Can Prepaid Care for Depression Be Improved Cost-Effectively?

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Objective: To determine the cost and health effects of changes in the content and quality of care for depressed patients treated in prepaid general medical (internal and family medicine) and mental health specialty practices and shifts in the proportion of patients treated in general medicine.

Methods: Cost-effectiveness analysis and simulations, which are empirically based on data from the Medical Outcomes Study.

Outcome Measures: Change in serious functional limitations; Annual treatment costs; Costs per improvement in functioning.

Results: More appropriate care for depression (increased counseling and antidepressant medication use, avoidance of minor tranquilizers) improves functioning outcomes. Within each specialty sector, it lowers the average cost per improvement in functioning outcomes compared to no treatment, although total costs of care are higher. Shifting patients from mental health specialists to general medical providers under current treatment patterns reduces total costs but worsens outcomes. However, such a shift does not affect the average cost per functioning outcome improvement, i.e., it does not increase the value of health care spending in terms of health improvement per dollar. But if quality improvement in general medical practices is achieved first, and if mental health specialty care remains much more expensive than general medical care, then shifting patients to general medicine can achieve better outcomes, lower treatment costs, and lower average cost per functioning outcome improvement, relative to current practice patterns.

Conclusion: Quality improvement roughly following practice guidelines for depression can improve outcomes and cost-effectiveness of care, but at increased treatment costs. In contrast, the current trend of shifting patients to general medicine under prevailing treatment patterns worsens outcomes and does little to improve the value of health care spending, although it lowers total costs. Yet such shifting in the context of markedly improved quality of care in general medical practices could result in improved outcomes and cost-effectiveness of care, and under some assumptions even lower treatment costs, relative to current practice.
ACKNOWLEDGMENTS

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INTRODUCTION

Depressive disorders are among the most common health problems of general medical and mental health specialty patients and are associated with high societal costs through morbidity (severe limitations in daily functioning) and high rates of use of services.1-8 Yet many depressed individuals who receive health care -- whether from a general medical provider (internal or family medicine) or a mental health specialist -- do not receive treatments of established efficacy, i.e., antidepressant medications and psychotherapy.9-11 With only moderate rates of appropriate treatment, yet high costs, current treatment patterns for depression may not be a very efficient use of health care expenditures.

Higher quality of care for depression has been a major clinical care goal nationally, as reflected by the development of clinical practice guidelines.1,2,12 But more appropriate care could mean higher total costs, making quality improvements much less attractive in the current environment. An often overlooked criterion is value of care in terms of health improvements per dollar spent on care. For a health plan or employer, the value of care or cost-effectiveness should be as important as absolute costs: There is little point in spending money on something that provides no benefits just because it is cheap.

In this paper, we simulate the cost and outcome consequences of changes in practice patterns for depression. We are particularly interested in identifying the greatest opportunity for improving the cost-effectiveness of depression care. Is it in general medical or in mental health specialty practices? For which processes of care? What does the existing trend of shifting care for depressed patients from mental health specialists to general medical providers achieve? These questions are relevant to many choices made by group practices and plans, which often have no information other than costs to guide their decisions, and to health care reform plans that seek to improve the efficiency of the system for the sickest patients.

Our main health outcome is change in the number of serious functioning limitations (whether or not the respondent was prevented from working around the house, at a paying job, or limited in ability to perform vigorous or moderate physical activities due to health), which has been
found to be sensitive to differences in treatment style across financing systems\textsuperscript{13}. While functioning is not as general as adjusted quality-of-life years and cannot be used in a cost-utility analysis, its simplicity, general applicability, and policy relevance make it a candidate for other cost-effectiveness comparisons in very different applications. Our cost measures focus on the treatment costs for depression, i.e., the plan or group practice perspective. Because better mental health care may lower use of general medical care (i.e., "the cost-offset effect"\textsuperscript{14}), we explore use of all health services. A broader societal perspective would include changes in individual earnings, disability, and welfare payments, and the reduced burden on others resulting from treatment\textsuperscript{7,8}, although some researchers would argue that such "indirect" costs are already captured by the health outcomes measure. The broader perspective is beyond the scope of our data, but we provide an indication of the effect of improved functioning on earned family income to illustrate one social benefit of improved treatment.

Because cost-effectiveness continues to have numerous interpretations, we need to clarify its meaning in this paper. Following Kamlet\textsuperscript{15}, we define cost-effectiveness analysis as a method to evaluate the desirability of a possible intervention by calculating the ratio of the incremental costs divided by the incremental health benefits compared to a baseline case. In this paper, the \textit{cost-effectiveness ratio} gives the additional expenditures necessary to remove one additional functioning limitation (through more appropriate care) over and above those removed through care as usual and is also referred to as the \textit{marginal cost}. To analyze the overall efficiency of treatment, we calculate the cost-effectiveness ratio in relationship to the hypothetical case of no care at all, and refer to it simply as \textit{cost-effectiveness}, or the average cost for each reduction in functioning limitation, i.e., including those removed through care as usual and additional limitations removed through increased appropriateness of care.

Our analysis is a simulation approach based on a decision-analytic model. In contrast to similar decision-analytic models, including models for depression\textsuperscript{16}, we estimate all central parameters from a single, clinically detailed, longitudinal study of typical practice settings and do not have to rely on the literature or expert guesses to obtain parameters. Through studying typical
practice settings, we avoid concerns about limited generalizability of estimates derived from efficacy trials using atypical patients and practices. We study outpatients independently identified as depressed by a research team and we are therefore able to consider consequences of process changes for all depressed patients in ongoing care, not just those diagnosed by providers as depressed. This is important because over one-half of prepaid general medical patients with depressive disorder are not identified as depressed by their provider4.

In defining quality of care, we focus on three major components of the acute phase of treatment for severe depression2,17. The first one is use of antidepressant medication in therapeutic daily dosages, considered the first-line treatment for major depression in primary care2. Its simplicity and low costs make it the most likely initial target for depression quality improvement efforts. The second component is counseling for depression. Multiple forms of psychotherapy are efficacious in moderate depression and may also be useful in improving functional limitations in severe depression2. However, an operational definition of effective psychotherapy in typical practice settings is difficult. We use brief counseling by the usual treating clinician during the initial visit as an indicator of counseling. Because practices are unlikely to consider increasing counseling without first improving medication practices, we only discuss the former in combination with the latter. The third component is decreasing the use of minor tranquilizers because there is little evidence of efficacy, but they cause side effects and are costly2.

METHODS

Data

The Medical Outcomes Study (MOS) is an observational study of adults in alternative systems of care in three urban areas (Boston, Chicago, and Los Angeles). In each geographic area, clinicians in Health Maintenance Organizations (HMOs), one or more large multispecialty group practices, and solo/small group practices were enrolled in the study. During the initial cross-sectional data collection (1986-1987), patients of the enrolled providers were screened for depression, using a brief self-administered instrument18, followed by a telephone interview that
included the depression section of the NIMH Diagnostic Interview Schedule\textsuperscript{19} for patients exceeding a cutoff score on the screener. The telephone interview was limited to respondents who had an ongoing relationship with an MOS clinician, could complete self-administered questionnaires, and did not have specific acute physical conditions that severely limited functioning. Patients in the longitudinal portion had current depressive disorder, past lifetime (but not current) depressive disorder, or depressive symptoms (exceeding the screener cut-point), but patients with lifetime mania were excluded. More detailed discussions of study design, sampling process, and response rates are presented elsewhere\textsuperscript{20,21,22,11,13}.

Baseline data for medication, counseling, and functioning limitations were collected for 544 patients; year 2 data are available for 424 (78 percent) of these patients. Data on use of psychotropic medications were obtained from patient interviews at study baseline conducted by study research clinicians\textsuperscript{11}. The data provide information on the name of each drug used in the prior month or daily for a month or more in the prior six months and the current total daily dosage. We derived measures of whether any minor tranquilizer or sedative/hypnotic was used and whether any antidepressant medication (heterocyclic, monoamine oxidase inhibitor, or newer antidepressant) was used in an appropriate daily dosage. For each medication, dosages were categorized as within a therapeutic range or below the minimum therapeutic dosage, based on criteria proposed by Katon et al.\textsuperscript{9}, as modified by Wells et al\textsuperscript{11}. Our measure of counseling is based on the encounter form completed by the treating clinician after the same visit in which the patient was initially screened for depression. Providers indicated whether they had provided counseling for depression for three minutes or more\textsuperscript{4}. Functional status is the number of 4 serious limitations in daily functioning (whether or not the respondent was prevented from working around the house, at a paying job, or limited in ability to perform vigorous or moderate physical activities due to health) at baseline and year 2 and we analyze the change in these two years. We calculated annual treatment costs based on outpatient mental health care utilization and medication. A visit to a psychiatrist was weighted at $120, a visit to a non-physician mental health specialist at $100, and a mental health visit to a general medical clinician at $60. The costs for medication varied
substantially across medications, and we weighted monthly pharmacy costs by the number of patients receiving each medication. Because a higher proportion of brand-name minor tranquilizers were prescribed, we estimate the average costs for minor tranquilizers to be about $225 for 6 months and the average costs of antidepressants to be around $170 for 9 months. With the development of new antidepressant medication, this relationship may have changed, but the conclusions are not sensitive to even a tripling of medication costs because they are a small component of total costs.

The analysis also uses data on each patient's initial physical and psychological health status, using global measures that summarize multiple health status measures\textsuperscript{13}. Patient ethnicity, education, gender, marital status, and age were assessed through questionnaires at baseline.

**Analytic Approach**

We developed a model to simulate 1) the effects of changes in processes of care within each specialty sector (general medicine, psychiatry, other mental health specialty) and 2) the effects across specialty sectors of changes in processes of care, combined with shifts in specialty mix (i.e., proportion of patients treated in each specialty sector). We first estimated the relationship among processes of care (antidepressant medication, counseling, and minor tranquilizer use) and then the linkage of processes to outcomes (changes in functioning limitations and imputed costs). We tested whether these relationships differed by specialty. The general structure of the model is represented in Figure 1 as an influence diagram. The arrows between the nodes represent conditioning - the probabilities and outcomes associated with the states of the conditioned event (pointed to by the arrow) depend on the states of the conditioning event, for example, the probability of prescribing medication depends on provider specialty. For graphical clarity, we excluded the arrows emanating from patient characteristics (initial physical and psychological health status, ethnicity, gender, marital status, age, education), but the calculations control for those factors where necessary. The absence of arrows means that there was no statistically significant direct relationship. For example, after controlling for patient characteristics and provider specialty, counseling did not predict the
use of antidepressant medication and vice versa. We analyzed the model using the software package DPL\textsuperscript{23}. The model inputs are presented in Tables 1 and 2 and their derivation is described below. The parameters relate to the most severely depressed patients (the sickest quartile according to the composite initial mental health measure\textsuperscript{13}) in prepaid care, based on regression analyses of the full sample.

Although the model was based on patients independently identified as depressed and consequently included undetected patients, we do not include detection as an independent process node because it has no independent association with outcome, only an indirect association as a predictor of treatments provided. Although improving detection may be an important means of increasing access to treatments, we were interested in processes that directly affect outcome.

Model Parameters

We performed preliminary tests for each of the 4 process of care variables in Table 1 to determine the influence of patient characteristics, including psychological and physical health status, payment system, and the other process of care variables and to specify the final model. We estimated the probability that a patient receives a certain type of treatment using qualitative response regression models to adjust for confounding factors, in particular initial sickness and patient demographics, and then predicted this probability for a severely depressed patient.

We distinguish 3 types of providers: general medical clinicians, psychiatrists, and other nonphysician mental health specialists (psychologists and masters-level therapists, but in this study the majority are psychologists). The probability that a severely depressed patient in a prepaid plan receives regular treatment from one specific type of provider is given in the first row of Table 1. The next 3 rows give the parameters for the probability of a) use of appropriate antidepressant medication; b) counseling; and c) minor tranquilizer use at baseline, stratified by type of provider. Overall, the estimates in Table 1 are precise and robust to changes in the statistical model to estimate them.
Table 2 presents the estimated process-functioning outcomes links. The strength of these links do not differ significantly by specialty. It is the probability of treatment, not treatment effects, that differs by specialty. Counseling and antidepressant medication are jointly significant at p=0.01. While counseling has a stronger estimated effect on improving functioning than does antidepressant medication, we cannot reject the hypothesis that the two effects are the same. Minor tranquilizer use is associated with a deterioration in functioning, although not statistically significant. The joint effect of counseling, antidepressant medication use, and minor tranquilizer use is significant at p=0.03. These findings support the validity of the group of process changes as measures of appropriateness of care. Point and confidence interval estimates of process-outcome links were less robust to different model specifications than the estimates of process probabilities, however, so we conducted analyses under three qualitatively different assumptions: a) that our estimates are correct; b) that changes in minor tranquilizer use have no effect on functional status, c) that the effect of counseling and effective antidepressant medication are identical and equal to the average of our two estimates. We report the range of outcomes results reflecting these different assumptions.

Processes of care are associated with increased utilization and imputed costs, regardless of specialty. Counseling for depression at the screening visit is associated with an additional 11.4 mental health visits in the next year, compared to no counseling. This may explain why this simple indicator predicts functioning outcomes: it indicates the course of treatment. Use of appropriate antidepressant medication is associated on average with 4.5 subsequent mental health visits in a year, plus medication costs. This is roughly consistent with practice guideline recommendations relating to starting such medications. Use of minor tranquilizers is not statistically significantly associated with increased mental health visits.

To simulate consequences of process changes, we specified three strategies of improved appropriateness of care, described in Table 3. For family and internal medicine, we selected target goals for counseling to reduce the current gap between it and mental health specialty by about 2/3. It probably would be unrealistic to assume that the general medical sector could achieve the same
rates of counseling as the current mental health specialty sector. However, we also modeled an additional increase of counseling for mental health specialists. For all specialty sectors, we modeled the same target goals for increasing use of appropriate antidepressant medications (70%) that represent about 2/3 of what could be accomplished by medicating all depressed patients, and reducing minor tranquilizers to 10% or approximately 2/3 of completing removing such medications. We wanted to markedly increase quality of care, but at the same time not expect all patients to be treated exactly the same. Although we simulate very substantial changes, which some practitioners may not consider feasible, we point out that smaller changes have the same cost-effectiveness ratio (a consequence of our mathematical model), but smaller absolute cost and outcomes implications.

To simulate consequences of changes in specialty mix (for usual care and for the three levels of improved care), we used both the actual mix in prepaid care in the study period (shown in Table 1), and a greater shift away from psychiatric care, i.e., probabilities of .15, .60, and .25 for being in psychiatric, general medical, or other mental health therapist practice, respectively. We considered the consequences of changing specialty mix in the context of improved practice patterns in all three specialty sectors simultaneously, and when only general medical practice improved.

RESULTS

The first row in each section (a-c) of Table 4 shows the current performance in terms of costs and functioning outcomes for severely depressed patients in prepaid care for each specialty sector considered one at a time. The next three rows provide total treatment costs per patient, the average change in functioning limitations (on a -4 to + 4 scale, with a more positive score indicating more limitations removed), and the cost-effectiveness ratio relative to care as usual for the three nested quality improvement strategies defined in Table 3. The cost-effectiveness ratio is calculated as the difference in total costs per patient under higher quality care minus total costs per patient under care as usual in this sector (first row in each section) divided by the difference in outcome under higher quality care minus outcome under care as usual. The lower the cost-
effectiveness ratio, the more health improvements can be bought for each additional dollar. Table 4 adjusts for differences in patient characteristics, including initial sickness, across specialty sectors. A comparison of the first rows of Tables 4a-c shows that the lowest costs, but also the worst outcomes are in the general medical sector; the highest costs, but also the best outcomes occur in psychiatry.

In the general medical sector, under care as usual, there is a slight deterioration in functioning (−.04, or four new serious limitations out of 100 patients), but this is a substantial improvement over the deterioration estimated for no treatment (−.27 or 27 new limitations out of 100 patients). In this sector, each level of quality improvement has the potential of substantially improving patient outcomes (Table 4a). The average gain of .14-.24 under Level 1 compared to care as usual is similar to removing an additional 14-24 serious functioning limitations out of 100 severely depressed patients; the improvement is even more dramatic (reducing 45 to 67 additional limitations out of 100 patients) under Level 3, which involves improving all three types of processes of care. The cost-effectiveness ratios for improving processes of care are in the $1,000 range. In other words, the marginal cost of removing one additional functional limitation through improving appropriateness of care is around $1,000 (excluding the start up costs of achieving the process improvement).

In psychiatry, which already has more appropriate treatment, better outcomes, and higher treatment costs, the degree of additional outcome improvement (over care as usual) that can be achieved at each level of process change is more moderate (8 to 35 more limitations removed over 100 patients) -- for example compare outcomes for care as usual and Level 1 in Table 4b. The cost-effectiveness ratios for Level 1 and 2 process changes are close to $2,000 -- twice the cost-effectiveness ratio for these levels of process changes in general medicine. At Level 3, however, the cost-effectiveness ratio is comparable to that for general medicine (compare level 3 in Tables 4a and 4b). This is because reducing minor tranquilizer use has a relatively large effect on costs in psychiatry, because of high levels of use under usual care. The increase in total costs per patient at
Level 3 over care as usual is under $200 in psychiatry, less than a 10% increase. The comparable amount for general medicine is $400 because of the greater change in counseling we simulated.

For other mental health specialists, most of what can be achieved in improved outcomes and cost-effectiveness is achieved at Level 1 (Table 4c), because these patients are already counseled and few receive minor tranquilizers (so there is little room for improvement at Levels 2 and 3). The cost-effectiveness ratios are in the range of $1000-2000 (similar to psychiatry).

Table 5 shows the results when improvements in quality of care are achieved across specialty sectors, and also under conditions of shifting patients further into general care. We present the cost-effectiveness ratio (CE) relative to no care (the average costs of improving one functioning limitation), because the cost-effectiveness ratios compared to care as usual have different interpretations depending on whether costs under improved care are greater or lower than the status quo. We assumed that "no care" was equivalent to zero treatment costs and the same outcome (a decrement equal to 0.27 new functioning limitations) as for patients in care who receive no treatment for depression. Our conclusions are not sensitive to these assumptions about no care, because the same conclusions are reached based on cost-effectiveness ratios of quality improvement compared to care as usual.

The left-hand side of the first row of Table 5 shows that the current system spends over $5000 to remove one functioning limitation. This is 2.5 to 5 times the marginal costs ($1000-2000) (reported in Table 4) of removing an additional functioning limitation. Thus, achieving quality improvement will lower average costs -- and this is seen in Table 5 through the lower value of average cost (CE) on the left hand side for all quality levels relative to care as usual. The lowest CE is for Level 3 implemented across all specialty sectors, which also provides the greatest outcome improvement. All levels of quality improvement raise total costs of care. But the lowest cost, after care as usual, is for Level 3 in general medicine only, which also provides moderate outcome improvement and substantially lowers average cost.

The right-hand side of Table 5 presents the results for shifting specialty mix. Without quality improvement, the shift toward general medicine reduces costs, worsens functioning, and
leaves average cost largely unaffected. But at each level of improved quality of care, the specialty shift achieves comparable outcome levels, reduces costs, and reduces average cost. Compared to current specialty mix and patterns of care, achieving Level 3 across specialty sectors but with a specialty shift, would greatly improve functioning outcomes, lower costs, and improve CE from 5350 to 2730-3350. Substantial gains, but with more moderate outcome improvement, could be achieved by Level 3 quality improvement in general medicine only, plus shifting patients more to general medicine. However, in the absence of quality improvement, outcome improvement could only be achieved through shifting to mental health specialty care, at much greater cost (see the first rows in Table 4b and c).

DISCUSSION

The goals of this paper were to identify the greatest potential opportunity for improving the cost-effectiveness of care for depression and to examine the likely consequences of shifting more care for depression away from mental health specialty care and toward general medical practices. These issues are of considerable policy importance in light of the debate over whether and how generously to include coverage for mental health care as part of national health care reform.

Our results suggest that increasing the appropriateness of care for depression to target goals roughly consistent with clinical practice guidelines is likely to improve functioning outcomes and to greatly increase the value of health care spending in terms of health benefits because the incremental costs of achieving additional health benefits are much lower than the average costs plans incur currently. Yet this strategy would increase total costs of depression treatment, which could reduce its attractiveness in the current cost-containment environment.

Our results also suggest that the greatest opportunity for improving the quality of care and the value of health care spending are in the general medical sector. The majority of depressed patients visit only general medical practices, and at least half of those patients do not receive specific treatment for depression. Nevertheless, their visits are costly and quality improvement would mean using such visits to provide appropriate treatment for depression, increasing the value
of health care spending. Because levels of appropriate care are higher in mental health specialty, the potential for gains in outcomes and cost-effectiveness is lower there. We note that more appropriate care improves the value of health care spending (lower average costs per health improvement) even though we take into account increases in utilization as a consequence of higher quality care (12 visits for counseling and 4.5 visits for antidepressant medication management).

Given that there is more appropriate care in mental health specialty, why are psychiatrists and other mental health specialists not more cost-effective? The main reason is that patients in those practices appear to have significantly higher utilization (over and above the utilization due to counseling and medication management), but not better outcomes, than similar patients receiving appropriate treatment for depression in general medical practices. We do not believe that this is caused by incomplete case-mix adjustment because the MOS collected very detailed health measures, and any bias from unmeasured health differences is likely to be against general medicine, which has a higher share of patients with chronic physical conditions who tend to get worse in physical and role functioning over time.

What would shifting more care to general medical practices achieve? This question is critical because many health plans are already shifting the specialty mix through limits on enrollment of specialists in panels and through gatekeeper control of access to specialists to lower costs. Our results suggest that this policy can lower costs of care under current practice patterns, but it also leads to poorer functioning outcomes and does little to improve the value of health care expenditures in terms of health improvements per dollar spent. Yet our results also suggest that if quality of care were improved in general medical practice, then shifting seriously depressed patients to general medicine care could improve outcomes, reduce the average cost of removing functioning limitations, and possibly lower treatment costs, relative to care as usual. The conclusions of improved functioning outcomes and cost-effectiveness under this scenario derive largely from the quality improvement alone, i.e., better use of visits that are already being paid for, and are not very sensitive to the assumptions we made about the relative costs of care in general medical and mental health specialty practices. However, whether treatment costs would be
reduced, stay the same, or increase under this scenario depends on the relative costs of general medical and mental health specialty care. If, as we modeled here, mental health specialty visits are 70-100% more costly than the mental health portion of general medical visits, then the combination of improved quality of care and shifting to general medicine would reduce depression treatment costs. For systems of care with little cost differential, for example, due to greater reliance on brief medication visits and group therapy in mental health specialty care, then the combination of quality improvement and shifting to general medicine would result in treatment costs remaining the same or increasing, relative to current practice. Since many systems of care are currently shifting toward general medicine (and also toward less costly treatment options within mental health specialty), we assume that they perceive general medicine as much less costly than mental health specialty care.

Our results support the value of counseling and antidepressant medication for improving functioning limitations in seriously depressed outpatients in usual care settings, even though the data were collected in an observational study. Observational studies are likely to underestimate treatment effects because patients with worse prospects are more likely to receive treatment. The reason why we find an outcomes effect for the crude indicator of counseling at the baseline visit is that this initial visit is followed by 11-12 additional mental health visits on average in our data, compared to an otherwise similar patient who was not counseled. This is the same number of visits as a course of Interpersonal Psychotherapy, which is an efficacious treatment for depression. 24

Our focus on direct depression treatment costs could be criticized as too narrow a cost perspective. In sensitivity analyses, we also considered total health care utilization, but this does not affect our conclusions, mainly because mental health visits account for over 80 percent of total outpatient health care for severely depressed patients. Many of the mental health visits included in our estimates are to a general medical provider, but patients considered some of them to be for a mental health reason. Studies relying on claims data or computerized records may fail to recognize such visits as mental health visits. We did not find any effect of depression treatments on the use of nonmental health care visits or on inpatient utilization (either for mental health or for medical
reasons). If a cost-offset effect exists\textsuperscript{14}, it was too small for us to detect and any such effect would be overwhelmed by the increased costs of more appropriate care. However, we point out that measurement error can result in positive cost-offset effects in data sets that cannot distinguish mental health and medical reasons for a visit: Patients receiving mental health care in the general medical sector may show up as higher users of medical care in such studies than patients receiving care from mental health specialists.

Improved care for depression is likely to reduce indirect costs of depression, although there is no research in this area as yet that would permit us to assess the overall impact. Mintz et al.\textsuperscript{25} found that work outcomes in terms of unemployment and on-the-job performance improved when treatment for depression was symptomatically effective, although they did not obtain a monetary estimate of this effect. We explored this issue using MOS data on family income over time. We found that the reduction of one functional limitation is associated with an increase of $2,000-3,000 in annual earned family income. Thus, even if the patient's family were to pay the full marginal cost ($1000-$2000) of removing a limitation under improved quality of care for depression, it would be a net monetary gain for them -- in addition to all the advantages of better health. From a public finance perspective, the increase in employment and earnings associated with better care is likely to increase tax revenue and lower unemployment and welfare payments. This broader perspective helps to evaluate whether the incremental health gains of quality improvements are worth the incremental costs.

Clearly, our analysis has a number of limitations. It is based on simulating process of care improvements. An ideal setting would involve data collected during randomized trials of actual quality improvement interventions rather than using the variations in an observational study from the late 1980s. Such a data base would improve the estimate of process-outcome links and avoid any possible selection bias. Moreover, it would indicate if process-outcome relationships change as the probability of more appropriate treatment increases, the extent to which process changes are achievable, and the magnitude of intervention costs (although we believe that the latter are relatively minor compared to the long-term cost implications of changes in practice patterns). It
also would be important to have detailed measures to assess the indirect effects of health, such as burden on family members or labor market history (which would probably strengthen our conclusions). But such data are unlikely to become available for many years. Major policy changes are occurring now without any estimates to their effect, and our data represent an important starting point by indicating the potential for improving the value of depression care dollars.

It remains an open question whether this potential can be realized. Proposed strategies to improve care for depression in the general medical sector include providing results of screening feedback to improve detection, specific suggestions for patient management through clinical algorithms or psychiatric consultation, quality assurance review of medical records based on appropriateness criteria, and clinical education and intensive training methods. But some studies in primary care found no effect or even a negative effect of screening feedback, although more sophisticated approaches reported some improvements in clinical assessment and quality of care.

Our model only addresses acute care for depression, but care for depression can also include continuing therapy for six months to prevent early relapse or over many years to prevent recurrence. Kamlet et al. provided a first model to analyze the cost-effectiveness of maintenance therapy in a clinical trial. A similar study based on more typical practice settings would require additional considerations, such as accounting for the role of plan or provider switching, which is of no concern in a clinical trial. For example, we have found that patient-provider relationships were significantly shorter in prepaid than in fee-for-service plans and the end of a relationship significantly increased the probability of discontinuing an effective antidepressant medication.

Finally, we only focused on the most severely depressed patients in prepaid care and assumed that our hypothetical process changes did not change care for other patients. To the extent that process changes are not well targeted and less severely patients receive fewer (or no) health benefits from antidepressant medication or counseling, it diminishes the cost-effectiveness of the quality improvement.
Conclusion

Many discussions focus on absolute outcomes or total costs alone without considering the value of each dollar spent in terms of health improvement, which should be a central goal for new policies. Our results suggest that there is much room for improving the value of health care dollars for depression, and that such improvement could be accomplished by increasing the exposure of patients to well-established treatments (counseling and appropriately medication management) for depression, i.e., there is a clinically obvious route. To accomplish this, however, incentives are needed for plans and providers to accomplish quality improvement, and excluding or markedly limiting mental health care coverage under national health care reform would seem inconsistent with that task. The current trend toward increasing the proportion of depressed patients treated in general medical instead of mental health specialty settings is likely to worsen outcomes without increasing the value of health care spending in the absence of quality improvement. As long as patient outcomes are an important criterion, plans that have already shifted depressed patients away from mental health specialists should consider evaluating their care patterns in general medicine and maybe should be required to provide evidence of successful quality improvement. Yet, such shifting may also have the potential, after quality improvement is achieved, to make higher quality of care affordable by lowering the total treatment costs for depression.
References


35. Sturm, R, Meredith LA, Wells KB. Provider Choice and Continuity for the Treatment of Depression. RAND, DRU-692-AHCPR, 1994a
Table 1: Probability of Type of Treatment for Severely Depressed Patients

<table>
<thead>
<tr>
<th>Probability of Process of Care</th>
<th>Psychiatrist</th>
<th>General Medical</th>
<th>Other Mental Health Specialist</th>
</tr>
</thead>
<tbody>
<tr>
<td>Probability that treating provider is: .31</td>
<td>.44</td>
<td>.25</td>
<td></td>
</tr>
<tr>
<td>Probability that patient uses appropriate antidepressant medication (A)</td>
<td>.44</td>
<td>.21</td>
<td>.16</td>
</tr>
<tr>
<td>Probability that patients uses any minor tranquilizer (A)</td>
<td>.57</td>
<td>.36</td>
<td>.34</td>
</tr>
<tr>
<td>Probability that patient receives counseling for depression at baseline (B)</td>
<td>.87</td>
<td>.37</td>
<td>.84</td>
</tr>
</tbody>
</table>

Note: (A) psychiatry is statistically significant from other two groups (p<0.05); (B) general medical is statistically significant from other two groups (p<0.05).
Table 2: Functioning and Cost Outcomes Associated with Processes of Care for Severely Depressed Patients

<table>
<thead>
<tr>
<th></th>
<th>Number of Functioning Limitations Reduced</th>
<th>Direct Mental Health Treatment Costs ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>P</td>
<td>GM</td>
</tr>
<tr>
<td>counseling and antidepressant medication</td>
<td>+0.68</td>
<td>4,200</td>
</tr>
<tr>
<td>counseling, minor tranquilizers, and antidepressant medication</td>
<td>+0.48</td>
<td>4,425</td>
</tr>
<tr>
<td>Counseling only</td>
<td>+0.40</td>
<td>3,505</td>
</tr>
<tr>
<td>counseling and minor tranquilizers</td>
<td>+0.20</td>
<td>3,730</td>
</tr>
<tr>
<td>Antidepressant medication only</td>
<td>+0.01</td>
<td>2,660</td>
</tr>
<tr>
<td>Minor tranquilizers and antidepressant medication</td>
<td>-0.19</td>
<td>2,885</td>
</tr>
<tr>
<td>No depression treatment</td>
<td>-0.27</td>
<td>2,125</td>
</tr>
<tr>
<td>Minor tranquilizers only</td>
<td>-0.47</td>
<td>2,250</td>
</tr>
</tbody>
</table>

Joint Significance test: p=0.03 p<0.01

Note: Reduction in functioning limitations is scaled -4 to +4, with a more positive score indicating more improvement (more limitations removed); direct mental health treatment costs are imputed outpatient costs including visits and medications. P = psychiatry; GM = general medicine; OMH = other mental health specialty.
Table 3: Definitions and Target Goals for Three Levels of Improved Appropriateness of Care, By Specialty

<table>
<thead>
<tr>
<th>Definition</th>
<th>General Medical</th>
<th>Psychiatry</th>
<th>Other Mental Health Specialty</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1:</strong> Use antidepressant medication in a therapeutic daily dosage and 4-5 follow-up visits</td>
<td>70%</td>
<td>70%</td>
<td>70%</td>
</tr>
<tr>
<td><strong>Level 2:</strong> Level 1 goals achieved plus provide counseling for depression and 11-12 additional &quot;mental health&quot; visits*</td>
<td>70%</td>
<td>95%</td>
<td>95%</td>
</tr>
<tr>
<td><strong>Level 3:</strong> Level 2 goals achieved plus reduce use of minor tranquilizers *</td>
<td>10%</td>
<td>10%</td>
<td>10%</td>
</tr>
</tbody>
</table>

* The target goal refers to the new process introduced at that level only.
Table 4: Simulation of Quality Improvement**

<table>
<thead>
<tr>
<th>Table 4a: General Medicine</th>
<th>Costs per Patient</th>
<th>Improvement in Functioning</th>
<th>Cost-Effectiveness Ratio *</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Medical care as usual</td>
<td>1,060</td>
<td>.04</td>
<td></td>
</tr>
<tr>
<td>Level 1) Increase use of appropriate Antidepressant Medication</td>
<td>1,270</td>
<td>.10 - .20</td>
<td>870 - 1,500</td>
</tr>
<tr>
<td>Level 2) Increase both Antidepressant and Counseling</td>
<td>1,490</td>
<td>.32 - .35</td>
<td>1,100 - 1,200</td>
</tr>
<tr>
<td>Level 3) Antidepressants, Counseling, Reduce Minor Tranquilizers</td>
<td>1,430</td>
<td>.32 - .43</td>
<td>790 - 1030</td>
</tr>
</tbody>
</table>

* cost effectiveness ratio is calculated relative to current care in general medical sector; it gives the additional cost to remove one additional functional limitation.

<table>
<thead>
<tr>
<th>Table 4b: Psychiatry</th>
<th>Costs per Patient</th>
<th>Improvement in Functioning</th>
<th>Cost-Effectiveness Ratio *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychiatric care as usual</td>
<td>3,760</td>
<td>.32</td>
<td></td>
</tr>
<tr>
<td>Level 1) Increase use of appropriate Antidepressant Medication</td>
<td>3,940</td>
<td>.40 - .44</td>
<td>1,500 - 2,250</td>
</tr>
<tr>
<td>Level 2) Increase both Antidepressant and Counseling</td>
<td>4,050</td>
<td>.45 - .48</td>
<td>1,810 - 2,230</td>
</tr>
<tr>
<td>Level 3) Antidepressants, Counseling, Reduce Minor Tranquilizers</td>
<td>3,940</td>
<td>.45 - .67</td>
<td>510 - 1,380</td>
</tr>
</tbody>
</table>

* calculated relative to current care in psychiatry, the low cost-effectiveness ratio of the combined QI strategy is due to substantial cost-savings through avoidance of minor tranquilizers.

<table>
<thead>
<tr>
<th>Table 4c: Other Mental Health Specialty</th>
<th>Costs per Patient</th>
<th>Improvement in Functioning</th>
<th>Cost-Effectiveness Ratio *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other MH care as usual</td>
<td>2,500</td>
<td>.27</td>
<td></td>
</tr>
<tr>
<td>Level 1) Increase use of appropriate Antidepressant Medication</td>
<td>2,840</td>
<td>.42 - .52</td>
<td>1,360 - 2,270</td>
</tr>
<tr>
<td>Level 2) Increase both Antidepressant and Counseling</td>
<td>2,960</td>
<td>.49 - .58</td>
<td>1,480 - 2,090</td>
</tr>
<tr>
<td>Level 3) Antidepressants, Counseling, Reduce Minor Tranquilizers</td>
<td>2,910</td>
<td>.49 - .67</td>
<td>1,030 - 1,860</td>
</tr>
</tbody>
</table>

* calculated relative to current care in other mental health specialty.

**Range of outcome changes and cost-effectiveness ratios corresponds to the three qualitatively different assumptions about process-outcome associations, see Methods.
Table 5: Effects for the System (Across Specialty Sectors) of Improved Appropriateness and of a Specialty Shift to General Medical Care for Severely Depressed Patients

<table>
<thead>
<tr>
<th>Specialty Mix as in MOS Costs</th>
<th>Functioning Limitations Reduced</th>
<th>CE*</th>
<th>New Specialty Mix Costs</th>
<th>Functioning Limitations Reduced</th>
<th>CE*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Care as usual</td>
<td>2,250 .15</td>
<td>5,360</td>
<td>1,825 .09</td>
<td>5,070</td>
<td></td>
</tr>
<tr>
<td>Level 1) Increase use of appropriate Antidepressant Medication</td>
<td>2,490 .27-.35</td>
<td>4,020-4,610</td>
<td>2,060 .23-.32</td>
<td>3,490-4,120</td>
<td></td>
</tr>
<tr>
<td>Level 2) Increase both Antidepressant and Counseling</td>
<td>2,650 .40-.45</td>
<td>3,680-3950</td>
<td>2,240 .38-.43</td>
<td>3,200-3,450</td>
<td></td>
</tr>
<tr>
<td>Level 3) Increase Antidepressants and Counseling, Reduce Minor Tranquilizers</td>
<td>2,580 .40-.56</td>
<td>3,110-3,850</td>
<td>2,180 .38-.53</td>
<td>2,730-3,350</td>
<td></td>
</tr>
<tr>
<td>Level 3a) Increase Antidepressants and Counseling, Reduce Minor Tranquilizers, only in GM</td>
<td>2,420 .31-.36</td>
<td>3,840-4,170</td>
<td>2,050 .31-.37</td>
<td>3,200-3,530</td>
<td></td>
</tr>
</tbody>
</table>

Note: Specialty mix in MOS for sickest patients: 44% GM, 31% Psychiatry, 25% other MH specialists. Simulated "new"mix: 60% GM, 15% Psychiatry, 25% other MH specialists. *: Average cost of removing one functioning limitation (cost-effectiveness ratio relative to no care, assuming $0 costs and -.27 deterioration).
Figure 1: Model of Care for Depression