A SIMULATION STUDY OF AUTOMATED TREATMENT PLANNING IN A MENTAL HOSPITAL


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Abstract

A simulation study of automated treatment planning in a state mental hospital revealed that automation, per se, was of little direct benefit to clinicians and had virtually no impact on the clinical process. However, supervisory and quality assurance staff found considerable utility in the ability to generate reports previously unavailable. The implications for planning automated clinical systems are discussed.

Method

Study Setting

Three wards of a large state mental hospital were selected for this study, each with a daily census of approximately 30, representing a total of 90 of the hospital's 1500 inpatients. These wards were selected to represent the three major functional units of the facility: acute admissions, long-term nongeriatric and psychogeriatric.

Study Procedures

(a) Questionnaire Survey: Prior to initiation of the study, a questionnaire was administered to several levels of hospital staff: therapy aides, other clinicians, physicians and clinical supervisors and administrative and quality assurance personnel. The questionnaire was designed to elicit pre-existing attitudes toward: (a) computers serving as an aid to medical personnel in general; (b) the treatment planning process as it currently exists; (c) proposed automation of the treatment planning process.

(b) Experimental Simulation of Automation: All study data were abstracted from the manual record by the study staff prior to automation including the face sheet, treatment plan, physical examination, reports and all progress notes, doctors' orders, and assessments for a three month period. Narrative computer files of these abstracted records were created using the IBM CMS-XEDIT text editing system. From those files, client data sheets containing all abstracted information were produced for each patient using the Waterloo Script text formatting program. In addition, treatment plan and progress note information was coded into categories of target behaviors (what was being treated) and treatments using a dictionary of 83 behaviors and 68 treatments. The client data sheets were distributed to the clinical staff (unit chief, nursing supervisor, team leader, psychiatrists, charge nurses, record clerks) prior to the next scheduled treatment planning meeting for each study patient. This sheet contained a summary of the prior treatment plan and, for the intervening three month period, a summary of the doctors' orders, physical examinations, assessments and progress notes. In addition, two types of reports were prepared for...
presentation to clinical supervisory, quality assurance and administrative personnel. One set of reports contained individual client data sheets similar to those given to clinical staff, broken down by discipline and aggregated by ward. The second set of reports consisted of aggregated tables of coded behaviors and treatments, providing frequency distributions of these categories by ward (e.g., the number of patients receiving a specific treatment from a specific staff discipline). These two reports were then presented to hospital staff at a series of meetings which solicited feedback from the staff as to the utility of this information.

(c) Outcome Variables:

(1) Medical Record Review: A medical record review was conducted of each patient's chart for the three month period before and after the introduction of the client data sheet. This review examined the extent to which changes occurred in the recording of treatment plan and progress note data related to the client data sheet introduction.

(2) Post-implementation Questionnaire: A questionnaire was administered to four groups of hospital staff after implementation of the client data sheets and aggregate reports to ascertain staff opinions regarding the usefulness and clarity of these reports.

(3) Post-implementation Meetings: After the introduction of the client data sheets and aggregate reports, meetings were held with 17 staff groups in four general categories: direct care, clinical supervisors, quality assurance and administration to ascertain more informally staff opinions regarding the benefits and deficiencies of the automated treatment planning reports and suggestions for further development.

Results and Discussion

Questionnaire Survey: A total of 73 staff members responded to the questionnaire, split into three groups: 29 mental health therapy aides (MHTA), 25 other clinicians (nonMHTA), including social workers, psychologists, nurses, recreational and occupational therapists and medical records technicians, and 19 physicians and supervisory personnel (MDSP). Respondents were asked to answer each question along a five point continuum from strongly agree to strongly disagree as described in an earlier report. Eight questions dealt with attitude towards the effect of automation on clinical care while five questions dealt with the use of automation in treatment planning. On individual question analysis, members of the MHTA group responded generally unfavorably to the prospect of computers serving as an aid to medical personnel while the nonMHTA group was equally divided between positive and neutral responses and the MDSP group generally responded positively. Interestingly, however, even those staff with negative attitudes toward automation in general were less negative toward the prospect of using automation to support treatment planning. These findings suggest that, in general, staff seem to be willing to give automation a try despite misgivings.

Medical Record Review: A review of each patient's medical record for the three months before and after the introduction of automated reports was carried out to address three issues.

(1) Would the availability of automated reports result in a change in the content of the treatment plan?

(2) Would the availability of these reports affect the extent to which progress notes reflected the treatment plan and vice versa?

(3) Would the availability of these reports change the pattern of treatment as reflected in the number and types of target behaviors and interventions addressed in the progress notes?

The first question was addressed by an analysis of the content of the treatment plans before and after the introduction of automated reports. The manual case record format was equally divided between three issues which were linked to specific target behaviors, objectives and interventions. On the initiation of such a goal, a treatment plan form (one to each goal) would be initiated. At each treatment plan review (monthly in the admissions ward, quarterly in the other two wards), staff were expected to review all goals and objectives and update these on a separate form indicating any changes or additions of goals, objectives, behaviors or interventions. It was hypothesized that staff might respond to the automated reports by increasing the number of goals, objectives, behaviors or interventions or by modifying the already existing ones. In general, this hypothesis was not supported. While a few changes occurred in the treatment plan content over the course of the study period, the majority of treatment plans remained virtually unchanged.

In regard to the second question, an analysis was carried out to determine the extent to which target behaviors and interventions mentioned in the treatment plan were also mentioned in the progress notes and vice versa for the three-month periods before and after the introduction of automated reports. This analysis explored the integration of progress notes and treatment plans as a measure of the extent to which planned treatment (as described in treatment plans) coincides with actual treatment provided (as reflected in the progress notes). In general, for all three wards during the three-month period prior to the introduction of automated reports, only about 21% of the target behaviors and 17% of the interventions identified were described in both the treatment plan and the progress notes. After the initiation of automated reports, the only consistent change noted was a shift of about 10% of both categories toward being mentioned only in the treatment plan and not in the progress notes. Thus, the chief change over time appeared to be an increase in proportion of target behaviors and interventions which were planned but not delivered. The primary conclusion to be drawn is that the introduction of automated reports had no appreciable
impact on the integration of planning with actual service delivery.

Finally, as regards the third question, an analysis was carried out comparing the relative frequency with which specific categories of target behaviors and interventions were addressed in progress notes during the three months before and after the introduction of automated reports. The expectation here was that the availability of these reports might be a stimulus to the recognition of the need for additional treatment interventions or to the identification of additional target behaviors requiring intervention. The 83 target behaviors and 68 interventions were each subsumed into eight categories for this analysis. The only consistent change seen after the introduction of automated reports was of the proportion of target behaviors falling into the category of activities of daily living (from 8.6% to 14.8% of all target behaviors) across all wards. All other target behavior and intervention categories showed small and inconsistent changes.

Thus, analyses of medical records for the three-month periods before and after the introduction of automated reports failed to show any meaningful impact of automation on the planning, integration or delivery of services and tended to confirm the earlier findings that, in this setting, the provision of direct care personnel with client data sheets summarizing the medical record had little value for such staff in patient care or management.

Post-implementation Questionnaire: After the introduction of automated reports, a questionnaire was distributed to staff members from four categories: direct patient care (N=45), clinical supervision (N=10), hospital administration (N=11) and support services (N=22). Each person was again exposed to the basic reports (client data sheets and aggregate reports) in a group setting and asked to respond to a set of 42 questions requesting opinions as to the usefulness of the data on a three point scale (not useful, useful, very useful) codes 0-2. Eighteen questions related to the client data sheets while the remainder addressed aspects of the aggregate reports. Analysis included the calculation of mean scores for each item by respondent group. In general, mean scores for hospital administrators were higher (more positive) than for the other three groups for all items and item-sets. The other three groups tended to have almost identical mean scores across all item categories. Several patterns of opinion emerged. All staff groups rated the client data sheets most useful with mean scores ranging from 1.4 (direct patient care and support services) to 1.7 (hospital administration). In contrast, there was a more mixed response to the aggregate reports, with hospital administration rating these reports as useful to very useful (range of means from 1.0 to 1.6) while the other three staff groups tended to rate such reports toward the not useful end of the spectrum (mean range 0.6 to 1.1). The findings, then, tended to support the conclusion that, in terms of acceptability, client data sheets which summarize, preferably in the words of the clinicians themselves, the treatment planned and delivered are perceived as most useful to all levels of staff. In contrast, hospital administrators showed an equally high regard for aggregate reports while the other three staff groups showed little interest in these latter reports.

Post-implementation Meetings: After the completion of the study, a total of 17 informal meetings were held with staff members in the following general groups: direct care staff (6 meetings), clinical supervisory and quality assurance staff (4 meetings), hospital administration (4 meetings) and support staff (3 meetings). The purpose of these meetings was to present these staff with examples of the automated reports used in the earlier part of the study so as to elicit feedback concerning benefits and deficiencies of the system and any suggestions or comments regarding future development of such a system.

In terms of benefits, the most commonly perceived advantages to automated treatment planning (reported by over one-third of respondents) related to the summarization of large amounts of handwritten material into client data sheets which could be readily reviewed. Other beneficial aspects of the client data sheets less commonly mentioned were their availability for rapid review of such items as the incidence of medical problems, the current interventions in effect and the patient's treatment history and their usefulness as a concise and legible source of information for quality assurance purposes (e.g., utilization review). In particular, legible, summarized progress note information seemed to provide access to data by all staff members which, while present in the chart, are largely unused and unusable due to illegibility and volume. In contrast, fewer groups reported potential benefits from the aggregate reports and these tended to be staff groups involved in supervisory, quality assurance or administrative activities. For clinical supervisors, aggregate reports were seen as useful to identify program needs and to monitor the activities of specific staff members by discipline as well as to determine staffing needs. Similarly, quality assurance staff found these reports useful for reviewing specific aspects of care across large numbers of patients and as the source of information regarding training needs. Administrators saw such reports as useful for overall planning purposes.

Of the deficiencies of the system as identified by staff groups, only one related specifically to automation. The aggregate reports were seen by more than a quarter of the respondent groups as being too broad, misleading, difficult to understand and containing too much information. While some of these deficiencies could be readily remedied (e.g., by more specific categorization or more focused information), others suggest a need for a basic educational input to assist staff in learning to read reports while still of all groups related to mistrust of statistical data and the uses to which it may be put. Also, the responses of clinical staff tended to suggest a preoccupation with individual patient characteristics and an unwillingness to accept the more general categorization (e.g., of target behaviors or interventions) necessary for effective data aggregation.
Implications

The results of this study have a variety of implications for the future development of automated clinical information systems in the mental health arena. First of all, it is clear that the more automation of the mental health record offers little, if any, advantage to direct patient care staff other than improved legibility of records and communication among disciplines in the absence of regular treatment planning meetings. In addition, the attitude questionnaire survey identified a distinctly antagonistic attitude toward automation on the part of the MHTA staff and at best a neutral attitude among other clinical staff with a decidedly skeptical attitude from all levels of staff toward the likelihood of increased paperwork. Clinical staff found aggregate reports to be not useful, difficult to understand and potentially misleading both because of inaccurate data entry and misinterpretation by supervisory and quality assurance staff. Finally, the provision of client data sheets had no observable effect on the medical record as regards treatment planning, the integration of the treatment plan with the medical record or the identification of target behaviors and interventions. Clinicians, therefore, are likely to see automation primarily as a one-way street on which they serve as the primary data "inputters" but reap little, if any, benefit (and possibly suffer harm) from the output.

Given these caveats on the clinical use of such automated data, does the present study offer any optimism for the use of automation in the mental health setting? The responses of supervisory personnel on both questionnaires and at the post-implementation meetings indicate that they (1) have decidedly more positive attitudes toward automation than clinical staff; and (2) found many of the reports generated (including aggregate reports) to have some degree of usefulness in their daily activities. Clinical supervisors were most positive towards the receipt of client data sheets which permitted them to quickly review the status and treatment of large numbers of patients under their supervision. Without these reports, supervisors were faced with a choice of either the mammoth task of reading the voluminous clinical charts on these patients in order to provide adequate supervision or to abdicate this responsibility entirely. Clinical supervisors were less positive toward aggregate reports, although they saw some value in these reports for purposes of program planning and staffing. Administrative and quality assurance personnel, at least in part because of their greater familiarity with the use of aggregated data, were the most positively disposed to the output reports and had the best sense of how to use them. In terms of feasibility, the research staff clearly delineated areas of greater or lesser practicality for automation. Abstraction of progress notes is impossible unless done on an ongoing basis by the clinician. This would incur a considerable data entry burden for those least likely to benefit from the output and could be expected to engender considerable resistance unless data entry could be structured so as to reduce the clinician's paperwork burden in other areas. However, earlier attempts to develop structured data entry instruments for clinical use have generally met with failure due to the clinician's demand for the ability to uniquely describe the individual patient. A more likely approach to at least partial automation of the treatment planning process seems to be to focus on the specific data elements needed to satisfy those staff (e.g., supervisors, administrators, quality assurance personnel) who seem best able to use the output and to design data entry instruments which can efficiently collect these items at a minimum cost to the clinician. In the case of the present treatment planning process, two sets of data were already being entered by clinicians in a relatively structured format which could be automated at little or no additional cost to the clinician--namely, the treatment plan and the doctors' orders. Perhaps the most difficult task in the development of such a system, then, will be in first working with clinicians, supervisors and administrators to arrive at a mutually acceptable set of definitions and then developing a feedback loop among all these staff to minimize the likelihood of misunderstanding or misuse of the output. While generalizable systems might be thus developed, actual implementation of the system, especially of the feedback loop, will require a specific effort at the individual facility level.

References


