Recovery From Depression Predicts Lower Health Services Costs

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Objective: To examine the association between outcome of acute-phase depression treatment and subsequent health services costs.

Method: Data from 9 longitudinal studies of patients starting depression treatment were used to examine the relationship between outcome of acute-phase treatment and health services costs over the subsequent 6 months. All studies were 2- to 4-year studies conducted between the years 1991 and 2004. Assessment of diagnosis was done using the Inventory of Depressive Symptoms or the Structured Clinical Interview for DSM-IV. Clinical outcomes were assessed by structured telephone interviews using the Hamilton Rating Scale for Depression or a 20-item depression scale extracted from the Hopkins Symptom Checklist. Costs were assessed using health plan accounting records.

Results: Of 1814 patients entering treatment and meeting criteria for major depressive episode, 29% had persistent major depression 3 to 4 months later, 37% were improved but did not meet criteria for remission, and 34% achieved remission of depression. Those with persistent depression had higher baseline depression scores and higher health services costs before beginning treatment. After adjustment for baseline differences, mean health services costs over the 6 months following acute-phase treatment were $2012 (95% CI = $1832 to $2210) for those achieving remission, $2571 (95% CI = $2350 to $2812) for those improved but not remitted, and $3094 (95% CI = $2802 to $3416) for those with persistent major depression. Average costs for depression treatment (antidepressant prescriptions, outpatient visits, and mental health inpatient care) ranged from $429 in the full remission group to $585 in the persistent depression group.

Conclusions: Among patients treated for depression in community practice, only one third reached full remission after acute-phase treatment. Compared with persistent depression, remission is associated with significantly lower subsequent utilization and costs across the full range of mental health and general medical services.

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Abundant research[1–6] demonstrates a strong and consistent association between depression and increased use of health services. Total health care costs for outpatients with current depression are 50% to 100% higher than for those without depressive disorder.[1–3] This relationship has been observed in general medical outpatient samples,[1,3] older adults,[2,5] and patients with chronic medical illness.[6,7] Increased costs are overwhelmingly due to greater use of general medical services rather than costs of depression treatment.[1–3] Differences persist after accounting for potential confounders such as medical comorbidity.[1–3] This consistent association between depression and increased health care costs suggests the possibility that improved depression treatment could actually decrease overall use of health services.

Few data are available regarding changes in health care costs during depression treatment. In a sample of 290 primary care patients beginning depression treatment, we reported that more favorable outcomes after 12 months of treatment were associated with lower health services costs over the following year, but this relationship was not statistically significant.[8] In a 6-site cross-national study of depressed primary care patients (total N = 968), favorable clinical outcome at 9 months was consistently associated with lower health services costs, but this relationship was only statistically significant at a single site.[9]

In the current report we used data from 9 longitudinal studies of patients starting depression treatment (including the 290 patients from our previous report[8]) to examine the relationship between outcome of acute-phase treatment and subsequent health services costs. The large sample size allowed us to overcome some limitations of

Table 1. Characteristics of Included Studies

Treatment Comparison	Study Population	Study Years	Sample Used for These Analyses (N)	Primary Outcome Measure	Time of Acute Phase Outcome Assessment (mo)	Percent in Full Remission at 3 or 4 Months
Psychiatrist collaborative care vs usual care[19]	Primary care patients starting antidepressant	1991–1993	89	SCL	4	38
Psychologist collaborative care vs usual care[20]	Primary care patients starting antidepressant	1993–1995	77	SCL	4	40
Fluoxetine vs tricyclic antidepressants[17]	Primary care patients starting antidepressant	1992–1994	367	SCL and HAM-D	3	33
Systematic depression treatment vs usual care[21]	High utilizers screened for depression	1995–1997	105	HAM-D	3	14
Telephone care management vs usual care[22]	Primary care patients starting antidepressant	1996–1998	376	SCL	3	23
Psychiatrist collaborative care vs usual care[23]	Primary care patients starting antidepressant	1997–1999	85	SCL	3	20
Telephone care management vs usual care[24]	Psychiatry patients starting antidepressant	2000–2001	148	SCL	3	29
Telephone psychotherapy vs telephone care management vs usual care[24]	Primary care patients starting antidepressant	2000–2003	356	SCL	3	42
Systematic depression treatment vs usual care[25]	Diabetics screened for depression	2001–2004	211	SCL	3	15

Abbreviations: HAM-D = Hamilton Rating Scale for Depression, SCL = Hopkins Symptom Checklist depression scale.

earlier research. We focused on clinical outcome following acute-phase treatment because our previous research suggested that remission after 3 to 4 months of treatment strongly predicts subsequent clinical course.[10]

METHOD

Data were collected from 9 studies, all of which were 2- to 4-year studies conducted between the years 1991 and 2004 at Group Health Cooperative (GHC), a prepaid health plan in Washington State. The GHC population is generally similar to the area population[11] and includes members enrolled via employers as well as via capitation agreements with Medicare, Medicaid, and the Washington Basic Health Plan (a state-subsidized program for low-income residents).

Characteristics of the 9 studies are summarized in Table 1. All 9 were randomized effectiveness trials comparing alternative treatments for depression. In 7 studies, participants were identified by the treating physician's decision to begin antidepressant treatment. In the other 2, participants were identified by depression screening. Outcome of acute-phase treatment was assessed by blinded telephone interview at either 3 or 4 months after treatment initiation. In all studies, participants received a full written description of study procedures and potential risks. All participants gave informed consent or documented oral consent for collection of follow-up data and use of computerized medical records for research. In 2 studies that involved no in-person contact with participants, the institutional review board approved a documented oral consent procedure. Procedures for all original studies as well as procedures for this secondary analysis were reviewed and approved by GHC's Human Subjects Review Committee (institutional review board).

In each study, baseline and follow-up assessments included either a structured or semistructured interview assessment of depression diagnosis using the Inventory for Depressive Symptomatology (IDS)[12] or the Structured Clinical Interview for DSM-IV (SCID).[13] Blinded follow-up assessments also included standard measures of depression severity, either the Hamilton Rating Scale for Depression (HAM-D)[14,15] or a 20-item depression scale extracted from the Hopkins Symptom Checklist (SCL).[16] Our previous research demonstrates strong correlations between the HAM-D and SCL scales[17] as well as excellent agreement between telephone and in-person administration for both measures.[18]

These analyses were limited to patients satisfying DSM-IV criteria for current major depressive episode at the baseline assessment. The sample was further limited to those who completed a follow-up assessment at 3 or 4 months (so acute-phase outcome could be classified) and who remained enrolled in the health plan for at least 6 months after the follow-up assessment (so health services cost data were available).

Acute-phase treatment outcome was classified as full remission, partial remission, or persistent depression based on diagnostic assessments and symptom scales at the 3- or 4-month assessment. The criterion for the full remission category was either a HAM-D score of 7 or less or an SCL depression score of 0.7 or less. The criterion for the persistent depression category was either major depressive episode (assessed by either the SCID or the IDS) or moderate depressive symptoms (defined by a HAM-D score of 15 or more or an SCL depression score of 1.5 or

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Table 2. Baseline Characteristics According to Acute Phase Clinical Outcome

Characteristic	Full Remission (N = 609)	Partial Remission (N = 672)	Persistent Depression (N = 533)	Statistic[f] Test	df	p
Age, mean (SD)	44.9 (13.8)	46.4 (14.7)	46.8 (14.5)	F = 2.96	2,1811	.052
Female, % (N)	75 (454)	70 (473)	73 (391)	χ^2 = 2.97	2	.23
Baseline depression scores, mean (SD)						
SCL[a]	1.80 (0.64)	1.88 (0.55)	2.12 (0.60)	F = 40.8	2,1510	< .001
HAM-D[b]	14.0 (2.9)	14.5 (3.1)	17.4 (4.0)	F = 31.5	2,386	< .001
Standardized[c]	–0.24 (1.02)	–0.10 (0.90)	0.44 (1.02)	F = 75.0	2,1811	< .001
Follow-up depression scores, mean (SD)						
SCL[a]	0.38 (0.21)	1.08 (0.22)	2.03 (0.44)	F = 3672	2,1510	< .001
HAM-D[b]	4.3 (2.2)	10.9 (2.0)	19.4 (4.3)	F = 709	2,386	< .001
Standardized[c]	–2.63 (0.47)	–1.33 (0.43)	0.36 (0.92)	F = 3162	2,1811	< .001
RxRisk score, mean (SD)[d]	2214 (2216)	2396 (2254)	2881 (2618)	F = 12.1	2,1811	< .001
Prior costs, mean (SD), $[e]	2318 (5509)	2248 (4043)	3188 (5908)	F = 5.66	2,1811	.004

[a]Includes 8 studies using the Hopkins Symptom Checklist (SCL) depression scale.
[b]Includes 2 studies using the Hamilton Rating Scale for Depression (HAM-D).
[c]Includes all studies, with score standardized to baseline mean and standard deviation in full sample.
[d]Based on computerized pharmacy records, a calculation of estimated severity of comorbid medical illness and predicted health services costs for the 6 months prior to study entry (see Fishman et al.[26]).
[e]Total health services costs during 6 months prior to study entry.
[f]Overall test for heterogeneity across 3 groups.

more). The remaining patients (those not meeting the criterion for either full remission or persistent depression) were classified as reaching partial remission.

As described in previous publications,[17,19–25] the quality and intensity of treatment varied considerably. The majority of patients received some antidepressant treatment, but poor adherence and inadequate follow-up care were common. Fewer than half of patients received psychotherapy, and premature dropout was common. Overall, treatment was representative of typical community practice.

Data on utilization and cost of health services were extracted from the GHC computerized cost accounting system. This system attributes general ledger costs (personnel, supplies, facilities, etc.) to each unit of service (visit, hospital day, prescription, laboratory test, etc.) provided by GHC. Services purchased from outside providers or facilities are assigned the cost actually paid by GHC. Overhead costs (management, billing, human resources, etc.) are allocated proportionately to individual units of service. Consequently, these data reflect production costs for health services rather than charges. All costs were inflated to 2003 dollars.

Computerized pharmacy records were used to calculate the RxRisk score[26] for the 6 months prior to study entry. This measure estimated severity of comorbid medical illness and predicted health services costs using computerized prescription records.

RESULTS

The criteria described above identified a total of 1814 patients eligible for these analyses. Compared with those who were eligible, participants excluded because of missing clinical outcome data or missing cost data (N = 226) were significantly younger (mean age of 41 years vs. 46 years, $p < .01$) but did not differ significantly in baseline depression severity or health services costs in the prior 6 months. Follow-up cost data were available for 168 of the 226 participants excluded because of missing clinical outcome data. Mean follow-up costs did not differ significantly between those included and those excluded (mean ± SD dollars, 2763 ± 5362 vs. 3006 ± 6976, $t = 0.44$, $p = .66$).

Acute-phase outcome was classified as full remission for 609 (34%), partial remission for 672 (37%), and persistent depression for 533 (29%). Table 2 describes baseline characteristics according to acute-phase outcome. More favorable clinical outcome was associated with significantly lower baseline depression scores, lower costs in the 6 months prior to beginning treatment, and lower RxRisk score (suggesting less medical comorbidity).

Also shown in Table 2 are follow-up depression ratings for each of the 3 outcome groups. The full remission group showed marked improvement in symptom severity (e.g., 10-point decrease in mean HAM-D score or 1.4-point decrease in SCL depression score, both equal to an effect size of approximately 2.4 standard deviation units). The partial remission group showed moderate improvement (approximately 1.2 standard deviation units), and the persistent depression group showed only minimal change.

Costs for the 6 months following acute-phase treatment are shown in Table 3. Across all categories, mean costs were lower for those with more favorable clinical outcomes. Costs for depression treatment accounted for only a small portion of this difference (approximately $160 difference in depression treatment costs between full remission and persistent depression groups compared with approximately $1400 difference in total health services costs).

Table 3. Health Services Costs Over the Subsequent 6 Months According to Acute Phase Clinical Outcome[a]

Health Service	Full Remission (N = 609)	Partial Remission (N = 672)	Persistent Depression (N = 533)
Total depression treatment costs	423 (554)	502 (813)	580 (889)
Antidepressant prescriptions	184 (208)	207 (268)	216 (268)
Primary care visits for depression	70 (184)	84 (228)	90 (227)
Outpatient mental health specialty visits	169 (426)	197 (540)	231 (561)
Inpatient mental health care	0 (0)	14 (294)	43 (432)
Total nondepression treatment costs	1824 (4560)	2021 (4630)	3076 (7330)
Other outpatient visits (excluding emergency)	529 (803)	611 (951)	839 (1638)
Emergency room/urgent care	66 (337)	89 (490)	121 (611)
Outpatient diagnostic tests	175 (588)	178 (374)	323 (1312)
Other prescriptions	307 (877)	327 (664)	467 (812)
Other outpatient costs	318 (1237)	306 (1048)	427 (1788)
Medical inpatient costs	429 (2955)	510 (3238)	899 (4827)
Total health services costs	2247 (4616)	2523 (4701)	3656 (7397)

[a]Values are expressed in U.S. dollars as unadjusted means with standard deviations.

As expected, distribution of total costs was highly skewed with the mean-variance relationship following a gamma distribution. Consequently, adjusted costs in the 3 groups were compared using generalized linear models with a log link.[27,28] Results are shown in Table 4. Each model included adjustment for age, sex, baseline depression severity, total costs in the 6 months prior to study enrollment, RxRisk score, and year of treatment (to account for changes in treatment patterns over time). Regression models included a random effect to account for differences between studies and (for studies including random assignment to treatment) differences between treatment groups. For the primary outcome of total health services costs, an overall test for heterogeneity indicated that mean costs in the 3 groups clearly differed by more than chance ($p < .0001$). Post hoc pairwise comparisons indicated that mean costs in the full remission group were significantly lower than in the persistent depression group ($p < .0001$) and the partial remission group ($p = .02$) and that mean costs in the partial remission group were lower than in the persistent depression group ($p = .007$). Approximately 2% of participants had no costs during the follow-up period, so 2-part models were not examined.

Table 5 compares specific categories of utilization across the 3 outcome groups. In general, mean utilization rates were lower for patients with more favorable clinical outcomes.

DISCUSSION

Compared with persistent depression, remission of depression is associated with statistically significant and economically important reductions in overall health services costs. After adjustment for baseline differences, health services costs were approximately 50% higher for patients with persistent depression than for patients who reached full remission. This cost difference was spread across all categories of outpatient and inpatient health services. Comparison of visit and hospitalization rates showed the same pattern: consistently higher utilization for those with poorer depression outcomes. These differences are consistent with our previous findings in U.S.[8] and international[9] samples, but the larger sample size in these analyses allowed much more precision.

Interpretation of these findings should consider some important limitations. First, the included studies were all conducted in a single prepaid health plan, and we cannot be certain that results would generalize to other health care settings with different organizational or financing arrangements. Second, we attempted to adjust for baseline differences between the 3 outcome groups, but we could not exclude residual confounding due to unmeasured differences in medical comorbidity or other characteristics associated with cost. Third, we examined costs only over a 6-month period following acute-phase treatment. We would predict that cost savings associated with remission would continue, but we cannot exclude a disappearance or even reversal of the observed savings.

The distribution of acute-phase clinical outcomes in this sample was generally consistent with that in other primary care studies. Only one third of patients achieved remission after 3 or 4 months of treatment. Patients with partial remission made up the largest group, nearly 40% of the sample. There remains substantial room for improvement in the current management of depression. As shown in Table 5, rates of depression follow-up visits (including specialty mental health visits and primary care visits for depression treatment) ranged from approximately 1.5 to 2.0 visits over 6 months. These rates fall far below recommended levels[29–31] and are certainly inadequate for the monitoring and treatment adjustment often necessary to achieve remission.

This observational study demonstrates that remission of depression predicts substantially lower costs over the

Table 4. Health Services Costs[a] Over the Subsequent 6 Months According to Acute Phase Clinical Outcome After Adjustment for Baseline Depression Severity, Costs Prior to Study Enrollment, RxRisk Score, Age, Sex, and Year of Treatment

Cost	Full Remission (N = 609)	Partial Remission (N = 672)	Persistent Depression (N = 533)
Total depression treatment costs	429 (378 to 487)	514 (455 to 580)	585 (512 to 670)
Total nondepression treatment costs	1555 (1386 to 1745)	2022 (1811 to 2258)	2483 (2261 to 2951)
Total health services costs	2012 (1832 to 2210)	2571 (2350 to 2812)	3094 (2802 to 3416)

[a]Values are expressed in U.S. dollars as adjusted means with 95% confidence intervals.

Table 5. Utilization of Specific Health Services Over the 6 Months Following Acute Phase Treatment[a]

Health Service	Full Remission (N = 609)	Partial Remission (N = 672)	Persistent Depression (N = 533)
Primary care visits for depression	0.61 (1.06)	0.73 (1.52)	0.81 (1.47)
Mental health specialty visits, medication management	0.19 (0.67)	0.24 (0.82)	0.41 (1.23)
Mental health specialty visits, psychotherapy	0.66 (1.84)	0.64 (2.00)	0.71 (2.08)
Other primary care visits	1.84 (2.24)	2.12 (2.59)	2.38 (2.73)
Medical specialty visits	1.14 (2.30)	1.27 (2.46)	1.54 (2.83)
Emergency/urgent care visits	0.08 (0.35)	0.07 (0.33)	0.11 (0.41)
Mental health inpatient days	0 (0)	0.02 (0.39)	0.05 (0.49)
Medical inpatient days	0.18 (1.29)	0.22 (1.59)	0.32 (1.69)

[a]Values are expressed as unadjusted means (e.g., mean number of visits, mean number of hospital days) with standard deviations.

subsequent 6 months than does persistence of depression. Randomized trials to date, however, have not demonstrated that improvements in depression management reduce overall costs of care.[4,32–35] We identify 2 possible explanations for this discrepancy. The first is that our finding of cost savings is due to residual confounding. Patients who achieve remission may have lower costs because they had a more favorable prognosis from the outset. According to this explanation, randomized trials do not demonstrate cost savings because they eliminate confounding and accurately represent the consequences of more effective depression treatment. The second explanation is that randomized trials to date have had insufficient power to adequately address this question. We observe an adjusted difference of approximately $1000 in total costs between patients who achieve remission and those with persistent depression (2 groups with a 100% difference in remission rates). No clinical intervention produces a 100% rate of remission, and up to 25% of people with depressive disorders may reach full remission with no specific treatment. Consequently, interventions to improve management of depression in primary care typically increase remission rates by 25% or less.[19,21,23,36] If the impact of improved treatment on service use is roughly proportional to the impact on clinical outcomes, we would not expect these interventions to reduce total health services costs by more than $250. No studies to date have had sufficient power to detect such a difference. Experimental demonstration of cost offset or cost savings from improved depression treatment will likely require larger studies with longer follow-up (to increase statistical power) and interventions capable of achieving higher remission rates.

We[37] and others[38] have pointed out that the justification for increased spending to improve depression care should not rest solely on possible reductions in health care costs. Improved care for depression may yield other important economic benefits such as reduced work absenteeism and increased productivity.[39,40] The primary goal of depression treatment, however, is to reduce suffering and improve daily functioning.

CONCLUSIONS

Among patients treated for depression in community practice, only one third reached full remission after acute-phase treatment. Compared with persistent depression, remission is associated with significantly lower subsequent utilization and costs across the full range of mental health and general medical services.

Drug name: fluoxetine (Prozac and others).

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