

Using Clinical Informatics to Improve Outcomes: A New Approach To Managing Behavioural Healthcare Services

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ABSTRACT

Objective: To use a clinical information system to improve treatment outcomes for patients receiving outpatient behavioural healthcare through a large managed care organisation.

Design: Naturalistic study investigating methods for improving outcomes in a large system of care.

Setting: Patients live in a widely distributed geographic area within the United States. Care is provided by over 5,000 individual clinicians and 75 multi-disciplinary behavioural health group practices.

Methods: Patients complete outcome questionnaires at frequent intervals during their treatment. This data is used by the clinical information system to monitor the trajectory of improvement for each case. The system provides feedback and decision support to clinicians and care managers. In particular, it alerts them to at-risk cases and enables them to take steps to keep these patients engaged in treatment.

Results: The integration of routine outcomes measurement into the delivery of care resulted in a number of apparent benefits, including improved assessment of at-risk cases and a heightened focus on keeping at-risk patients engaged in treatment. In addition, the system identified the most effective providers within the system of care and helped the organisation direct more patients to them. Finally, the system helps ensure that the most distressed patients utilise the services they need.

Conclusions: This case study demonstrates not only the feasibility, but the substantial benefits of routinely collecting clinical outcomes data. A primary benefit is the ability to identify practitioners whose patients report above average improvement. Directing referrals to the most effective practitioners has the effect of improving outcomes for the entire treatment population.

INTRODUCTION

The purpose of this paper is to describe a managed behavioural healthcare organisation's use of a clinical information system to systematically measure and manage clinical outcomes for outpatient behavioural healthcare. The idea of

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outcomes management goes beyond the relatively simple activity of outcomes measurement. Outcomes management seeks to measurably improve outcomes over time for the entire system of care through real-time treatment interventions.

The clinical information system that will be described here, ALERTSM, has had a profound impact on the organisation's understanding of the relationship between the effectiveness of care and the cost of services. ALERT sheds new light on the question of whether the most effective care costs more.

PacifiCare Behavioral Health (PBH) is a managed behavioural healthcare organisation with over 4,000,000 insured members in the United States. PBH is responsible for the cost of all behavioural healthcare services for its clients, both for inpatient and outpatient care. Like other managed care companies, PBH seeks to ensure that its clients receive high quality and effective services at an affordable cost.

Care is provided by a network of licensed independent behavioural health professionals that are contracted with PBH to provide services to its clients. PBH contracts with both individual clinicians and multidisciplinary group practices (MGPs).

MGPs provide an array of clinical specialists and facilitate coordination of care for patients treated within their practice. If a patient is referred to an MGP, the entire practice becomes responsible for the patient's outcome, regardless of which clinicians within the practice provide the care. This tends to foster collaboration among practitioners, and MGP administrators tend to focus on optimal matching of patients with clinicians within the practice.

In 1999 PBH launched the ALERT system with a subset of its MGPs. In subsequent years the project has been expanded to include all willing practitioners within the network. The system has been developed and maintained by a team of clinicians, researchers and statisticians with accountability for data analysis, reporting and publication of findings. For the purposes of this article, this team is referred to as the informatics team. The precise make up of the team varies over time, but is always composed of experts within and from outside the PBH organisation.

A Scientific Advisory Council (SAC), comprised of nationally recognised experts from major academic institutions, provides ongoing consultation to the informatics team. At any point in time, one or more members of the SAC are likely to be doing work directly related to the analysis of the data, and so become members of the core informatics team for periods of time.

The ability of the informatics team to quickly modify any aspect of the clinical information system is the key to the success of the clinical informatics programme at PBH. This has resulted in continuous refinement of the system since its introduction.

The outcomes data within ALERT are naturalistic data collected during real world treatment episodes, not as part of any controlled research design. Data collected in naturalistic settings cannot be expected to yield information comparable to that which can be learned from a controlled study. In the real world of

PBH managed behavioural health services, patients and clinicians have broad latitude in the choice of method, duration and intensity (frequency of sessions) of treatment. Furthermore, both clinicians and patients are exercising these choices over time, presumably depending on the response to treatment thus far. The effects due to patient/clinician freedom of choice are precisely those effects that controlled research studies are designed to minimise or eliminate^{1,2}.

Services provided within controlled studies are always far more prescriptive in terms of the type, intensity and length of treatment. In the real world, patients do not receive a fixed “dosage” of psychotherapy, nor is the method of treatment necessarily consistent. Patients responding quickly to treatment in naturalistic settings are likely to use fewer services than those responding more slowly. In other words, in the real world it is not uncommon for patients to stop treatment when they have attained the improvement they sought. This means that patients with fewer sessions might have outcomes equal to or better than patients with more sessions.

ALERT has developed increasingly complex clinical algorithms and decision support tools designed to ensure that patients with the greatest level of psychological distress receive treatment of adequate intensity and duration. ALERT is a clinical information system focused primarily on the need for patients to get optimal clinical results, with the assumption that the amount of treatment needed is a function of how the patient’s condition is improving.

MEASUREMENT METHODS

The ALERT system was designed to facilitate the measurement and management of outcomes *from the patient’s perspective*. At the core of ALERT are brief, validated tools for the patient’s rating of improvement in symptoms, interpersonal relationships and daily functioning. The feasibility of this approach had been previously demonstrated within a managed care environment using the Outcome Questionnaire-45 (OQ-45) for adults and the Youth Outcome Questionnaire for children^{3,4}. This earlier initiative identified systematic differences in clinician versus patient reports of improvement. Clinician assessments tended to underestimate change for patients reporting rapid improvement early in treatment. Conversely, patients reporting rapidly worsening symptoms tended to be assessed by clinicians as showing no change. The data suggested clinicians tend to significantly underestimate deterioration and risk for premature termination⁴.

Since the ALERT protocol calls for the patient questionnaires to be administered at frequent intervals during the treatment episode, brevity and ease of use are important considerations. To address this concern, the Outcome Questionnaire-45 and Youth Outcomes Questionnaire were refined and shortened for the ALERT system. The resulting 30 item measures were labelled the Life Status Questionnaire (LSQ) and the Youth Life Status Questionnaire (YLSQ)^{5,6,7}. Figures

1 and 2 provide examples of the questionnaires. Note that the YLSQ is worded in such a way that it can be completed either by an adolescent or by the parent in the case of a younger child. The abbreviation Y/LSQ is used to denote when both questionnaires are being referred to simultaneously.

Session 1 LSQ

Form Completed By Client

This form will be returned to you if you do not supply the client's name, date of birth, and the "Reference ID-Suffix" which can be found on the authorization form. Adult clients should complete this form prior to the 1st, 3rd, and 5th sessions. Fax to (800) 992-2809.

Reference ID-Suffix

Client's Name (Last, First)

Provider's Name - Last, First

Client's Date of Birth

Session #

Today's Date

Please read carefully and follow instructions on back

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	Never	Rarely	Sometimes	Frequently	Almost Always
1. I have trouble falling asleep or staying asleep	○ 0	○ 1	○ 2	○ 3	○ 4
2. I feel no interest in things	○ 0	○ 1	○ 2	○ 3	○ 4
3. I feel stressed at work, school or other daily activities	○ 0	○ 1	○ 2	○ 3	○ 4
4. I blame myself for things	○ 0	○ 1	○ 2	○ 3	○ 4
5. I am satisfied with my life	○ 4	○ 3	○ 2	○ 1	○ 0
6. I feel irritated	○ 0	○ 1	○ 2	○ 3	○ 4
7. I have thoughts of ending my life	○ 0	○ 1	○ 2	○ 3	○ 4
8. I feel weak	○ 0	○ 1	○ 2	○ 3	○ 4
9. I find my work/school or other daily activities satisfying	○ 4	○ 3	○ 2	○ 1	○ 0
10. I feel fearful	○ 0	○ 1	○ 2	○ 3	○ 4
11. I use alcohol or a drug to get going in the morning	○ 0	○ 1	○ 2	○ 3	○ 4
12. I feel worthless	○ 0	○ 1	○ 2	○ 3	○ 4
13. I am concerned about family troubles	○ 0	○ 1	○ 2	○ 3	○ 4
14. I feel lonely	○ 0	○ 1	○ 2	○ 3	○ 4
15. I have frequent arguments	○ 0	○ 1	○ 2	○ 3	○ 4
16. I have difficulty concentrating	○ 0	○ 1	○ 2	○ 3	○ 4
17. I feel hopeless about the future	○ 0	○ 1	○ 2	○ 3	○ 4
18. I am a happy person	○ 4	○ 3	○ 2	○ 1	○ 0
19. Disturbing thoughts come into my mind that I cannot get rid of	○ 0	○ 1	○ 2	○ 3	○ 4
20. People criticize my drinking (or drug use) (If not applicable, mark "never")	○ 0	○ 1	○ 2	○ 3	○ 4
21. I have an upset stomach	○ 0	○ 1	○ 2	○ 3	○ 4
22. I am not working/studying as well as I used to	○ 0	○ 1	○ 2	○ 3	○ 4
23. I have trouble getting along with friends and close acquaintances	○ 0	○ 1	○ 2	○ 3	○ 4
24. I have trouble at work/school or other daily activities because of drinking or drug use (If not applicable, mark "never")	○ 0	○ 1	○ 2	○ 3	○ 4
25. I feel that something bad is going to happen	○ 0	○ 1	○ 2	○ 3	○ 4
26. I feel nervous	○ 0	○ 1	○ 2	○ 3	○ 4
27. I feel that I am not doing well at work/school or in other daily activities	○ 0	○ 1	○ 2	○ 3	○ 4
28. I feel something is wrong with my mind	○ 0	○ 1	○ 2	○ 3	○ 4
29. I feel blue	○ 0	○ 1	○ 2	○ 3	○ 4
30. I am satisfied with my relationships with others	○ 4	○ 3	○ 2	○ 1	○ 0

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Developed by Gary M. Burlingame, Ph.D., Michael J. Lambert, Ph.D.,
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32582

Figure 1. LSQ Questionnaire

The items selected for these shorter instruments were those that best tracked improvement during treatment while remaining relatively stable in a sample of matched non-treatment controls. This approach to item selection created instruments with presumptively sound psychometric properties despite the fact that

Session 1 YLSQ

Form Completed By Client/Parent

This form will be returned to you if you do not supply the client's name, date of birth, and the "Reference ID-Suffix" which can be found on the authorization form. A parent or guardian should complete this form for children under the age of 12. Fax to (800) 992-2809.

Reference ID-Suffix Client's Name (Last, First)

Provider's Name - Last, First Client's Date of Birth Session # Today's Date

Please read carefully and follow instructions on back

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Person Completing Form: Adolescent Parent/guardian Other

	Never	Rarely	Sometimes	Frequently	Almost Always
1. I have headaches or feel dizzy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
2. I don't participate in activities that used to be fun	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
3. I argue or speak rudely to others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
4. I have a hard time finishing my assignments or I do them carelessly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
5. My emotions are strong and change quickly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
6. I have physical fights (hitting, kicking, biting, or scratching) with my family or others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
7. I worry and can't get thoughts out of my mind	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
8. I steal or lie	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
9. I have a hard time sitting still (or I have too much energy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
10. I use alcohol or drugs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
11. I am tense and easily startled (jumpy)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
12. I am sad or unhappy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
13. I have a hard time trusting friends, family members, or other adults	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
14. I think that others are trying to hurt me even when they are not	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
15. I have threatened to, or have run away from home	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
16. I physically fight with adults	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
17. My stomach hurts or I feel sick more than others my same age	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
18. I don't have friends or I don't keep friends very long	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
19. I think about suicide or feel I would be better off dead	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
20. I have nightmares, trouble getting to sleep, or oversleeping, or waking up too early.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
21. I complain about or question rules, expectations, or responsibilities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
22. I break rules, laws, or don't meet others' expectations on purpose	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
23. I feel irritated	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
24. I get angry enough to threaten others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
25. I get into trouble when I'm bored	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
26. I destroy property on purpose	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
27. I have a hard time concentrating, thinking clearly, or sticking to tasks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
28. I withdraw from my family and friends	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
29. I act without thinking and don't worry about what will happen	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
30. I feel like I don't have any friends or that no one likes me	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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31340

Figure 2. YLSQ Questionnaire

they had not been previously administered in this 30-item format^{5,6}. Subsequent experience with the instruments has confirmed these psychometric properties.

Clinicians are encouraged to ask patients to complete the Y/LSQ at frequent intervals, minimally at sessions one, three, five and every fifth session thereafter. Clinicians are also asked to complete a brief Provider Assessment Report (PAR) within the first few sessions of the treatment episode. The PAR asks for basic information on diagnosis, prior hospitalisations, psychiatric medications, frequency of suicidal ideation, functional impairment and assessment of a substance use disorder.

The LSQ and YLSQ have cutoff scores for determining whether a person's level of distress is comparable to patients seeking behavioural health treatment or to a community sample of people not engaged in treatment. The cutoff score between a clinical and non-clinical sample was calculated for each measure using the method recommended by Jacobsen and others^{5,6,8}. Scores below the clinical cutoff are more characteristic of individuals not seeking behavioural health services. Patients with scores above the clinical cutoff are evidencing distress that is likely to improve with treatment. One of the functions of the ALERT system is to ensure that patients with elevated scores receive adequate services in an effort to bring the scores below the clinical cutoff.

ALERT analyses a patient's score on the Y/LSQ in comparison with a normative database, rather than simply in relation to the clinical cutoff score. As treatment progresses and repeated measures enter the ALERT system, the patient's scores are analysed against an expected trajectory of change. This trajectory is derived from cases in the normative database with similar diagnoses and severity. The trajectory is calculated using regression techniques to model the relationship between scores at

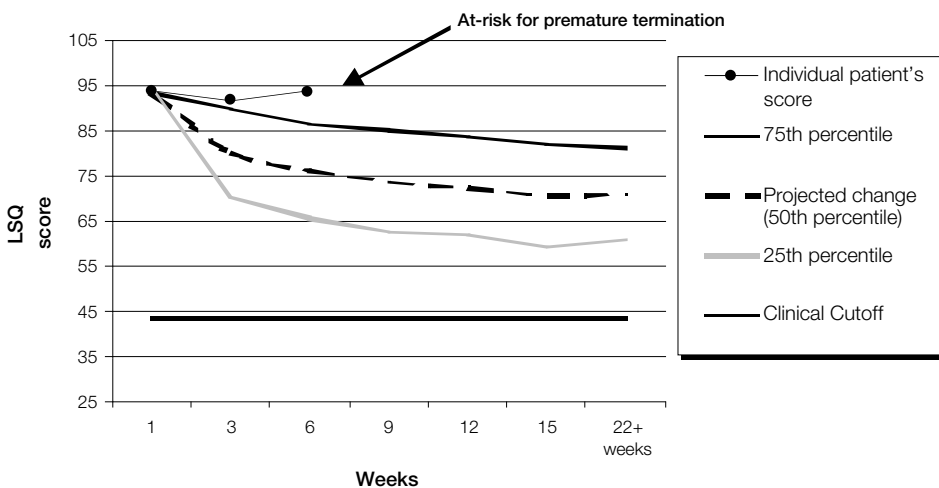


Figure 3. Monitoring trajectory of change for an individual patient

one point in time and subsequent points in time. This capability permits the system to flag cases at-risk for a poor outcome based on the initial response to treatment.

Figure 3 displays the trajectory of change for an individual patient compared to the normative expectation for patients with a comparable diagnosis and intake score. Higher scores reflect greater distress, and so a reduction in test scores indicates improvement. Note that in this example the patient is showing much less improvement than expected by week six.

Patients with a poor initial response are prone to premature termination. However, if they remain in treatment, there is a high likelihood that they will eventually show significant improvement⁷. The ALERT system targets these at-risk cases by notifying the treating clinicians and reinforcing the importance of keeping the patient in treatment.

The Y/LSQ also contain critical items assessing suicidal ideation and problems related to substance abuse (Figures 1 and 2). The patient's answers regarding these risk factors are compared to the clinician's assessment of these risk factors. If the ALERT system finds that the clinician's assessment significantly underestimates the risk as reflected by the patients self-report, the clinician is notified.

The ALERT system contains a series of clinical algorithms that determine which cases need closer attention. One set of algorithms identifies cases to be brought to the attention of the treating clinicians. Another set identifies a group of higher risk patients that are brought to the attention of the clinicians and PBH care managers. On average, 14% of cases are brought to the attention of the treating clinicians and 7% to the attention of both clinicians and care managers.

The ALERT system notifies treating clinicians of high risk cases by automatically generating case-specific letters focusing attention on one or more risk indicators. The letters urge clinicians to keep the patient engaged in treatment, offer to authorise more intensive or specialised treatment, and ask the clinician to contact the care manager if the patient drops out of treatment. These are sent to clinicians via regular mail, and so most clinicians are notified within 2–3 days of submitting data. Figure 4 provides a sample of such a letter, based on the clinical information for the patient whose scores are displayed in Figure 3.

PBH care managers are notified of patients at highest risk on a daily basis. Each day when they turn on their workstations they receive an updated list of at-risk cases that need their attention. Care managers are expected to contact the treating clinician and work to ensure that these patients remain engaged in treatment and receive all necessary services until symptoms and risk indicators are reduced substantially.

TECHNOLOGY, METHODS AND COSTS

In choosing the appropriate technology for ALERT, cost and speed of development were critical factors. The design philosophy envisioned a flexible system that

would evolve as more information was gleaned from incoming data. In fact, ALERT has evolved over time in terms of its norms for trajectory of change, its clinical algorithms, its rules for creating ALERT letters and other forms of feedback and decision support for clinicians and care managers.

This programming flexibility was intended to permit the system to “learn” over time, responding rapidly to feedback from system users and to information extracted from the outcomes data. In order to achieve these design goals, the ALERT system was developed using several well-established, readily available software products that provided the needed functionality. This approach not only served to meet PBH’s goals related to cost and speed of development, but it provided the informatics team with a certain degree of autonomy from the PBH corporate IT staff. Decisions to modify the ALERT system could be made without major concerns about the availability of PBH programmers. There are many competing demands placed on the corporate IT staff of a healthcare organisation, and the use of existing proprietary products removed ALERT from this competition for resources.

The data warehouse and reporting logic of the ALERT system was developed using tools from the SAS Institute⁹. SAS markets software for organising and reporting on large quantities of complex data, and it includes routines for a wide variety of advanced statistical procedures. The product provides a powerful scripting language that permits rapid development of code to create SAS datasets, and it provides great flexibility with regard to how data are manipulated and reported.

Data acquisition is another challenge that was solved with a readily available tool. The ALERT system depends on large quantities of data from paper and pencil questionnaires to be entered into the system on a daily basis. This is accomplished using TeleForm™, from Cardiff Software, Inc¹⁰. TeleForm provides the capability to easily create paper forms that are formatted for TeleForm’s powerful optical mark and character recognition engine. TeleForm automatically recognises a faxed or scanned image from one of its forms, reads and converts the image to data, and saves the result to the designated database file for that form. PBH receives many different forms created in TeleForm in any given day, and the software is able to distinguish each form type, read the data and accurately link it to the correct patient in the database.

The use of paper-based questionnaires permits rapid implementation with minimal cost or training for clinicians and patients. The questionnaires can be distributed via a hard copy or fax-back service, and the clinician can freely make as many copies as needed. The clinician (or other appropriate staff member) then need only fax the completed forms to the designated toll-free number provided by PBH.

Data verification staff within PBH use PC workstations to process forms received by the PBH fax server. Teleform’s optical mark and character recognition functionality highlights questionable data elements. The human verifiers confirm

the accuracy of the data captured, manually over-riding questionable fields where necessary. This process assures well over 99% accuracy in the data capture.

Multiple times per day, fresh data files captured via Teleform are read into the ALERT system using an automated batch process. Presently the batch processes for the ALERT system are run on a network server. The entire process is automated using Visual Basic scripts to launch the various steps in the processes (SAS programs, mail merge macros, etc).

The number of forms processed by ALERT has been growing steadily since the program was first implemented in 1999. At present almost one thousand patient and clinician completed forms enter the system every day. Once the raw data enter the ALERT database, the ALERT algorithms score the outcome measures and organise the clinical data for that patient. The system compares newly submitted forms to any previously submitted data for the same patient. When a Y/LSQ is received from the first session, the system calculates an expected trajectory of change for that patient based on age, diagnosis and severity of symptoms on the Y/LSQ.

Overall, the ALERT system evaluates the ten clinical variables that are captured from Y/LSQ and PAR forms:

- Patient age
- Test score range
- Comparison of actual versus expected change
- Diagnostic group
- History of hospitalisation
- Patient report of suicidal ideation
- Patient report of drug/alcohol related problems
- Clinician assessment of suicidal ideation
- Clinician assessment of drug/alcohol related problems
- Whether the patient is taking a medication

It is outside of the scope of this article to go into the details of the logic of the algorithms. They contain rules for processing the ten variables in different combinations and producing system output in the form of messages to care managers and letters to clinicians.

The SAS batch process digests all of the incoming data, utilises the appropriate clinical algorithms, targets at-risk cases for further action and outputs the relevant data to an Excel file or an ODBC database depending on the action to be taken. The SAS batch process outputs to an Excel file the list of cases targeted for ALERT letters. This file contains all of the relevant case information, clinical data, statements to the clinician about the patient's risk factors, and the name and address of the clinician. Mail merge functions in Microsoft Word are used to generate the letters based on the SAS output to the Excel file.

As is evident from this description, the ALERT system can be maintained and modified as needed by someone competent in SAS, Visual Basic scripts, and

Microsoft Office products. Creating SAS code is the most advanced skill required, but this is precisely the skill set of the statisticians and researchers tasked with analysing the data and developing useful clinical feedback and reports for clinicians and care managers.

It should be noted that the ALERT system is not the only information system employed by PBH clinical staff. PBH uses Facets, a proprietary product developed by TriZetto, to manage benefit information, member eligibility, provider information, pre-authorisation and claims payment. In addition, PBH developed a software product internally, the Clinical Management System (CMS), that supports the utilisation management and care management functions. Each of these products is tightly integrated with the other, such that system users experience it as a single, integrated platform.

RESULTS

ALERT was developed to allow PBH to understand the clinical outcomes achieved by members receiving outpatient care, but along the way it has served to transform its entire system of care in fundamental ways. ALERT has had a powerful impact on the care management process, both in terms of identifying members in need of intensive care management and determining their progress in treatment. ALERT has also had an impact in determining which practitioners are selected for members accessing services. Finally, ALERT has most recently driven the transformation of the PBH utilisation management system. In order to understand how and why the system has evolved, it is necessary to understand some of the essential clinical findings from ALERT.

In its first year the ALERT system tracked 4,705 cases, and patterns emerged in the data at that time which are still evident today. The most obvious pattern is that patients reporting high levels of symptomatic distress at intake experience much more improvement on average than patients with mild symptoms. Many of those patients with severe symptoms experience very rapid improvement. Furthermore, it would appear these positive changes are enduring. PBH collected a sample of follow-up LSQs six to twelve months after the end of the treatment episode, and the data revealed that most patients continued to improve after leaving treatment. Even those with very few sessions showed much improved functioning during the post-treatment period. These encouraging results are consistent with findings from previous uses of the OQ-45 in a comparable managed care environment^{4,6}. A more complete discussion of the results can be found in other published discussions of these and related findings^{6,11,12}.

In 2000 ALERT was expanded to include a larger number of individual clinicians in addition to the multi-disciplinary group practices that launched the system. In fact, this expansion has continued at a steady rate over the four years of the system's life span. At the time of this writing there are over 5,000 individual

clinicians and 75 multidisciplinary group practices submitting Y/LSQ data. ALERT is currently handling between 15,000 and 20,000 Y/LSQ protocols on a monthly basis, and the trend remains strongly upwards as more clinicians participate. An estimated 100,000 individual cases will be monitored by the system in 2003 alone.

During the second year of the project the informatics team focused on identifying opportunities for quality improvement. The team found that there is frequently a significant discrepancy between the patient's rating of suicidal ideation or substance use problems on the Y/LSQ and the clinician's assessment of these problems on the PAR. For example, for patients who report thinking about suicide "Frequently" or "Almost always" on the Y/LSQ, 50% of the time the clinician's rating of suicidal ideation on the PAR is "None." Even more extreme discrepancies were found between the clinician's assessment of substance abuse and the patient's report of such problems. Once again the clinician's report appeared to significantly underestimate the extent of the problem.

From the outset the informatics team programmed the ALERT system to bring these discrepancies to the attention of PBH care managers. The care managers were expected to call the treating practitioner to discuss the discrepancy and review the treatment plan. However, little improvement was detected as the months progressed, and it was determined that care managers had a difficult time interpreting and explaining the results of the ALERT system. Practitioners were similarly confused about the meaning of scores on the Y/LSQ and how they should be incorporated into the treatment plan.

These findings drove the informatics team to implement the ALERT high-risk letters in 2001. While the letters have been modified over time, they have remained quite similar to the current version presented in Figure 4. These letters provide the informatics team with a method for communicating directly with clinicians and care managers. They explain the clinical findings in clear language and invite the clinician to request more intensive or specialised services as needed. Both the wording and the underlying logic of the algorithms generating the letters can be modified quickly with minimal effort by the informatics team.

The letters appear to have had an impact on assessments by clinicians of suicidal ideation and substance abuse. After implementing feedback via the ALERT letters, clinicians' assessment of suicidal ideation and substance use problems became significantly more concordant with the patient self-report. This suggests that clinicians are increasingly making use of the clinical data contained in the questionnaires^{13,14}.

ALERT produces reports on aggregated outcomes by comparing the initial and final scores on the Y/LSQ. Aggregate outcome reports have been developed for each MGP, for all MGPs in aggregate and for all solo clinicians in aggregate. MGPs get an aggregate report once they have at least fifty patients with change scores. They receive monthly feedback on their aggregated outcomes, and they are also shown how their results compare to other MGPs in their area. All comparison

between provider groups is adjusted statistically for differences in case mix (age, sex, diagnoses and severity)⁷.

Comparisons of MGP and solo clinician outcomes have been dramatic from the beginning of the ALERT system. MGPs average significantly more improvement per case than solo clinicians. In fact, the MGPs have averaged over 150% greater improvement per case. The reasons for this are not apparent, but the finding has been consistent over time as more MGPs and solo clinicians have participated in the programme. Another dramatic finding is that the MGPs have achieved these outcomes with on average 20% fewer sessions per case than the solo clinicians. MGPs tend to achieve significantly more improvement in the first six to nine sessions of treatment than the solo clinicians. This rapid improvement seems to be associated with lower overall utilisation of services for the entire episode of care. In other words, it appears that effective treatment is less costly because it works faster^{11,12,15}.

While MGPs had performed well on other quality measures tracked by PBH, these powerful findings related to cost and outcome of care contributed to PBH's decision to increase the number of MGPs in the network and preferentially refer members accessing services to MGPs whenever possible. While roughly one quarter of PBH members have historically received care from one of the MGPs, the exceptional results of this segment of the network contribute significantly to aggregate costs and outcomes for the entire PBH treatment population.

ALERT has generated several interesting findings about the relationship between clinical outcomes and utilisation of services. Patients that improve rapidly tend to have a shorter duration and lower intensity of treatment than patients that improve slowly. Patients with severe levels of distress receive more services than patients with milder symptoms. This seems to be quite rational. In fact, it became clear in 2001 that ALERT was not simply a clinical outcomes system, but it was a system that could guide the rational allocation of resources.

ALERT identifies two types of outliers in the outpatient treatment population, patients at risk of dropping out of treatment and not getting the services they need to improve and patients utilising services they don't appear to need due to minimal psychological distress. The vast majority of patients appear to fall in between these two extremes, and they essentially get enough treatment to get the improvement they need.

PBH determined that ALERT could be the basis for changing its systems for preauthorising care and managing utilisation. PBH had historically preauthorised outpatient services based on written or telephonic requests by the treating practitioner (although the initial sessions authorised are based on the member calling PBH to request services). It was determined that micro-management of every episode of care was unnecessary, and that ALERT could identify the outlier cases needing the focus of PBH care managers. However, for such a system to succeed, Y/LSQ data must be available for virtually all outpatient cases.

Up to 2002 this was far from the actual experience since the ALERT system was a voluntary process that existed in parallel to the process for preauthorising care. Consequently, the decision was made to marry the two systems, and during 2002 extensive programming changes involving the ALERT system, the Clinical Management System, and Facets created an automated system whereby additional outpatient sessions are authorised automatically upon receipt of every Y/LSQ and PAR form. While submission of Y/LSQ data is still voluntary and clinicians can call PBH for additional authorisations, the ease of the new system provides an incentive for clinicians to submit Y/LSQ data.

PBH is now fully focused on managing the outcomes of care. Routine episodes of care are preauthorised and completed without the involvement of care managers. The ALERT system now drives most of the activity of care managers, as they make outbound calls to treating practitioners based on two daily reports. Care managers call when high-risk patients may need more intensive or specialised services, as well as when patients have nearly twenty sessions authorised and the termination of treatment should be evaluated in light of minimal psychological distress on the Y/LSQ.

It is too early to fully evaluate the impact of this automated authorisation process, but in the near term it is clear that the effect has been to rapidly expand the number of clinicians participating in ALERT, as well as increase the overall consistency of data collection. The increased participation and consistency in the use of the outcome questionnaires will permit the most skilled clinicians in the network to demonstrate their effectiveness. Reporting at the level of the individual practitioner shows that there are substantial and reliable differences in the effectiveness of individual clinicians. In fact, many of the clinicians in the network have results superior to the MGPs.

As noted previously, PBH members initially seeking services must contact a PBH call centre to obtain authorisation for services to a specific practitioner. The member is free to request any practitioner in the network, and approximately one third of the time the member has the name of a specific clinician when requesting services. However, two thirds of the callers do not already have a name, and this provides an opportunity to direct referrals towards those clinicians with the highest probability of a positive outcome. Over time, as clinicians submit a larger volume of data, PBH will be able to identify the most effective practitioners within the network and further encourage the flow of referrals in their direction.

There is evidence that outcomes been improving since the introduction of ALERT with overall outcomes trending upwards during the past two years. While the magnitude of the increase is modest (on the order of a 3–5% annual increase), the difference from year to year is highly significant statistically due to the very large sample sizes involved. The naturalistic nature of these data does not permit us to draw any conclusions about the causes of this upward trend. Multiple factors

may be at work – the addition of new MGPs and clinicians each year, the increased use of the questionnaires, the impact of the ALERT letters, competition for best outcomes among the MGPs, increased referrals to the most effective clinicians and any number of other unidentified mechanisms.

DISCUSSION

ALERT was initially implemented as a clinical outcomes management system, and it has succeeded in its original goal of improving patient outcomes. However, the system has evolved and transformed existing processes for utilisation management, care management and referral management. ALERT has allowed PBH to move from the labour-intensive, micro-management of each episode of outpatient care to a data and performance-driven method. The focus on clinical results has allowed the most effective providers (both MGP and individual clinicians) to demonstrate the value of their services and benefit from an increased flow of referrals.

Despite the gains in knowledge provided by ALERT, the system is in many ways still in its infancy. Over the next few years the quality and consistency of the data being generated by the PBH network will permit PBH to understand and realise the full potential of its network of clinicians. ALERT began as a system for improving clinical outcomes by targeting at-risk cases, providing clinical feedback to practitioners, and informing the care management process that provides support and collaboration for clinicians with difficult cases. While these are positive contributions to the quality of care, ALERT is likely to have much greater value when it becomes the primary gateway for members seeking clinicians with demonstrably superior outcomes. The ALERT system will increasingly allow PBH to identify especially effective clinicians, and benefit both them and patients by referring more patients to them.

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