Texas Medication Algorithm Project: Development and Feasibility Testing of a Treatment Algorithm for Patients With Bipolar Disorder

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Background: Use of treatment guidelines for treatment of major psychiatric illnesses has increased in recent years. The Texas Medication Algorithm Project (TMAP) was developed to study the feasibility and process of developing and implementing guidelines for bipolar disorder, major depressive disorder, and schizophrenia in the public mental health system of Texas. This article describes the consensus process used to develop the first set of TMAP algorithms for the Bipolar Disorder Module (Phase 1) and the trial testing the feasibility of their implementation in inpatient and outpatient psychiatric settings across Texas (Phase 2).

Method: The feasibility trial answered core questions regarding implementation of treatment guidelines for bipolar disorder. A total of 69 patients were treated with the original algorithms for bipolar disorder developed in Phase 1 of TMAP.

Results: Results support that physicians accepted the guidelines, followed recommendations to see patients at certain intervals, and utilized sequenced treatment steps differentially over the course of treatment. While improvements in clinical symptoms (24-item Brief Psychiatric Rating Scale) were observed over the course of enrollment in the trial, these conclusions are limited by the fact that physician volunteers were utilized for both treatment and ratings, and there was no control group.

Conclusion: Results from Phases 1 and 2 indicate that it is possible to develop and implement a treatment guideline for patients with a history of mania in public mental health clinics in Texas. TMAP Phase 3, a recently completed larger and controlled trial assessing the clinical and economic impact of treatment guidelines and patient and family education in the public mental health system of Texas, improves upon this methodology.

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Demand is increasing for continuing improvement in accessible, high-quality medical care at an affordable cost. Development of clinical practice or treatment guidelines is one response to this demand.[1] In recent years, as the number of treatment options has expanded, the field of psychiatry has adopted this trend from general medicine focusing on the development of treatment guidelines and algorithms for major psychiatric illnesses.

Guidelines should be geared to produce (1) assistance for physicians to make more informed decisions, (2) maximal symptom reduction in a majority of patients, and (3) maximum functional recovery.[2–4] In particular, the effort to improve the quality of care, integration of innovation and new medications, accountability of care, and expected economic advantages have been powerful arguments for the use of treatment algorithms in patient management.[5–7]

As application of treatment algorithms expands, it is important to determine whether treatment response in psychiatric illnesses will, in fact, be improved through a systematic approach to clinical management. The utility of treatment algorithms or consideration of the impact of algorithms on aspects of care besides clinical outcome has yet to be demonstrated. The current article describes Phases 1 (guideline development) and 2 (feasibility study) of the Texas Medication Algorithm Project (TMAP) Bipolar Disorder Module. This collaboration between aca-

demic institutions and the public mental health system was conceived as a method to assess the feasibility and potential benefits of implementing algorithms for treatment of major psychiatric illness (bipolar disorder, depression, schizophrenia) in public mental health clinics in Texas.[7–9]

THE TEXAS MEDICATION ALGORITHM PROJECT (TMAP)

The Texas Medication Algorithm Project began as a collaborative venture between the Texas Department of Mental Health and Mental Retardation (TDMHMR), researchers from the University of Texas Southwestern Medical Center and other state medical schools, and the College of Pharmacy at University of Texas Austin. Ultimately, community mental health centers, hospitals, and physicians across the state contributed to TMAP, as well as representatives from the National Alliance for the Mentally Ill—Texas (NAMI-Texas), the Texas Depressive and Manic-Depressive Association (TXDMDA), the Mental Health Association in Texas (MHAT), and Texas Mental Health Consumers (TMHC). Phase I of TMAP was initiated to develop treatment algorithms for 3 major psychiatric disorders, major depressive disorder, bipolar disorder, and schizophrenia. Phase 2 assessed the feasibility of implementation of the developed guidelines and the resources and methods required to implement the guidelines in the public sector. This article describes the development of the original TMAP treatment algorithms for patients with a history of mania and the feasibility test of the guidelines in Phase 2 of TMAP.

DEVELOPMENT OF THE TMAP BIPOLAR DISORDER GUIDELINE: PHASE 1

Algorithms provide an opportunity to organize information from diverse sources into an easily accessible format. As the treatment choices for bipolar disorder have expanded (e.g., increasing use of newer mood stabilizers, atypical antipsychotic agents, and combination therapies), a treatment algorithm provides a useful mechanism to disseminate the most current information. The assumed benefit of this tool is clearly evident in the multiple consensus efforts to develop treatment guidelines for this patient group in the absence of controlled trials informing the stages of treatment after monotherapy.[10–13]

The conference to develop the TMAP Phase 1 treatment algorithm for care of patients with a history of mania (bipolar I disorder and schizoaffective disorder, bipolar type) was held in September 1997. At that time, the development of treatment algorithms in this area was limited. In particular, a small gathering of experts included in the International Psychopharmacology Algorithm Project discussed treatment of patients with bipolar disorder.[14] The American Psychiatric Association also published general guidelines for treatment of patients with bipolar disorder around this same time, but did not provide a delineated, specified, decision-making approach to the treatment of patients with bipolar disorder.[15]

The Expert Consensus Guideline for treatment of bipolar disorder (Kahn et al., 1996[16]; since updated in Sachs et al., 2000[12]) had been completed and was in the process of publication. This comprehensive set of consensus guidelines was developed using a modification of a method developed by the Rand Corporation.[17] In this method, a large number of national experts were asked a set of questions regarding specific clinical scenarios. From the resultant data, statistical analyses were used to identify treatment recommendations for various clinical scenarios. The first version of the Expert Consensus Guidelines was organized as a "menu" of options after step 1 or 2, rather than a delineated, ordered sequence of treatment stages. The Expert Consensus Guideline developers attended and presented their findings at the TMAP consensus conference, facilitating the development of the Phase 1 algorithms.

The goal of the Phase 1 development of a treatment algorithm for bipolar disorder was to integrate the available information regarding pharmacologic treatment of patients with a history of mania into an understandable, useful format for clinicians within busy, public, community mental health clinics. As a first approach, the principal investigators (PIs) (T.S. and A.C.S.) for the TMAP bipolar disorder module developed a proposed algorithm for discussion. The content and order of these proposed algorithms were derived from literature review, the Expert Consensus findings, other algorithm documents, and clinical research experience. Research evidence was rated using the method widely adopted in this area, ranging from Level A to C evidence.[2,3] Level A data are drawn from randomized controlled and, in most cases, blinded clinical trials. Level B refer to open but randomized trials or, in some cases, very large clinical series. Retrospective studies could be considered either a Level B or C, based on methodology. Level C consists of smaller or more scattered case reports and expert opinion or consensus. In general, Level A would be viewed as the strongest form of evidence followed by Level B and then Level C. Because of the new medications available and limited efficacy data on the combination therapies widely used with this population, data of all types were used to inform and further develop the Phase 1 algorithm for treatment of patients with a history of mania.

Finalizing the Algorithm

The second step in this process was the convening of a symposium in Dallas, Texas, in September 1997. Attendees included multiple stakeholders in the TMAP project including consumers, Texas advocacy group leaders, the clinicians who would be carrying out the Phase 2

feasibility study in Texas, and prominent researchers who would serve as consultants to the project on both treatment issues and algorithm development and implementation. Inclusion of clinicians who will be implementing an algorithm in the development process has been associated with greater support of and adherence to the final product.[18] The principle of including academics, physicians, administrators, staff from public agencies, advocates, and consumers has been central to the success of TMAP and exemplifies the need to include all stakeholders in guideline development.[7,9,19,20]

The day included a series of individual presentations, including review of other guidelines and current research and consumer presentations and discussion of experiences. There was ample opportunity for interactive discussion, questions, and debate by all participants. The generalized consensus algorithm that had been developed by the PIs was presented in a step-by-step manner. The document was discussed in detail and consensus reached.

General Issues Regarding the Algorithms

One of the critical discussion points was whether to develop separate algorithms for treatment of manic/hypomanic episodes and depressive episodes. Two algorithms were eventually developed for TMAP Phase 2.

The group devoted time to definitions of symptom response, parameters of adequate dosing, and duration of medication trials. Given the short duration of the Phase 2 trial that was planned (patients treated for up to 4 months), a profound degree of response was not anticipated. Suggested time lines were developed, providing recommendations for clinical decisions to occur at 2 weeks, 4 weeks, and 6 weeks after the start of a new medication treatment.

Certain principles to guide implementation were defined by the symposium discussions. One of the most important principles was that clinical judgment and patient history superseded any specific step in the treatment algorithm. If a patient had a clear history of nonresponse or a significant side effect to a specific medication, there was no expectation that the patient would repeat that step. It was clearly communicated that the order of stages was based on the best available scientific data, expert consensus, and consideration of safety and tolerance issues, but that this order was not inflexible. Physician judgment and patient history and preference were expected to interact with the recommendations of the guideline.

Availability and Selection of Medications

An additional issue that often affects physician choice of treatment is the availability of medications. In the case of TMAP, the treatment guidelines were not subjected to limits in the choice of medications, either in brand or generic form. Therefore, the algorithms were not based on economic factors (e.g., medication acquisition costs), but rather on the best research evidence and clinical consensus available at the time of this symposium in 1997. Given the data regarding medication adherence by patients with bipolar disorder, medication choices associated with improved tolerability were selected (e.g., divalproex sodium [Depakote] and extended-release lithium, such as Lithobid or Eskalith). Again, the algorithms presented and reviewed here, developed in the fall of 1997, do not include the newer anticonvulsants and atypical antipsychotics now widely available and included in the TMAP Phase 3 algorithms. More updated versions of the TMAP algorithms for treatment of bipolar disorder can be found on our Web site, http://www.mhmr.state.tx.us/centraloffice/medical director/tmap.html.

Specification and order of mood stabilizers. Earlier work within public mental health centers[21] suggested that treatment failure in this population can often be attributed to inadequate dosing of mood-stabilizing medications, inadequate duration of exposure, or inadequate use of combination medications. The Phase 2 algorithm for treatment of manic symptoms includes combination mood stabilizers in Stages 2 and 3. Based on limited data supporting response in some treatment-refractory patients,[22] the simultaneous use of carbamazepine, divalproex, and lithium was included as Stage 3 in the Phase 2 algorithm for treatment of a manic or hypomanic episode. Part of the discussion included education on the use of combination medications and, in particular, the simultaneous use of 3 mood stabilizers as an option in the treatment algorithm for TMAP Phase 2.

Inclusion of atypical antipsychotic medications. An additional area of discussion included the appropriate use and timing of atypical antipsychotics. While at first only clozapine was specified in the algorithm, over the course of the feasibility trial use of risperidone increased and was also allowed. Use of either clozapine or risperidone in conjunction with a mood-stabilizing medication for treatment of manic symptoms and/or mood lability was allowed in Stage 4 of the mania/hypomania algorithm. This was based in part on national clinical consensus, early clinical reports, and the research on efficacy of clozapine to treat severe affective symptoms.[23–27] Adjunctive use of either atypical or conventional antipsychotics for psychotic symptoms was allowable at any point.

Adjunctive medications. Another area of discussion centered on the use of additional sleeping medication. Change in sleep habits is often an early and critical symptom of imminent relapse. The decision was made not to recommend use of the antidepressant medication trazodone because of its potential to contribute to the development of mania. Rather, benzodiazepines and low-dose divalproex were suggested.

Summary

The goal of Phase 1 of the Texas Medication Algorithm Project was to develop treatment guidelines for major

Figure 1. Strategies for the Treatment of Bipolar Disorder: Hypomanic/Manic Episode

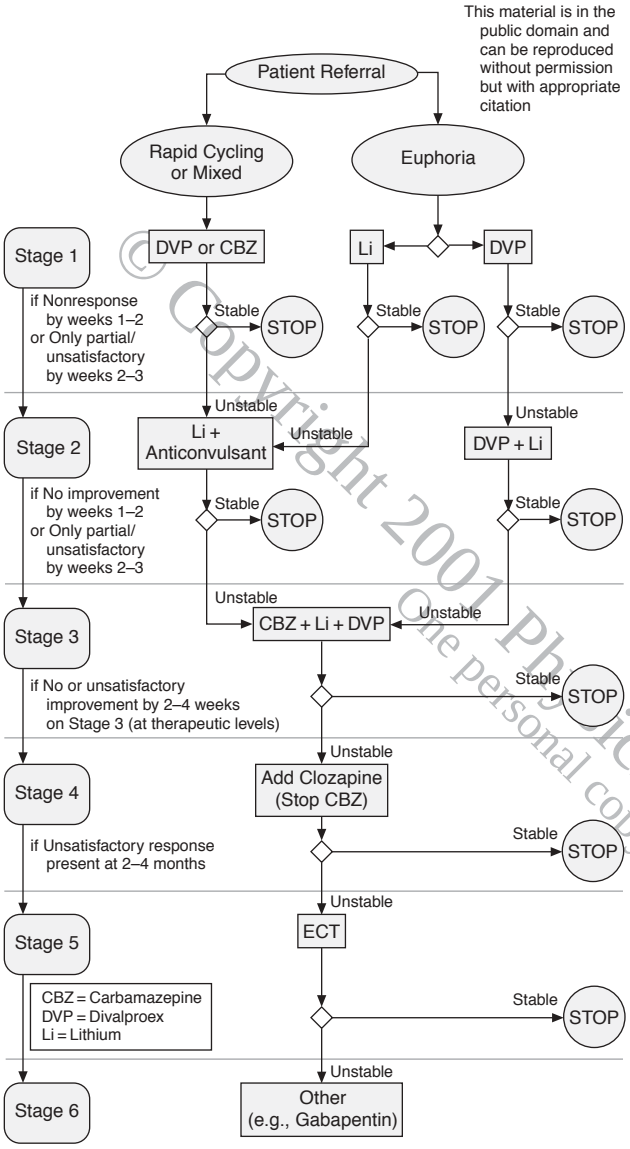
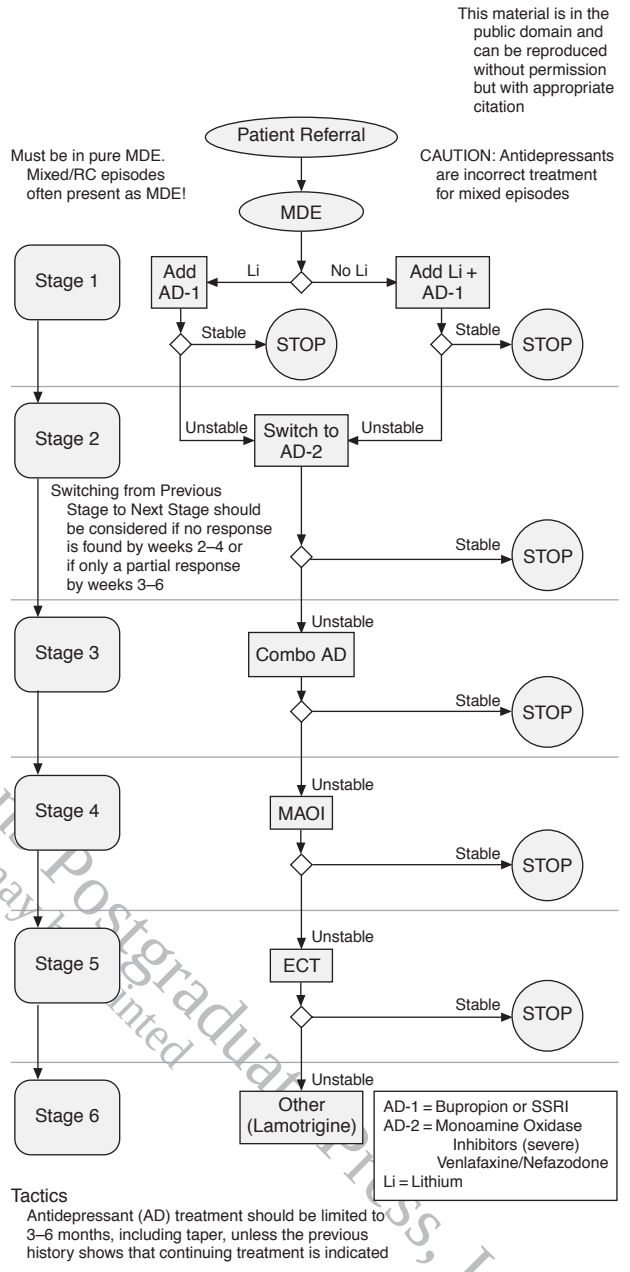


Figure 2. Strategies for the Treatment of Bipolar Disorder: Major Depressive Episode



depressive disorder, bipolar disorder, and schizophrenia. The PIs of the bipolar disorder module, with feedback elicited in a consensus conference, developed an understandable, user-friendly algorithm for use by physicians in busy, overburdened public mental health clinics. All groups present at the symposium agreed that these guidelines were helpful in clinical decision making, but still flexible enough to be customized to individual history and response. Importantly, other than the International Psychopharmacology Algorithm Project,[14] the TMAP algorithms were the first to codify and delineate a series of specific treatment stages taking into account efficacy, safety, and tolerability. The algorithms utilized in Phase 2 of the TMAP can be viewed in Figures 1 and 2.

FEASIBILITY TRIAL OF THE ALGORITHMS: PHASE 2

The primary goal of Phase 2 was to evaluate the feasibility of integrating the treatment guidelines developed in Phase 1 into public mental health settings. To that end, the feasibility trial was designed to provide preliminary answers to the following questions, among others: (1) Would physicians accept and implement treatment guidelines? (2) Would use of treatment guidelines be

Table 1. Basic Demographic Information of 69 Patients With Bipolar I Disorder or Schizoaffective Disorder, Bipolar Type[a]

Variable	Outpatient Sample (N = 44)	Inpatient Sample (N = 25)
Gender, N (%)		
Male	15 (34)	11 (44)
Female	29 (66)	14 (56)
Age, y		
Mean	40.43	39.28
Range	19–65	18–64
Ethnicity, %		
Caucasian	86	44
African American	14	44
Hispanic/Latino	0	12
% Reporting a current alcohol/substance abuse problem	19	48
Baseline symptoms (total 24-item BPRS score at first visit)		
Mean ± SD	56 ± 15.43	74 ± 14.90
Range	29–96	49–100

[a]Abbreviation: BPRS = Brief Psychiatric Rating Scale.

associated with meaningful changes in patient symptomatic and functional outcomes? (3) Would treatment guidelines increase physician time? (4) How would physicians and patients rate treatment with a prescribed treatment guideline?

Method

The feasibility trial of the TMAP algorithms was launched in October 1997. The enrollment period was 6 months, and when possible, physicians were asked to follow enrolled patients for at least 4 months. For all modules (bipolar disorder, depression, schizophrenia), 40 physicians at 16 sites (inpatient and outpatient) across the state were asked to participate. At each site, a 2-physician team was asked to implement the proposed algorithms and patient education materials with 5 to 15 patients who needed a medication change.

Prior to the initiation of enrollment, a 1-day conference was held to orient the physicians regarding use of the algorithms; enrollment procedures; data collection; and administration of symptom ratings. Physicians were asked to complete specific forms at the time of enrollment, at each patient visit, and at the time of termination. These forms were presented and reviewed during this orientation. Additionally, since physicians were asked to complete a 24-item Brief Psychiatric Rating Scale (BPRS-24) at each patient visit, standards for the administration and rating of this instrument were reviewed. A videotaped sample of BPRS administration was also shown during this session to augment the training. However, it should be emphasized that there was no process for gathering data on reliability or uniformity of ratings in this time-limited feasibility trial. In some cases, physicians were assisted with rating scales and paperwork by a volunteer clinician in their clinic. There were no data collected on the reliability of these ratings. The educational materials were reviewed, and parameters for providing patient and/or family education discussed. In addition to this initial training session, participants were provided with a brief manual that covered the procedures, forms, educational materials, and other basic questions regarding implementation.

Results

Sixty-nine patients with a diagnosis of bipolar I disorder or schizoaffective disorder, bipolar type, were enrolled into TMAP Phase 2. Forty-four of these patients were treated in an outpatient setting; 25 were treated as inpatients. Demographic information about each subsample is included in Table 1. As this was a feasibility trial of algorithm implementation in public sector mental health centers and hospitals, no efforts were made to ensure representative or matched samples. However, as can be viewed in Table 1, the sample reflects much of the usual populations treated in these settings in terms of diversity, except for Mexican Americans, who were underrepresented. On the basis of our experience in this setting, baseline symptom severity in this group was somewhat higher than would have been expected, but not significantly different from other studies based in the TDMHMR system.[21] Inpatients demonstrated higher overall BPRS-24 item total scores than outpatients.[21,26]

Algorithm Implementation

Physicians were asked to enroll patients with requisite diagnoses and symptoms and to follow them either for the duration of their hospitalization or for at least 4 months in the outpatient settings. In the inpatient setting, patients were treated with the algorithms for a mean ± SD length of 100 ± 79.47 days. The shortest enrollment was 6 days; the longest was 371 days. Outpatient participants were enrolled for 95 ± 49.66 days. The range of time that outpatients were treated with the algorithms ranged from 3 days to 151 days.

The algorithms for treatment of bipolar disorder specify more frequent visits during acute treatment. Specifically for outpatients, while medications are being added and adjusted, the recommendation was that visits be scheduled at 2-week intervals. While there is no comparison group for this initial feasibility trial, data obtained suggest that outpatient physicians adhered to the suggested visit schedule specified in the treatment manual, with an average of 16 days between outpatient visits. Initial implementation of the algorithms and education appeared to take slightly more time than usually allocated (15–20 minutes). Physicians spent a mean of 29.7 minutes with inpatients and 28 minutes with outpatients, although there was a trend to decreased visit time as numbers of visits accumulated. More time and familiarity with the

Table 2. Inpatients: Number of Treatment Steps Taken and Time per Step

No. of Steps Taken	N	Mean Days at 1st Step	Mean Days at 2nd Step	Mean Days at 3rd Step	Mean Days at 4th Step
1	18	15.8			
2	5	12.8	4.0		
3	2	11.0	10.0	10.0	

Table 3. Outpatients: Number of Treatment Steps Taken and Time per Step

No. of Steps Taken	N	Mean Days at 1st Step	Mean Days at 2nd Step	Mean Days at 3rd Step	Mean Days at 4th Step
1	20	100.1			
2	17	60.5	51.7		
3	6	23.5	44.0	50.2	
4	1	14.0	28.0	42.0	33.0

algorithms and paperwork (or simplification of the paperwork) might further reduce physician time.

If medication changes did not result in adequate clinical improvement or caused significant side effects, the algorithm recommended changing medications (i.e., proceeding to the next treatment step) after a reasonable trial period. For inpatients, the majority (72%) were treated with only 1 stage of the algorithm (Table 2). It should be emphasized that this could have been any stage of the algorithm. However, those that progressed to additional steps of treatment spent less time at the first step, an indication of either inadequate response or intolerable side effects, both rationales for switching to another stage of treatment. For outpatients, about 45% of those enrolled were treated with 1 stage of the algorithm (Table 3). The majority required at least 1 stage change, and similarly, those that switched treatment stages spent less time at initial stages.

Further information about physician adherence to the treatment guidelines can be gained through analysis of visit data. In this short trial, physicians conducted 416 visits. They were allowed to override the algorithm, if desired, and use medications or medication combinations not specified in either algorithm. This was done for only 9 visits (2%) conducted with 2 of the 69 patients. While physicians were permitted to move both forward and backward in the algorithm as clinically appropriate, analysis of stage changes also reveals information about physician behavior. In the 45 stage changes that were made, only 6 involved retreating to an earlier stage of the algorithm. The large majority (31 stage changes) involved either a forward progression (17 stage changes) or a switch from the algorithm for mania/hypomania to the one for treatment of a depressive episode (14 stage changes). The remaining 8 stage changes involved making changes inconsistent with any algorithm stage (see above). These data are also supportive of our perception that physicians were systematically exploring treatment options in a stepwise, algorithmic fashion.

Use of Stages: Algorithm for Treatment of Hypomanic/Manic Episodes

There is evidence that physicians utilized many of the treatment options available in the algorithm for treatment of hypomanic/manic episodes and that there was differential use of these options over the course of treatment. While 15 (60%) of the inpatient group were entered on Stage 1 of this algorithm, at the time of termination, only 10 (40%) of the inpatient group were still being treated at this early stage. (Note: Overall, 18 [72%] of the inpatient group were treated on only 1 stage, but not necessarily Stage 1—see above.) In contrast, use of other stages increased. The outpatient group demonstrated a similar pattern. Stage 1 was most frequently utilized at study entry (N = 22, 50%), but at the time of termination, only 12 patients (27%) were being treated at this initial stage.

Use of Stages: Algorithm for Treatment of Bipolar Depressive Episodes

A minority of patients were treated with the algorithm for the depressed phase of bipolar disorder, and there was virtually no use of additional stages other than the first treatment option described (combination mood stabilizer and antidepressant from a selected group). Five patients (11%) of the outpatient group were entered on the first stage of the algorithm for a depressive episode. At termination, 10 outpatients (23%) were being treated using this stage. Inpatient data were similar, with 8 patients (32%) entering on Stage 1, and 8 patients (32%) on this stage at the time of termination.

CLINICAL OUTCOMES

During the time period that each patient was treated with the algorithm, a 24-item BPRS was administered. Patient's Visit 1 and final visit (which varied by individual) BPRS scores were compared to determine the degree of change in symptoms during the algorithm intervention period. Change in BPRS score was significant for both the inpatient and outpatient groups. Outpatient participants in TMAP Phase 2 had a mean BPRS score of 56 at study entry. At their final visit, the mean BPRS score was 42 ($t = -4.85$, $p < .01$). Inpatients started participation with a mean BPRS score of 74, and at the time of the final visit the mean was 35. This difference was also significant ($t = -10.83$, $p < .01$). An alternative way to view change, and more appropriate for an uncontrolled feasibility trial, is the distribution of BPRS scores at Visit 1, final visit, and the difference scores (Table 4).

Additionally, patient function was assessed with the Multnomah Community Ability Scale (MCAS)[28–30] at intake and termination from the feasibility trial. This scale measures the degree of psychiatric disability and provides

Table 4. Distribution of BPRS Total Score From Baseline to End of Study[a]

	Visit 1			Final Visit			Change		
Patient Group	25%	50%	75%	25%	50%	75%	25%	50%	75%
All patients	51	61	77	30	36	44	–46	–18	–7
Inpatients	62	77	86	30	30	36	–55	–47	–26
Outpatients	49	53	66	32.5	40	47.5	–23	–10.5	–4

[a]Visit 1 and Final Visit columns show distribution quartiles (25th percentile, median, 75th percentile) on the Brief Psychiatric Rating Scale (BPRS). The Change column shows distribution quartiles after subtracting each subject's Visit 1 BPRS score from final BPRS score, i.e., within subject score shown in quartiles.

subscale scores for each of 4 domains, as well as a total score. A lower score indicates a more impaired functioning within the community. For both inpatient and outpatient samples, functioning improved over the course of the study. For inpatients, the improvement in functioning reached statistical significance ($t = 9.74$, $p < .001$). The significant improvement in functioning for the overall sample ($t = 6.64$, $p < .001$) is most likely due to the changes from inpatient subjects, as the outpatient subjects' improvement was not statistically significant.

Physician Satisfaction

To assess the degree to which physicians may endorse use of the algorithms in future studies, physician satisfaction was measured at termination of each patient. Questions were specific to treatment of each individual patient, rather than global ratings of algorithm treatment overall. Physicians were asked to rate their level of agreement with the following 3 statements: "Following the algorithm was difficult with this patient;" "Using the algorithm assisted me in making treatment decisions for this patient;" and "The patient's symptoms have improved since starting the algorithms." Additionally, physicians were asked to use a scale from 1 = Excellent to 5 = Unacceptable to respond to the following statement: "In using the algorithm, how would you rate the overall quality of medication treatment?"

Physician ratings were available for 64 of the 69 patients enrolled in Phase 2. Overall ratings were favorable, with physicians stating that the overall quality of medication treatment was "very good" or "excellent" for 33 of the patients (52%). Physicians determined that the overall quality of medication treatment was "good" or better for 97% of those treated.

Physicians did not find implementation of the algorithms difficult, given that for 47 of the patients enrolled (73%), physicians disagreed or strongly disagreed with the statement that using the algorithm was difficult. In a majority of cases (N = 43, or 67%), physicians agreed with the statement that using the algorithm assisted them in making treatment decisions for the patient. Finally, for 44 of the enrolled patients (69%), physicians believed that patient symptoms had improved since initiating treatment with the algorithm.

DISCUSSION

The Texas Medication Algorithm Project is an innovative public-academic collaboration intended to assess whether implementation of treatment guidelines for patients with serious psychiatric disorders improves clinical outcomes in the public mental health setting. Review of evidence and consensus procedures were used to develop initial algorithms for treatment of patients with a history of mania (bipolar I disorder and schizoaffective illness, bipolar type), considering the need to target these tools for implementation in busy, overburdened, public mental health clinics and hospitals with few supports for physicians.

TMAP Phase 2 assessed the feasibility of implementation in this setting. The feasibility trial was designed to provide preliminary answers to questions including (1) Would physicians accept and implement treatment guidelines? (2) Would implementation of treatment guidelines effect meaningful changes in patient symptomatic and functional outcomes? (3) Would implementation of treatment guidelines increase physician time? (4) How would physicians and patients rate treatment with a prescribed treatment guideline?

From the results, it is clear that physicians accepted the treatment guidelines, and there are indications that they followed specific recommendations contained in the guidelines. Physicians changed standard scheduling practices to accommodate the request for twice-a-month visits in the acute treatment phase. There is also evidence that physicians changed treatments for those patients who demonstrated inadequate response or intolerance to the first stage of treatment selected (though not necessarily Stage 1 of the algorithm), as those patients who were treated with more than 1 stage spent less time at initial stages, an indication of either intolerance or lack of symptom response. Initial use of early stages of the algorithm gradually shifted to include some of the later stages, further evidence that physicians were systematically working through available treatment options. The majority of stage changes were either a forward progression through the algorithm or a switch to the alternative symptom algorithm. Analysis of visits demonstrated that medications or medication combinations not recommended by the algorithm were prescribed for only 2% of visits. Finally, physicians reported that the algorithm was easy to use, helped them in making treatment decisions, and was beneficial to patients as well.

With regard to specific medications, this preliminary trial does not afford opportunity to analyze medications utilized in great detail. Physicians were permitted to utilize adjunctive medications, and 1 or more adjunctive agents were prescribed for at least 1 visit for 44 (64%) of the enrolled patients. These agents were predominantly benzodiazepines and/or antipsychotic medications for specific

treatment of psychotic symptoms only. There was limited utilization of clozapine and risperidone for treatment of mania in Stage 4 of the mania/hypomania algorithm. Physicians did not utilize algorithm Stage 3 (triple mood-stabilizer treatment) to a great degree. During a poststudy focus group, participating psychiatrists verbalized that patients were generally not receptive to triple drug therapy. They further noted that patients expressed concern about potential side effects from taking 3 medications and a patient perception that taking 3 medications meant that he or she was really ill. Revisions in the algorithm for TMAP Phase 3 reflect this feedback from practitioners.

It is important to note that baseline physician behaviors were not measured in this limited feasibility trial. Therefore, it is not clear whether these indications of algorithm implementation and adherence represent a change from usual physician practice in this group. Since physicians volunteered for the feasibility trial, these providers may have been motivated by the prospect of introducing innovation into public mental health services. Additionally, the strong support and involvement of TDMHMR administration in the TMAP project may have provided further motivation.

Consistent with research in other medical arenas which indicates that systematic use of treatment guidelines often results in beneficial patient outcomes,[31] measurable changes in patient clinical symptoms and functioning were observed in patients enrolled in this feasibility trial. However, due to the fact that outcomes were measured by the clinicians (physicians or support staff), rather than independent, trained raters, we report these findings with a caveat. Baseline BPRS-24 item scores were somewhat high, and consequently may overestimate the degree of improvement in these uncontrolled groups. The clinical symptom ratings were completed by physicians and staff invested in the study, which may have introduced a systematic bias toward rating clinical improvement. Additionally, the improvement in functioning can largely be attributed to the inpatient sample, and this degree of change would be expected from a sample who had been hospitalized, treated, and discharged. The positive direction of this result does provide an additional rationale for pursuing more controlled investigations of the use of treatment guidelines for psychiatric illness in this setting. Thus, TMAP Phase 3, a larger, controlled evaluation of the clinical and economic impact of treatment algorithms and patient/family education for bipolar disorder, depression, and schizophrenia, was initiated in public mental health clinics in Texas in 1998. TMAP Phase 3 expands on this feasibility trial in many aspects, including the use of control groups and independent raters for quarterly evaluations.

Implementation of the treatment guideline utilized more physician time than is typically allotted for a medication visit in a public mental health setting. It is our expectation that time requirements would be reduced as physician and support staff obtain more experience and exposure to the paperwork, educational materials, and algorithm recommendations. Additionally, in Phase 2, time estimations may be inflated because the physician was often responsible for introducing patient education materials. In the future, this responsibility could be absorbed by other staff members, further reducing physician time burden. TMAP Phase 3 will assess this issue more directly by measuring the costs associated with implementation of an algorithm and educational materials in public mental health settings.

Results from Phase 1 and 2 of the Texas Medication Algorithm Project, Bipolar Module indicate that it is possible to develop and implement a treatment guideline for patients with a history of mania in public mental health clinics in Texas. The feasibility trial indicates that physicians were responsive to recommendations of the guidelines and followed them in a reasonable manner and that patients experienced reductions in clinical symptoms over fairly brief courses of treatment. While these conclusions are limited by the open trial, use of volunteer physicians, and lack of independent raters, there is evidence to support further investigation of the use of guidelines for treatment of psychiatric disorders in large, resource-limited environments such as public mental health settings.

Drug names: bupropion (Wellbutrin and others), carbamazepine (Tegretol and others), clozapine (Clozaril and others), divalproex sodium (Depakote), gabapentin (Neurontin), lamotrigine (Lamictal), nefazodone (Serzone), risperidone (Risperdal), trazodone (Desyrel and others), venlafaxine (Effexor).

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