

Summarizing Clinical Psychiatric Data

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The authors propose a method of summarizing clinical data to serve patient care. The proposed one-page summary uses diverse visual presentations of data, including small graphs for ratings and drug dosages, time lines for clinic visits and hospital stays, and genograms for inherited illness, as well as a textual presentation of recent clinical notes. The summary depicts a patient's recent and lifetime clinical experience. It allows the viewer to assess relationships between interventions and outcomes for psychiatric and medical problems. Computerized patient information systems, which are increasingly being used, can present data in virtually any form. The authors hope to encourage mental health professionals to reshape psychiatric records. (*Psychiatric Services* 48:1458-1461, 1997)

To document and comprehend the complex history of psychiatric patients, clinicians work with written records. These documents are not primarily organized with clinical care in mind (1). The most common form of psychiatric record is a manila folder containing handwritten notes, along with some interspersed laboratory or medication sheets. Each day a patient stays in a hospital, the physicians, psychologists, nurses, social workers, and other health professionals all write notes, and even the weekend staff may fill more than a page.

Today's psychiatric narratives are far more extensive than those of 1900,

when two pages were initially allocated in hospital journal books for each patient's stay. Indeed, the history of psychiatric records is a history of increasing paperwork as these records have come to serve administrative, regulatory, financial, and legal needs (2,3).

Computerized systems that archive a mass of data for each patient are becoming available. For example, data can be scanned from mark-sense (filled-in circles) questionnaires answered by patients and rating sheets completed by clinicians. Or, with training, clinicians and clerical staff can enter information directly, using electronic pens or keyboards. Hospitals can pay for computer transcription of conventional notes. Nonetheless, data are lost just as easily in pages of printout as in tangles of handwriting.

In this paper we propose a summary of clinical psychiatric data specifically designed to serve patient care. Augmenting the traditional record, this one-page summary includes identifying information, a history of clinical visits and hospital stays, patient and family background information, symptom ratings, medication dosages, and recent notes.

Graphical summary of psychiatric status

Clinical records involve a variety of data—numeric, narrative, diagrammatic, temporal, and relational. Psychiatrists use written narratives, forms, rating scales, diagrams, pictures, and numbers in graphs or tables (4,5). An effective summary for clinical care will present the important facts on a single page and, at the same time, retain this diversity of methods for data representation.

Figure 1 summarizes clinical psychiatric data from 30 years of clinic and hospital records for a patient with bipolar disease and adult-onset dia-

betes. (The display has been reduced in size so that the key to the figure and the figure itself appear on one page.) All identifying information has been disguised. The summary contains six elements, which are described below. Experimental software written by one of the authors (SMP) transforms the data. Adobe Illustrator accepts transformed data along with text to produce a graphical summary.

Basic administrative information. The patient's name and clinic and the current date are shown at the top of the summary.

Time line. Above the time line, individual dots mark clinic visits. Below, the short bars show length of hospitalizations since enrollment in the clinic. The enrollment date appears at the far left and the current date at the far right. Figure 1 indicates that the patient visited the clinic every month or so from 1976 to 1988, with a brief hospitalization in 1988. The last hospitalization was for pneumonia in March 1993. The upsurge in clinic visits at the end of 1993 reflects a psychotic episode.

Background. A short narrative in the upper left summarizes the patient's social background and development, substance abuse, and life with illness. Primary clinicians would prepare and update this paragraph as appropriate.

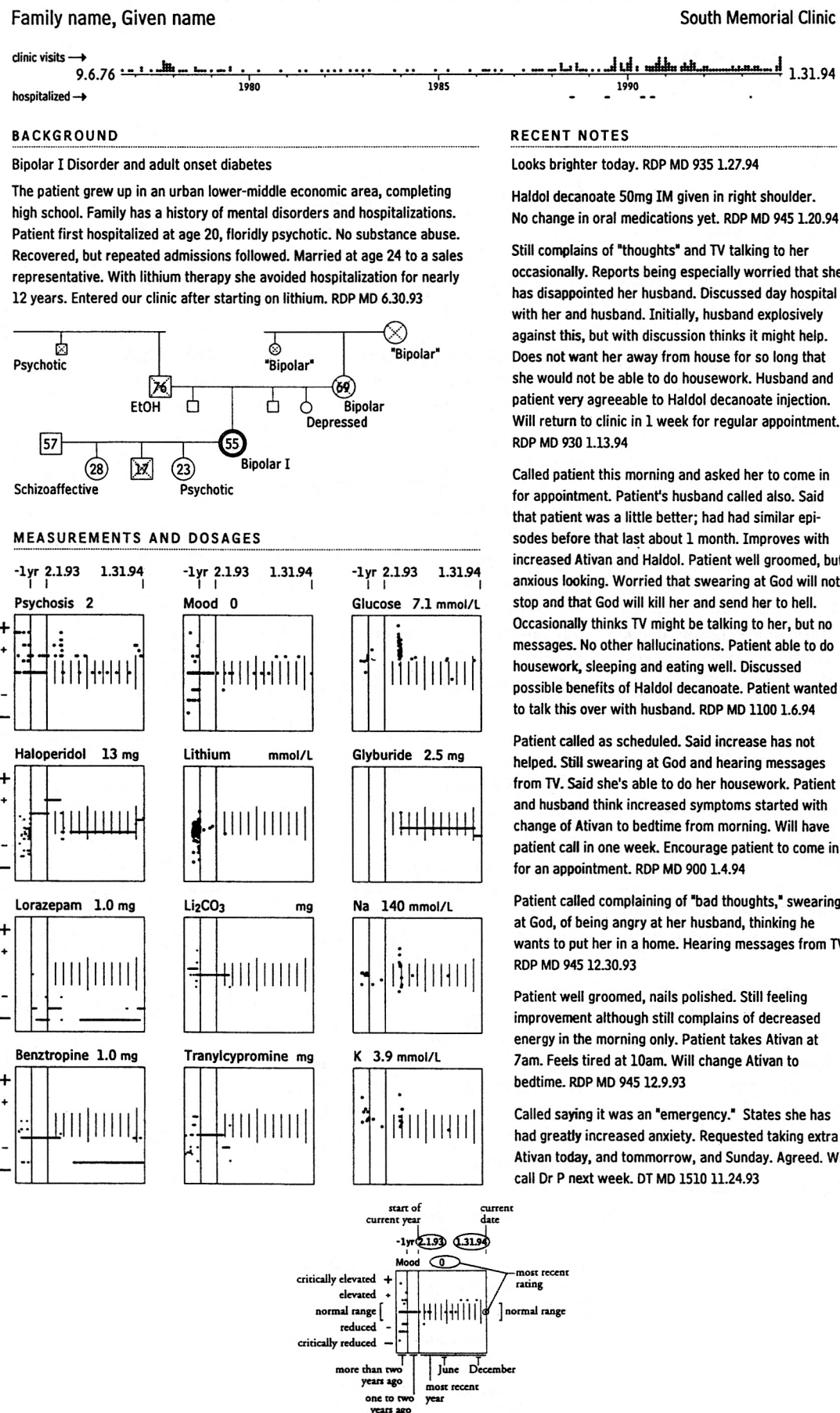
Genogram. The family tree follows standard conventions (6), with the patient represented by a double circle. Current ages are inside the circles (females) and squares (males), and dotted lines appear across deceased family members. Diagnoses of family members are shown; those in quotation marks are based on family stories suggestive of these diagnoses.

Recent notes. The right-hand column of text shows a traditional psychiatric narrative, with the most re-

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Figure 1

Summary of 30 years of clinical psychiatric data from clinic and hospital records for a patient with bipolar disease and adult-onset diabetes



cent entry at the top; the text is typed or transcribed after each session. Each entry concludes with the initials and professional degree of the writer, which is usually enough information to identify the writer uniquely, followed by the time and date. Interim summaries might also appear here. A compact and legible typeface, Bitstream Centennial, is used.

Measurements and dosages. Following our previous work (7), a matrix of small graphs (8–10) depicts clinical events over the last year in a context of previous years. Each graph shows clinical information flowing over time, which is detailed in a graphic key to the figure for clinicians (see Figure 1). Clinics and hospitals can add scales and arrange the section on measurements and dosages to suit their patients.

In Figure 1, each of the three columns of graphs corresponds to a particular problem: psychotic symptoms (left column), mood disturbance (center), and diabetes (right). Clinical ratings or findings head each column, and the graphs for interventions in that area are placed below the findings to emphasize their connection. In each of the small graphs a nonlinear timescale compresses years of data into a context for assessing recent trends. The large area of each graph represents the past year. A narrower area to the left depicts data from the two years before the current year (see key). The leftmost narrow area summarizes all available data from more than two years ago.

The graphs of psychosis and mood tabulate clinical impressions based on a review of chart notes, although scores based on standard scales, such as the Brief Psychiatric Rating Scale, the Hamilton Depression Rating Scale, and the Beck Depression Inventory, would be preferable and may be more useful when plotted over time. Because this 30-year record includes no standardized ratings, clinical impression scales provide a workable substitute; mood ratings range from –3, severely depressed, to 3, floridly manic, with 0 indicating normal mood. Psychosis ratings range from 0, none evident, to 3, florid hallucinations. Scoring increments of .5 are used throughout.

Drug dosages are recorded, including haloperidol, lorazepam, tranylcypromine, and Li_2CO_3 , with citrate doses converted to equivalent carbonate doses. The lithium graph shows serum Li^+ ; other important laboratory values are plotted in other graphs. The patient's drug regimen was simplified during her pneumonia early in 1993, and she continued to do well as an outpatient without lithium carbonate or tranylcypromine. A psychotic episode at the end of the year was treated with additional haloperidol and lorazepam, as the small multiple graphs show.

In the graphs, measurements and

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dosages are individually rescaled to allow a common, uniform vertical axis, which may simplify reading. (Our experimental software includes numerical tables that specify the scale and normal limits for each rating and medication.) Gross vertical displacements indicate clinical significance. Thus each measurement or dosage is plotted so that its vertical position corresponds to its clinical significance (that is, normal, elevated, clinically elevated, and so forth). The most recent relevant value is printed above each graph and is also plotted as the rightmost dot of the sequence.

The graphs showing medications

use horizontal bars to depict the total daily (prescribed) dosage over time in place of dots depicting dosages at specific time points. These graphs map dosage so that routine amounts, such as 5 to 20 mg of haloperidol daily, fall in the central, normal range. The range is indicated by the plus and minus signs on the left; the larger plus and minus signs indicate critical elevations and reductions (see key). Low dosages may signal use of the medication for secondary indications; for example, lorazepam for insomnia appears as a low daily dosage on the lorazepam graph. Medications used at atypical doses stand out for review. When a medication is stopped, or a laboratory measurement is no longer recent, the corresponding graph does not show a numeric current value. Thus in Figure 1 no current values are displayed for lithium, Li_2CO_3 , and tranylcypromine.

Interpreting nonlinear scales requires some learning by readers. In return, these scales emphasize abnormal values (and make it unnecessary to remember exact ranges for various scales and drug dosages). Clinicians' implicit sense of the critically abnormal becomes visually explicit. For example, the patient whose data are summarized in Figure 1 was delirious in March 1994, which is evident from the simultaneous elevation of the psychosis rating and serum glucose. The patient suffered an exacerbation of psychiatric illness, which is evident from the elevation of only the psychosis rating in January 1994.

Scores from different rating scales, such as self-ratings on the Beck depression scale from the clinic and staff ratings on the Hamilton depression scale during hospitalization, would be mapped together onto the clinical mood graph. Similarly, a drug dosage graph shows past medications of the same class—antidepressant, antipsychotic, or sedative—mapped on to the same dosage scale as the current treatment. In Figure 1 the haloperidol graph includes previous dosages of chlorpromazine.

Conclusions

Our proposed summary is a high-resolution display that invites the viewer to assess relations between findings

and interventions, and it allows for consideration of alternative treatment strategies. Instead of a thick folder filled with a single jumbled chronology, our proposed display shows many coherent chronologies with timescales ranging over generations, the lifetime of the patient, the patient's clinic experience, and the last few weeks.

Patient information will soon be collected in computer systems capable of printing a fresh summary for each patient daily. Our proposal should encourage doctors and other mental health professionals to reshape, if not reinvent, psychiatric records before computer programmers cast institutional habit into silicon. ♦

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References

1. Fries JF: Alternatives in medical record formats. *Medical Care* 12:871-881, 1974
2. Koran LM, Foley T: Maximizing clinical revenues of psychiatric consultation-liaison services: an economic commentary. *Psychosomatics* 35:333-340, 1994
3. Dick RS, Steen EB (eds): *The Computer-Based Patient Record: An Essential Technology for Health Care*. Washington, DC, National Academy Press, 1991
4. Wyatt RJ: *Practical Psychiatric Practice: Forms and Protocols for Clinical Use*. Washington, DC, American Psychiatric Press, 1994
5. Post RM, Roy-Byrne PP, Uhde TW: Graphic representation of the life course of illness in patients with affective disorder. *American Journal of Psychiatry* 145:844-848, 1988
6. McGoldrick M, Gerson R: *Genograms in Family Assessment*. New York, Norton, 1985
7. Powsner SM, Tufte ER: Graphical summary of patient status. *Lancet* 344:386-389, 1994
8. Tufte ER: *The Visual Display of Quantitative Information*. Cheshire, Conn, Graphics Press, 1983, pp 160-175
9. Tufte ER: *Envisioning Information*. Cheshire, Conn, Graphics Press, 1990, pp 67-79, 105
10. Tufte ER: *Visual Explanations*. Cheshire, Conn, Graphics Press, 1997, pp 104-119