Posttraumatic stress disorder	19 (32.2)	16 (26.2)
Major affective disorder	7 (11.9)	9 (14.8)
Substance use disorder	15 (25.4)	18 (29.5)
Other	5 (8.5)	6 (9.8)
Severe psychiatric illness†	47 (79.7)	44 (72.1)
Medical diagnoses‡		
Arthritis or back problem	5 (9.3)	7 (15.9)
Gastrointestinal or liver disease	7 (13.0)	6 (13.6)
Hypertension	8 (14.8)	4 (9.1)
Hypercholesterolemia	5 (9.3)	5 (11.4)
Cardiac disease	7 (13.0)	1 (2.3)
Chronic lung disease	4 (7.4)	4 (9.1)
≥1 Medical diagnosis not previously known‡	29 (53.7)	23 (52.3)
Global Assessment of Functioning score, mean (SD)	45.9 (9.9)	48.9 (10.9)

*All data are number (percentage) unless otherwise indicated. The groups did not differ on any variable at the $P<.05$ level except for cardiac disease ($\chi^2_1 = 5.0$, $P = .05$).
†As defined by the National Advisory Mental Health Council criteria.[32]
‡This information was gathered from chart reviews among patients with at least 1 primary care visit in the 2 groups (n = 54 for integrated care group, n = 44 for usual care group). Percentages for these variables are calculated using these denominators.

variables were available for 100% of subjects randomized into the study. Data for use of non-VA services (a small portion of overall service use) were available only for individuals who completed the follow-up surveys.

IMPLEMENTATION AND CONTENT OF INTEGRATED AND USUAL CARE

Four of the 120 subjects were transferred from the integrated care clinic to the general medicine clinic after randomization. Three of these were found to have urgent medical conditions on initial evaluation, and the fourth was transferred because of a language barrier. There were no significant baseline differences between these crossovers and the remainder of the sample. No subjects assigned to the general medicine clinic were transferred or used any services in the integrated care clinic.

The case manager kept records of interventions that she provided throughout the study period. (These interventions were recorded for the clinic as a whole rather than linked to specific participants in the study.) During the study, the case manager recorded 739 interventions: (1) telephone reminders to patients about upcoming appointments and blood tests (29%), (2) escorting
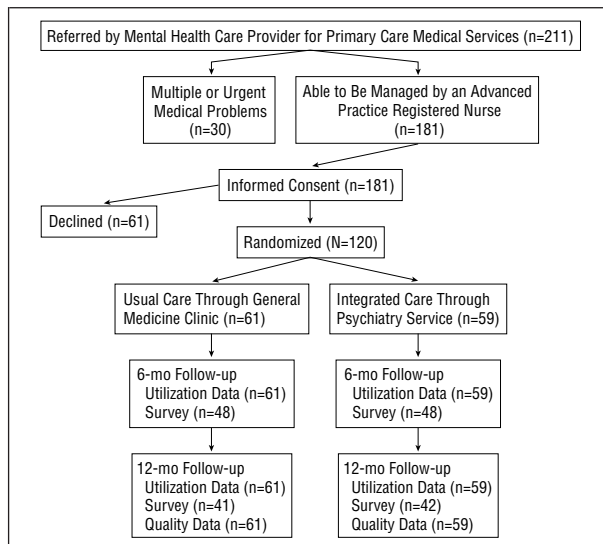
Screening and enrollment process.

patients to medical appointments (23%), (3) booking transportation from home to the clinic or specialty clinics (18%), (4) communicating with providers in other clinics (17%), (5) picking up medications at the pharmacy (7%), and (6) making home visits to patients' homes to deliver medications or equipment (6%). In addition to these specific interventions, the case manager provided general psychosocial support to patients, encouraging them to call or visit if any problems arose.

Discussions with administrators in both the mental health and general medical clinics confirmed that there were no similar medical case management services targeted toward individuals with mental disorders in either of these 2 settings.

BASELINE CHARACTERISTICS

There were no significant differences between the 2 groups in demographic, diagnostic, or health status data at the time of randomization except for prevalence of cardiac disease, which was higher in the integrated care group. Almost all patients were male, reflecting the veteran population from which the sample was drawn. Using an algorithm developed by the National Advisory Mental Health Council that includes diagnosis, Global Assessment of Functioning score, and hospitalization history,[32] more than three quarters of patients met criteria for severe mental illness.

After enrollment in the study, a similar range of medical problems was reported in chart reviews among patients with at least 1 visit in each of the 2 groups. During the 1-year study period, more than half of patients with at least 1 visit in each group were found to have at least 1 medical diagnosis not previously recorded in their VA medical records (Table 1).

SERVICE USE

Patients in the integrated clinic were significantly more likely than those in the general medicine clinic to make a primary care visit in the year after referral (91.5% vs 72.1%; $\chi^2_1 = 7.5$, $P = .006$) (**Table 2**). They were also sig-

nificantly less likely to have an emergency department visit during the year after referral than those in the general medicine clinics (11.9% vs 26.2%; $P=.04$). There were no significant differences in rates of other categories of service use across the 2 treatment conditions.

QUALITY OF PREVENTIVE CARE

Fewer than half (44.2%) of patients had received 1 or more of the preventive interventions in any setting in the year before baseline; on average, patients had received a mean of 1.2 of the possible 17 measures (**Table 3**). In the year after random assignment, patients in the integrated care clinic were significantly more likely than those in the general medicine clinic to have received 15 of the 17 preventive measures. The 2 groups had similar rates of hemoccult testing. Veterans in the integrated care clinic were

significantly less likely than those in the general medicine clinic to have one of the indicators, use of a pneumonia vaccine (Pneumovax). However, among patients 65 years and older, the typical target population for use of this vaccination,[16] these differences were not significant.

SATISFACTION WITH MEDICAL CARE

In the year after randomization, veterans assigned to the integrated care clinic reported significantly fewer problems in 6 of 8 satisfaction domains: access, attention to patient preferences, courtesy, coordination, continuity, and overall care (**Table 4**). The largest effect was in continuity of care, where only 1.3% of those in integrated care reported a problem, compared with 22.5% of those in the general medical clinic. There was no significant difference between the 2 groups on satisfaction with emotional support or information.

PHYSICAL AND MENTAL HEALTH STATUS

During the year after randomization, subjects in the integrated care clinic had a 4.7-point increase (ie, improvement) in the physical component summary score, whereas subjects in the general medicine clinic had a 0.3-point decline in the score (**Table 5**). In random regression models, the group $\times$ time interaction, which reflects the difference in change between the 2 groups, was significant ($t_{170}=3.7$, $P<.001$). Although there are no absolute guidelines for clinically significant change on the physical component summary, the average change throughout 1 year in the intervention group (4.7 points) is similar to the effect size seen for effective treatment of duodenal ulcers.[36]

Table 2. Service Use in the Year After Randomization

	No. (%)		
Any Service Use	**Integrated Care (n = 59)**	**General Medicine (n = 61)**	**Difference**
Medical service use			
Primary care	54 (91.5)	44 (72.1)	$\chi^2_1 = 7.5$, $P = .006$
Specialty	41 (69.5)	41 (67.2)	$\chi^2_1 = 1.9$, $P = .17$
Emergency department	7 (11.9)	16 (26.2)	$\chi^2_1 = 4.0$, $P = .04$
Inpatient	5 (8.5)	11 (18.0)	$\chi^2_1 = 2.4$, $P = .12$
Mental health service use			
Outpatient	58 (98.3)	61 (100)	$\chi^2_1 = 1.0$, $P = .31$
Emergency department	21 (35.6)	25 (41.0)	$\chi^2_1 = 0.37$, $P = .54$
Inpatient	8 (13.6)	10 (16.4)	$\chi^2_1 = 0.19$, $P = .66$

Table 3. Quality of Preventive Care (12-Month)

	No. (%)*		
Measure	**Integrated Care (n = 59)**	**General Medicine (n = 61)**	**Difference**
Coordination			
Medication list in chart	51 (86.4)	39 (63.9)	$\chi^2_1 = 8.1$, $P = .004$
Problem list in chart	52 (88.1)	41 (67.2)	$\chi^2_1 = 7.5$, $P = .006$
Physical examination			
Hemoccult	29 (49.2)	27 (44.3)	$\chi^2_1 = 2.7$, $P = .10$
Weight	50 (84.7)	36 (59.0)	$\chi^2_1 = 9.8$, $P = .002$
Blood pressure	50 (84.7)	40 (65.6)	$\chi^2_1 = 5.9$, $P = .01$
Digital rectal examination	41 (69.5)	27 (44.3)	$\chi^2_1 = 7.8$, $P = .005$
Flexible sigmoidoscopy	20 (33.9)	9 (14.8)	$\chi^2_1 = 6.0$, $P = .01$
Laboratory testing			
Diabetes screening	42 (71.2)	28 (45.9)	$\chi^2_1 = 7.9$, $P = .005$
Hepatitis screening	23 (39.0)	9 (14.8)	$\chi^2_1 = 9.0$, $P = .003$
Cholesterol screening	47 (79.7)	35 (57.4)	$\chi^2_1 = 6.9$, $P = .009$
Tuberculosis screening	11 (18.6)	4 (6.6)	$\chi^2_1 = 4.0$, $P = .04$
Vaccination			
Received flu vaccine	19 (32.2)	7 (11.5)	$\chi^2_1 = 7.6$, $P = .006$
Received Pneumovax	7 (11.9)	20 (32.8)	$\chi^2_1 = 7.5$, $P = .006$
Education			
Exercise	48 (81.4)	32 (52.5)	$\chi^2_1 = 11.2$, $P<.001$
Nutrition	49 (83.1)	38 (62.3)	$\chi^2_1 = 6.5$, $P = .01$
Smoking	50 (84.7)	39 (63.9)	$\chi^2_1 = 6.7$, $P = .009$
Discussed advanced directives	19 (32.2)	3 (4.9)	$\chi^2_1 = 14.9$, $P<.001$

*Data are the number (percentage) of individuals receiving each of the interventions in the year after entry into the study.

None of the corresponding group×time interactions for the Symptom Checklist–90 ($t_{160} = 1.62$, $P = .11$), the alcohol ($t_{171} = 0.86$, $P = .39$) or drug ($t_{172} = 0.53$, $P = .6$) subscales of the Addiction Severity Index, or the SF-36 mental component summary ($t_{170} = 0.17$, $P = .87$) were statistically significant (Table 5).

COSTS

The mean costs per subject treated in the integrated care clinic (logged and then retransformed) were $13 010 (SD, $13 271) vs $14 543 (SD, $15 871) for patients in the gen-

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Table 4. Satisfaction With Medical Care*

| | Difficulties, Mean (SD), %† | | |
Domain	Integrated Care (n = 40)	General Medicine (n = 40)	Difference
Access	3.1 (4.7)	11.4 (11.2)	$t_{38} = 3.8$, $P<.001$
Courtesy	4.2 (9.2)	15.1 (27.6)	$t_{34.7} = 2.1$, $P = .046$
Attention to patient preferences	12.3 (10.1)	20.4 (17.7)	$t_{45.5} = 32.2$, $P = .03$
Emotional support	7.6 (8.6)	9.2 (8.7)	$t_{38.8} = 0.42$, $P = .68$
Information	12.0 (12.6)	18.3 (16.4)	$t_{44} = 1.48$, $P = .15$
Continuity	1.3 (7.7)	22.5 (10.0)	$t_{40.9} = 3.7$, $P<.001$
Coordination	13.3 (10.8)	24.3 (20.4)	$t_{42.7} = 2.6$, $P = .01$
Overall care	8.0 (8.9)	12.4 (22.3)	$t_{38.5} = 3.0$, $P = .005$

*These analyses include only individuals who completed 6- and 12-month follow-up surveys.
†The score for each subscale is calculated as the mean number of questions in that domain for which the individuals report difficulties. Thus, possible scores range from 0% (no problems) to 100% (problems in all questions for that domain).

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eral medicine clinic. The group×time interaction term was not significant in the random regression model ($t_{238} = -0.43$, $P = .67$). Primary care costs in the integrated care clinic were estimated at $1582 per patient ($266 per visit), in contrast to $398 per patient ($148 per visit) for the general medicine clinic ($t_{238} = 2.4$, $P = .02$ for group×time interaction in random regression model). This was largely a function of the fact that because the clinic was in its startup phase, clinicians did not have full caseloads. There were no other significant differences in specific components of costs. The significant difference in primary care costs appeared to be offset by large nonsignificant difference in impatient costs between the 2 groups after follow-up ($2673 in the general medical clinic vs $410 in the integrated care clinic group; $t_{238} = -1.32$, $P = .19$).

COMMENT

The study found that for a cohort of patients with serious mental illness, integrated, on-site delivery of primary care was feasible, promoted greater access to primary care and preventive care, and resulted in a significantly larger improvement in health status than usual care. Although the confidence intervals around cost estimates are wide because of the modest sample size, the intervention appeared to be cost neutral when considering total health care expenditures for subjects in each group.

Before baseline, the subjects had received little medical care. Half of medical problems were not documented in VA records, and patients had very low rates of preventive services. Rates of primary care visits and preventive care improved for both the integrated care and the general medicine clinics, implying that any referral

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Table 5. Health and Mental Health Status

| | Mean (SD) Score | | |
Measure*	Integrated Care	General Medicine	Difference†
SF-36‡ physical component summary			
Baseline	46.2 (9.6)	45.6 (9.8)	
6 mo	49.2 (7.6)	44.9 (10.4)	$t_{170} = 3.7$, $P<.001$
12 mo	50.9 (7.1)	45.3 (9.7)	
SF-36 mental component summary			
Baseline	32.6 (14.1)	35.1 (14.1)	
6 mo	34.0 (13.7)	37.0 (13.5)	$t_{170} = 0.17$, $P = .87$
12 mo	35.0 (14.6)	37.1 (13.9)	
Symptom Checklist–90			
Baseline	89.9 (23.0)	83.9 (22.7)	
6 mo	78.8 (20.7)	80.2 (24.4)	$t_{160} = 1.62$, $P = .11$
12 mo	77.1 (21.4)	79.7 (25.0)	
Addiction Severity Index drug subscale			
Baseline	0.09 (0.07)	0.11 (0.10)	
6 mo	0.07 (0.05)	0.07 (0.04)	$t_{172} = 0.53$, $P = .6$
12 mo	0.07 (0.04)	0.09 (0.06)	
Addiction Severity Index alcohol subscale			
Baseline	0.07 (0.23)	0.09 (0.27)	
6 mo	0.00 (0.17)	0.03 (0.22)	$t_{171} = 0.86$, $P = .39$
12 mo	0.04 (0.18)	0.01 (0.18)	

*For baseline group, n = 59 for integrated care and n = 61 for general medicine; for 6-month group, n = 48 for integrated care and n = 48 for general medicine; and for 12-month group, n = 41 for integrated care and n = 42 for general medicine.
†Statistical test for group × time coefficient from a random regression equation as a function of the group, time (baseline, 6 months, 12 months) and group × time. This coefficient represents the difference in change over time between the 2 groups, accounting for clustering within subjects.
‡SF-36 indicates 36-Item Short-Form Health Survey.

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for primary care can provide an important first step in improving access to medical care for patients with serious mental disorders. However, patients in the integrated care clinic improved substantially more than those in the general medical clinics. This improvement appeared to be specific to physical health domains, rather than a more general effect on emotional well-being or mental symptoms.

At least 2 broad categories of "active ingredients" in the clinic may have contributed to improved outcomes. First, the clinic used additional staff resources to improve access and adherence to care, including outreach by the case manager, extra time for visits in the clinic, and flexibility in scheduling appointments. This clinic targeted a caseload of only half that carried by practitioners in the VA general medical clinics. However, the clinic provided added value for those additional expenditures in terms of improved quality and clinical outcomes of care. Furthermore, the intervention appeared to be cost neutral in terms of overall expenditures, which are predominantly a function of inpatient rather than outpatient service use.

The second way in which the clinic is likely to have improved care was through a basic reorganization that allowed greater integration of medical and mental health care services. At its most fundamental level, integration involves breaking down boundaries to improve the transfer of information.[37] Integration across service lines has been shown to improve care for patients with serious mental illness[38,39] and in the treatment of depression in primary care.[40-42] For the integrated care clinic, the on-site location, common chart, and enhanced channels of communication, including joint meetings, e-mail, and in-person contact, facilitated the development of common goals and sharing of information between medical and mental health care providers.

The study has several limitations. The sampling strategy was based on referrals rather than a population-based sampling strategy. The modest sample size provided only limited statistical power for cost estimates, particularly for inpatient service use, in which SDs are highest and distributions least normal. A sample size of 3 to 4 times that used in the present study would probably be needed to make more definitive statements about differences in costs or cost-effectiveness between integrated and usual care.[43] The sample size and length of follow-up did not allow for the measurement of more distal outcomes, such as mortality and adverse medical events. Limited resources did not permit the use of blinded interviews, although the possibility of interviewer bias was mitigated by the use of standardized, structured interviews. Similarly, it was impossible to blind participants to their treatment assignment, raising the possibility of bias due to knowledge of that assignment (ie, a Hawthorne effect).

Finally, the VA has a unique population and structural characteristics that may limit generalizability to non-VA settings.[44-46] Most notably, mental health and medical care are already provided in a quasi-integrated fashion in the VA, since both types of services are provided in the same facility.[7] The fact that community mental health centers and other public sector mental health facilities do not have in-house medical facilities increases both the potential challenges and benefits of providing on-site primary care in those facilities.

Despite these limitations, the study provides evidence that integrating medical treatment can improve the care and health status of patients with serious mental disorders. We hope that the study can serve as an impetus for further research and program development focused on improving medical care in this vulnerable population.

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