Organizational preparedness for change: Staff acceptance of an on-line computer-assisted assessment system

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An on-line assessment system is briefly described. Previous positive evaluation studies are summarized. Results of studies of staff acceptance and staff preparedness for change are reported. Findings are interpreted in terms of the need for planning for change. Implications related to the acceptance of other on-line computer systems in psychology are discussed.

The Psychiatric Assessment Unit (PAU) at the University of Utah and Veterans Administration Hospital in Salt Lake City uses on-line computer technology in an attempt to improve the productivity of mental health service delivery. The PAU was implemented after a systems analysis of the extant program (Williams, Johnson, & Bliss, 1975). It was concluded from this analysis that a more rigorous evaluation and triage approach would improve the productivity of the patient care program. However, it was impossible to implement a more rigorous approach using traditional methods. The traditional approach to psychological evaluation was far too time consuming. Therefore, we decided to develop an on-line computer-assisted system which would permit the gathering and interpretation of patient assessment data quickly enough for rapid clinical decision making. According to this design, part of the data would be gathered directly from the patient using interactive cathode-ray-tube terminals (CRTs) and other data would be collected by paraprofessional personnel using structured schedules presented on the CRTs. The on-line computer system would analyze the data and output interpretive reports (Cole, Johnson, & Williams, 1975; Johnson, Giannetti, & Williams, 1975; Johnson & Williams, 1975). By developing a system to provide comprehensive and timely assessment information, we hoped to improve our ability to triage patients and, thus, improve the productivity of the entire mental health care delivery system.

The PAU has now been in operation for 3 years

and has evaluated more than 8,000 patients. It is located in approximately 2,000 sq ft of office space in the entrance area of the Mental Health and Behavioral Science Treatment Building. The PAU staff consists of one psychologist, two computer programmers, one computer operator, two secretaries, one nurse, and six mental health technicians. The computer used is a Control Data Corporation 3200 with 13 CRTs for patient assessment, 32K memory, 32-million characters of disk storage, three tape drives, and unit record I/O.

The actual operation of the system can be described briefly. A patient requesting treatment is referred to the PAU receptionist, who opens his computer file. The patient is instructed in the use of the CRT and completes a brief screening test for dissimulation (Johnson, Williams, Klingler, & Giannetti, 1977). He is then interviewed for information about the circumstances and history of his present illness. If the patient fails the dissimulation test and is judged to need immediate inpatient care, he bypasses the regular PAU assessment procedure and is evaluated later. However, in the usual case, self-report testing is possible, and the computerized assessment process begins. The patient completes a series of self-report questionnaires administered via a CRT. This battery includes: (1) the MMPI (Miller, Johnson, Klingler, Williams, & Giannetti, 1977), (2) a test of intellectual performance and screen for organicity [consisting of the Shipley-Hartford, a test of episodic long-term memory (Johnson & Klingler, 1976) and the WAIS arithmetic subtest], (3) the Briggs

Social History (Briggs, Rouzer, Hamburg, & Holman, 1972), and (4) the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, & Erbaugh, 1961). As each test is completed, the computer analyzes the responses and prints a narrative report. Following self-report testing, a technician administers the CAPPS structured mental status examination (Endicott & Spitzer, 1972), recording data on a CRT. Upon completion, a computer-derived narrative report and DSM-II diagnosis (Spitzer & Endicott, 1969) are printed on a terminal printer located in the PAU office area. The PAU coordinator reviews all test reports and then completes a structured problem list on the CRT (Giannetti, Johnson, Williams, & McCusker, 1977). The coordinator determines an optimal treatment disposition for the patient based on this problem list.

We have evaluated this system in several ways (Klingler, Johnson, & Williams, 1976; Klingler, Miller, Johnson, & Williams, 1977; Johnson, Williams, & Klingler, Note 1). The basic approach to this research has been to compare the PAU admitting system with the traditional method of intake decision making. Traditionally, an applicant for care is interviewed briefly by an officer-of-the-day, who gathers mental status and anamnestic data. On the basis of these data, a treatment disposition is made. All comparisons have shown the PAU to be equal or superior to the traditional method. Intake assessment reports completed by both methods were rated by experienced clinicians for readability, organization, and clinical utility. PAU workups were rated as superior for all assessment components. Accuracy of the workups was studied by having experienced clinicians interview 35 subjects who were assessed using both the PAU and traditional approach. They rated the PAU workup as significantly more accurate than the traditional workup. A comparison of the diagnostic accuracy of the two methods indicated that they were equivalent in accuracy. The two approaches were also compared on length of time from application for care to report completion. Results indicated that the PAU reports were completed in approximately half the time of the traditional reports. Results of a cost comparison of the two methods indicated that the PAU workup, while more thorough and accurate, was about one-half the cost of the traditional workup (PAU = \$242.04, traditional = \$466.72). Finally, patient satisfaction with the PAU system was evaluated. Patients reported that they liked the PAU evaluation process better and were more truthful in it than with the traditional approach. In summary, these evaluation studies seem to indicate that the PAU procedure results in a better organized, more accurate, more timely, and less expensive assessment report than the traditional officer-of-the-day approach, and that patients like it better.

Despite the breadth of these previous evaluation studies, questions continue to be asked about the PAU

system. Important among these is the question of clinician acceptance of the computerized approach (Johnson, Williams, Giannetti, & Schmidt, 1977). Do clinicians approve of the computer-assisted intake evaluation approach? In the present paper we present the results of two studies related to the question of clinician acceptance of the on-line computer-assisted system. In the first experiment, we queried treatment staff users of the PAU about their satisfaction with the system. In the second, we questioned treatment staff users as to the organizational readiness for the implementation of an innovative technological system such as the PAU. Our purposes in presenting this paper are: (1) to provide further evaluation information about a radical innovation in mental health care delivery, the on-line computer-assisted PAU, (2) to provide heuristic information about our developmental errors to others interested in implementing the PAU, and (3) to stimulate others interested in the development of on-line computer applications to consider problems of organizational readiness for innovative change.

EXPERIMENT 1

We have been aware that clinician acceptance of computers in mental health care delivery systems is generally poor despite a large number of advances in the field and several positive evaluation studies (Johnson, Giannetti, & Williams, 1976). Furthermore, we have received anecdotal information that local clinicians were not always positive about our computerized system. However, we have not previously attempted to quantitatively study staff acceptance of the PAU system. In the present experiment we have attempted to gain information about this area of concern.

Method

Subjects. Subjects were staff members of six treatment units of the Mental Health and Behavioral Sciences Service (both outpatient and inpatient) at the Veterans Administration Hospital in Salt Lake City. Participation in the study was limited to those personnel who delivered direct services to patients. The study included 95% ($n = 74$) of the total staff. At the time of the study the mean age for staff members was 35.3 years ($SD = 10.4$) and the mean education level was 17 years ($SD = .94$). The occupations represented include psychologists, psychiatrists, social workers, nurses, nursing aides, and rehabilitation technicians. The occupational breakdown by treatment unit is presented in Table 1.

Instrumentation and Procedure. Staff members were asked to complete a six-item questionnaire about their response to the PAU system. The questions were designed to measure actual use and acceptance of PAU-generated materials. These questions were rated generally in terms of a 7-point scale, "1" meaning "least favorable" and "7" meaning "most favorable." The actual questions asked were as follows: (1) "In general, how do you view the computerized PAU approach to intake assessment?" (2) "Do you find the PAU testing clinically useful?" (3) "Specifically, how does the availability of PAU testing influence the accuracy of your clinical decisions?" (4) "Specifi-

Table 1
Occupational Distribution by Treatment Unit

Occupation	Inpatient					Out-patient
	A	B	C	D	E	A
Psychologists	4	0	3	2	0	9
Psychiatrists	0	2	0	0	0	1
MSWs	2	4	0	0	0	2
Nurses	6	1	3	0	5	4
Nursing Aides	4	6	2	0	4	0
Rehabilitation Technicians	0	0	2	2	0	3

cally, how has the availability of the PAU testing influenced patient prognosis and outcome?" (5) "Does the PAU testing present an accurate picture of the patient's condition at the time of application for care?" (6) "Does the PAU testing present a complete description of the patient's condition (i.e., complete enough for initial treatment decisions)?"

Results

Results are presented in Table 2 by treatment unit and for the total treatment staff. The total staff response to the PAU system fell in the "neutral" to "slightly unfavorable" range. Of the several questions presented, staff were most favorable toward the notion of the PAU approach to intake assessment and least favorable toward the idea that the PAU could lead to improved patient outcomes. However, these data also indicate that attitudes toward PAU computerized testing vary significantly according to treatment unit. Using a one-way analysis of variance, there were statistically significant differences for each question among the different treatment units. By inspection of Table 2, it is apparent that staff members of one treatment unit (Inpatient A) consistently rated the PAU system in a least favorable

manner. (A post hoc statistical analysis was not completed because of the small group sizes.)

EXPERIMENT 2

Davis (1973) has pointed out that innovations in mental health service delivery technology may not succeed because of a failure to adequately prepare an organization for change. He has developed the A-VICTORY model of readiness for change. According to this model, the success of a change is affected by the organization's Abilities (availability and willingness to commit resources to change), Values (attitudes conducive to change), Information (ongoing and wide dissemination of information—especially relating to planned change), Circumstances (other aspects of an organization which favor rather than interfere with planned change), Timing (appropriate timing for change), Obligation (felt need to take action), Resistances (feared negative consequences to a proposed change), and Yield (expected rewards from a change).

In developing the on-line computer-assisted PAU, we had not considered that a methodology for effecting planned organizational change might be required. We believed that any innovation leading to improved productivity of a mental health care delivery system would be accepted by staff members. The results of Experiment 1 forced us to re-evaluate this belief. Therefore, we decided to complete a post hoc study of the organizational readiness for the acceptance of the PAU by the treatment staff of the Mental Health and Behavioral Sciences Treatment Services at the VA Hospital in Salt Lake City. For this study we used Davis' (1973) A-VICTORY model. Our purpose in undertaking this study was to attempt to learn whether there were

Table 2
Questionnaire Responses for Total and by Treatment Unit with ANOVA Results Among Treatment Units

Question	Total Service (n = 74)		Inpatient A (n = 16)		Inpatient B (n = 13)		Inpatient C (n = 10)		Inpatient D (n = 4)		Inpatient E (n = 9)		Outpatient (n = 19)		F*	p
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD		
View computerized PAU favorably	3.79	1.60	2.19	1.30	4.84	1.20	4.40	1.10	2.25	.96	4.33	1.90	4.05	1.30	7.83	.01
PAU testing clinically useful	3.70	1.52	2.25	1.20	4.54	1.10	4.20	1.20	3.23	.96	4.78	1.80	3.95	1.30	7.09	.01
PAU testing influences accuracy of clinical decisions	3.30	1.64	1.63	.96	3.33	1.40	3.40	1.40	2.75	.50	4.89	1.40	4.00	1.40	9.41	.01
PAU testing influences patient outcome positively	2.83	1.37	1.56	.81	3.00	1.10	3.30	1.40	2.50	1.00	3.78	1.20	3.16	1.40	5.45	.01
PAU testing presents an accurate picture of the patient	3.64	1.34	2.36	1.30	3.69	1.00	3.60	1.20	4.75	1.50	3.44	1.40	3.89	1.30	4.06	.01
PAU testing presents a complete description of the patient	3.20	1.54	2.13	1.20	3.46	1.30	3.60	1.30	2.50	1.30	3.89	1.80	3.56	1.60	2.82	.05

Note—Ratings on a 7-point scale, with "1" equal to a least favorable rating and "7" equal to a most favorable.

*df = 5/69

factors involved in the organization's preparedness for change which affected the clinician acceptance of the on-line computer-assisted PAU.

Method

Subjects, Instrumentation, and Procedure. Subjects for this experiment ($n = 20$) were chosen randomly across treatment units from the sample that had participated in Experiment 1. Each of the subjects was questioned with a 19-item questionnaire based on a similar questionnaire developed by Mayer (Note 2) and derived from Davis (1973). The questionnaire consisted of items designed to assess the organization's readiness to accept the PAU in terms of each of the eight categories of the Davis A-VICTORY model. Items were of the following form: "Staff skills on your ward are sufficient to make full use of the PAU material." "Your unit chief is in favor of computer-assisted assessment." And, "The need to implement the computer-assisted PAU was ascertained through sound evaluation." Subjects were asked to rate each of the 19 items according to how truthful the subject thought the item to be. Items were rated on a scale from 1 to 7, "1" meaning the "least truthful" and "7" meaning the "most truthful." Mayer (Note 2) noted that this approach leads to a "domain-referenced" score which provides information about how the organization could have scored rather than how it compares to other organizations. Thus, results are useful in the determination of rational organizational-readiness components related to the acceptance of change.

Results

A graph of results is presented in Figure 1. These results show a favorable attitude of preparedness (especially for Ability) over all groups for all categories except Obligation (felt that the introduction of PAU was necessary to the organization). When a comparison

*Seven-point scale where "1" means "least true" and "7" means "most true"

Figure 1. Mean A-VICTORY scores for the total sample ($n = 20$).

*Seven-point scale where "1" means "least true" and "7" means "most true"

** $n = 3$

*** $n = 17$

Figure 2. Mean A-VICTORY scores for Inpatient Unit A compared with mean scores for all other subjects.

is made between Inpatient Unit A (the least accepting unit from Experiment 1) and the other treatment units, a large difference is apparent (see Figure 2). Inpatient A indicates a lack of preparedness for Value, Information, Circumstances, Obligation, Resistance, and Yield. The differences in preparedness for Inpatient A as compared with all other units reached significance for three categories; (1) Values [$t(18) = 2.76$, $p < .05$], (2) Information [$t(18) = 2.36$, $p < .05$], and (3) Resistances [$t(18) = 2.11$, $p < .05$].

DISCUSSION

In this paper we have presented two studies related to clinician acceptance of the on-line computer-assisted PAU. Our results indicate that, despite previous positive evaluation studies, clinician acceptance of the PAU is, at best, neutral. In previous papers (Johnson, Williams, Giannetti, & Schmidt, 1977; Johnson, Williams, Klingler, & Giannetti, 1977), we have noted anecdotal evidence of clinician dissatisfaction with the computerized system and have described efforts to make improvements to the PAU that would eventuate in improved clinician acceptance. The present studies quantify this dissatisfaction and shed light on what is, perhaps, the most obvious area to concentrate on in order to effect an improvement in clinician acceptance of computerized mental health care systems: creative planning for organizational change.

Findings from Experiment 2 show that, while staff members at the VA Hospital in Salt Lake City viewed the organization as having the abilities and resources to implement the computer-assisted PAU, they did not feel any obligation or need to undertake the installation of such a system. These findings help us better understand the lack of enthusiastic acceptance by clinicians for the on-line computer-assisted approach to mental health care. Those of us involved in the design and implementation of the system (T. A. W. and J. H. J.) believed there was a need for improved productivity in our mental health care delivery system and that computer technology could be used to bring about this improvement. However, we failed to communicate our rationale for the development of the PAU to the treatment staff users. It seems likely that clinician acceptance of the PAU would have been improved significantly had we appropriated a significant portion of our time and monetary resources to the preparation of the organization for creative change.

This problem is highlighted by the negative results obtained from Inpatient Unit A in both experiments. Inpatient Unit A offers an innovative and effective treatment program. However, due to a number of historical factors, Inpatient Unit A has never been strongly affiliated with the College of Medicine, University of Utah (under whose auspices the PAU project was implemented). For example, it is the only mental health and behavioral sciences service treatment unit that does not employ full-time college faculty members or residents. As a result of this difference, little or no effort was employed in the preparation of Inpatient Unit A for the introduction of the PAU. This fact is readily apparent in Figure 2.

What, then, can we learn from these two studies? We have shown previously that the innovative use of on-line computer technology can result in an improvement of the productivity of mental health care service delivery systems. With these two studies we show that technological innovation alone is not enough. Those considering such innovations must also consider the need for organizational preparedness for the acceptance of change.

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