Web-Based Psychoeducational Intervention for Persons With Schizophrenia and Their Supporters: One-Year Outcomes

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Objective: This study examined the use of a uniquely designed Web site and home computers to deliver online multifamily psychoeducational therapy to persons with schizophrenia and their informal supports (family and friends). Web site usage and outcome benefits are reported.

Methods: Thirty-one persons with schizophrenia or schizoaffective disorder and 24 support persons were randomly assigned to the online intervention (telehealth) or treatment as usual (usual care) condition. At three, six, and 12 months, interviewer-administered assessments were conducted with participants. Intention-to-treat analyses compared persons with schizophrenia in the two study conditions on severity of positive symptoms and knowledge of schizophrenia. Support persons in the two study conditions were compared on knowledge of schizophrenia. Each participant's usage of the Web site was logged.

Results: Persons with schizophrenia in the telehealth condition had a large and significant reduction in positive symptoms (p=.042, d=−.88) and a large and significant increase in knowledge of schizophrenia compared with their counterparts in the usual care condition. Support persons in the telehealth condition showed a large and significant increase in knowledge about prognosis compared with those in the usual care condition (p=.036, d=1.94). Persons with schizophrenia used the Web site to a much greater extent (pages viewed and time spent) than support persons.

Conclusions: These findings suggest that online delivery of psychotherapeutic treatment and educational resources to consumers' homes has considerable potential to improve consumer well-being and offers several advantages over standard clinic-based delivery models.

(Psychiatric Services 61:1099–1105, 2010)
Methods

This study was conducted from October 2003 to April 2005. A more detailed description of the methods and participants is available elsewhere (20).

Participant recruitment and selection criteria

Persons with schizophrenia or schizoaffective disorder were recruited from community mental health centers and inpatient units. Enrollment criteria for persons with schizophrenia were age 14 or older, diagnosis of schizophrenia or schizoaffective disorder (DSM-IV criteria), one or more psychiatric hospitalizations or emergency department visits within the previous two years, the ability to speak and read English, living in the community at the time of study entry, and absence of physical limitations that would preclude using a computer. Enrollment criteria for support persons were age 18 or older, ability to speak and read English, and absence of physical limitations that would preclude using a computer. [Additional enrollment details are provided in an appendix available as an online supplement to this article at ps.psychiatryonline.org.] Informed consent was obtained from participants, and the research protocol was approved by the University of Pittsburgh Institutional Review Board.

Participants

Thirty-one persons with schizophrenia or schizoaffective disorder and 24 support persons were randomly assigned to the telehealth or usual care condition.

Procedures

Participants assigned to the telehealth condition received dial-up Internet access and a computer as needed. Participants were in the study for up to one year (see online appendix for additional details).

SOAR Web site

Each intervention participant was given a unique login name and password to access SOAR. The SOAR software collected information on each participant’s usage of the Web site, including the pages visited, time of day the site was visited, time spent on the site, and user identifier. (See the online appendix for greater detail about the content and design of the site.)

Content. Selection of the content domains and their creation are described elsewhere (12,20). The SOAR Web site provides the following components: three therapy forums, one for persons with schizophrenia only, one for support persons only; and one for both groups of users; a capability for asking questions of and receiving answers from the project team within 24–48 hours; a library of previously asked and answered questions; a library of educational reading materials; and a list of community activities, events, and resources.

Facilitation of therapy forums

Each forum was led and moderated by a therapist. In each forum the therapist emphasized discussions that focused on problem solving, alleviating stress, and interacting with peers to develop a supportive forum where members could work together to address problems (3,21).

Site design.

SOAR was specifically designed to be accessible to persons with cognitive impairments, as detailed elsewhere (12). The design model is based on five key principles: use of explicit links and labels; a flat, one-page-deep hierarchy; a relatively high number of links on navigation pages; a single constant navigational toolbar; and minimal superfluous and distracting content, such as images.

Psychoeducation survival skills workshop

Before we installed computers in participants’ homes and provided access to SOAR via a desktop icon, telehealth participants (persons with schizophrenia and their support persons) attended a joint, four-hour psychoeducation survival skills workshop. The course was modeled on a workshop developed by Dr. Anderson and her colleagues (3) and is described elsewhere (20).

Assessment instruments

Trained, nonblinded interviewers collected data from participants at study entry and at three, six, and 12 months postbaseline. (Additional details about assessment tools are provided in the online appendix.)

Scale for the Assessment of Positive
Symptoms. The 34-item Scale for the Assessment of Positive Symptoms was used at all time points to assess for the presence and severity of positive symptoms associated with schizophrenia (22).

Knowledge About Schizophrenia Instrument. At baseline and at six months, the Knowledge About Schizophrenia Instrument was administered to assess participants’ clinical knowledge about the illness (23).

Usage of the Web site. Server logs from October 2003 to April 2005 were analyzed to determine usage patterns and number of page views or hits. The time between accessing one page and viewing another was considered to be the amount of time that a page was available for viewing. For usage analyses, online time spent on educational activities included viewing reading materials, viewing the library of questions and answers, and submitting questions to be answered and viewing responses.

Data analytic plan
Intention-to-treat analyses were used to investigate the effects of the intervention versus usual care conditions on outcomes. The three-month data collected from one person with schizophrenia was deemed unreliable by the interviewer and was thus excluded from analyses. Mixed-effects random intercept models characterized the rates of change over the course of the study, after analyses adjusted for baseline age, gender, and positive symptoms. These models used an autoregressive error structure most appropriate for longitudinal data (24) and used restricted maximum-likelihood estimate model parameters when data were missing (25).

The significance of treatment effects was examined by calculating two-tailed t tests of the beta weight for the mixed-model treatment \times time interaction term, as is customary. Cohen’s d was calculated from predicted means based on these models to estimate the magnitude of treatment effects on rates of changes to symptomatology (schizophrenia group) and knowledge (schizophrenia and support persons). In addition, within-group analyses of the associations between Web site usage and baseline symptomatology and knowledge outcomes were conducted within the intervention group using Pearson correlation coefficients to identify the correlates of the intervention. For symptomatology data collected at multiple follow-up periods, correlation coefficients were pooled across the intervention group to estimate the magnitude of treatment effects on symptomatology (schizophrenia group) and knowledge (schizophrenia and support persons). In addition, within-group analyses of the associations between Web site usage and baseline symptomatology and knowledge outcomes were conducted within the intervention group using Pearson correlation coefficients to identify the correlates of the intervention.

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Results
Participants
Demographic characteristics of the study sample are presented in Table 1. Forty-eight percent of the sample with schizophrenia was Caucasian, and the average age in the group was 38. In the group of support persons, 46% were Caucasian, and their average age was 50. One patient (3%) and four family members (17%) dropped out of the study.

Use of the Web-based intervention
Persons with schizophrenia in the telehealth group. The total amount of time spent on the SOAR Web site by those in the schizophrenia group was 43,789 minutes (730 hours), which involved 47,630 page views. Over the course of the study, the average total time spent on the Web site per person was 46 hours, or 2,737±3,692 minutes (median=1,170, range=189–14,120) per person. Usage of the main components of the Web site is presented in Table 2.

Support persons in the telehealth group. The total amount of time that support persons spent on the Web site over the period of observation was 10,901 minutes (182 hours) and involved 8,210 page views. The average total time spent on the Web site per person was 14 hours, or 839±1,125 minutes (median=372, range=30–4,021), with an average of 2,977±4,546 page views (median=1,170, range=189–14,120) per person. Support persons’ usage of the main components of the Web site is presented in Table 2.

Engagement in treatment
Although treatment engagement involves a complex set of processes (26), an established operational defi-

<table>
<thead>
<tr>
<th>Table 1</th>
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<tr>
<td><strong>Demographic characteristics of persons with schizophrenia and their supporters who were randomly assigned to a telehealth intervention or to usual care</strong></td>
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</table>

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<thead>
<tr>
<th>Characteristic</th>
<th>Persons with schizophrenia</th>
<th>Support persons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Telehealth (N=16)</td>
<td>Usual care (N=15)</td>
<td>Telehealth (N=13)</td>
</tr>
<tr>
<td><strong>Age (mean±SD)</strong></td>
<td>38±11</td>
<td>38±11</td>
</tr>
<tr>
<td>Male</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Caucasian</td>
<td>9</td>
<td>6</td>
</tr>
<tr>
<td>African American</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
<td>1</td>
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* From a t test or chi square test of differences between telehealth and usual care groups

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A number of months in which each person was active in a therapy forum was 11±4 (median=11, range=4–17), where they spent an average of 3.2 hours per month or 193±316 minutes (median=64, range=14–1,193). Overall, these data indicate strong engagement of most participants in this part of the intervention.

Persons with schizophrenia participated in educational activities during 807 visits (18% of total visits), with an average 50±50 visits per participant (median=30, range=4–340). The average number of months in which each person viewed educational materials was 8±4 (median=8, range=3–16), spending an average of 32±26 minutes per month (median=24, range=7–88). These data suggest that online approaches to education, using materials specifically designed and written for this population, can be well received.

Support persons had a total of 972 sessions on the SOAR site, with an average of 75±59 sessions per person (median=57, range=1–207). They participated in a therapy forum during 539 visits (55% of total), with an average of 42±40 visits per person (median=19, range=1–129). The average number of months in which each support person was active in a therapy forum was 9±6 (median=7, range=1–19), and each spent an average of 55±43 minutes on the site per month (median=41, range=9–161). Support persons participated in educational activities during 339 visits (35% of total), averaging 26±29 visits per person (median=189, range=0–92) over an average of 7±6 months (median=6, range=0–18). They spent on average 29±42 minutes (median=17, range=0–160) during an active month. Support persons used the forum and educational components of SOAR frequently and over a sustained period, indicating that family and friends can become engaged by this approach to psychoeducation.

**Outcomes**
Analyses using mixed-effects random-intercept models indicated that compared with persons with schizophrenia who received usual care, their counterparts in the telehealth group had significant and large reductions (30) in positive symptoms during the treatment intervention (t=-2.06, df=97, p=.042, d=-.88) (Figure 1). Using the same analytical methods, we found in the telehealth group a significant and large improvement in knowledge about the diagnosis of schizophrenia (t=-2.34, df=24, p=.028, d=.88) (Figure 1). No effects were found on other domains of knowledge about schizophrenia. Analyses of the association between

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**Table 2**

<table>
<thead>
<tr>
<th>Site component</th>
<th>Users with schizophrenia (N=16)</th>
<th>Users supporting person with schizophrenia (N=12)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Page viewsb</td>
<td>Time on SOAR (minutes)</td>
</tr>
<tr>
<td>Therapy forum</td>
<td>M  SD  Mdn Range</td>
<td>M  SD  Mdn Range</td>
</tr>
<tr>
<td>For persons with</td>
<td>1,838 2,795 586 41–8,725</td>
<td>1,874 2,728 713 49–8,305</td>
</tr>
<tr>
<td>schizophreniac</td>
<td>For all users</td>
<td></td>
</tr>
<tr>
<td>For support personsd</td>
<td>414 882 70 6–3,127</td>
<td>334 665 99 1–2,461</td>
</tr>
<tr>
<td>Educational materials</td>
<td>Questionsc 113 217 42 3–886</td>
<td>124 198 53 3–732</td>
</tr>
<tr>
<td>Articles</td>
<td>69 59 51 11–207</td>
<td>163 172 86 19–579</td>
</tr>
</tbody>
</table>

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* Covers period from October 1, 2003, to April 30, 2005

* Number of times pages on the SOAR Web site were viewed (page “hits”) by participants

* This forum was not available to support persons.

* This forum was not available to persons with schizophrenia.

* Included submitting questions to “Ask an Expert” and viewing the “Previous Questions and Answers” library.
cumulative Web site usage and symptom severity indicated that individuals with more severe positive symptoms tended to spend more time on the SOAR site ($r=.65, p=.005$) and to access SOAR more frequently ($r=.62, p=.009$). Cumulative Web site usage was weakly associated with magnitude of positive symptom reduction (based on within-subject reduction in positive symptoms from baseline to 12 months), but the relationship was not statistically significant. Supporters in the telehealth group showed a large improvement in knowledge about prognosis ($t=2.32, df=14, p=.036, d=1.94$). No significant effects were observed on other domains of schizophrenia-related knowledge.

**Discussion**

The findings are remarkable in terms of the high level of engagement in online activities of persons with schizophrenia (100%) and supportive persons in their lives (92%) and the substantial usage of telehealth resources. Positive symptoms and knowledge about schizophrenia improved. In addition, higher Web site usage was associated with higher rates of positive symptoms, suggesting that those most in need of treatment sought and used a greater “dose” of the telehealth intervention. Perhaps surprising was the relatively higher level of participation of persons with schizophrenia compared with their supporters, a finding that may reflect a generation-based discomfort with technology or caused by the support group’s composition, a highly diverse yet relatively small group. More than one member of the group of support persons suggested that the group be larger or more homogeneous to allow members to more easily bond over common experiences. The sustained involvement with the SOAR site suggests that the intervention has the potential to be a viable approach to providing therapies such as family psychoeducation to clients and their support network.

Although family psychoeducation is commonly associated with reductions in relapse rates and intimately involved in controlling positive symptom exacerbations, only some psychoeducation programs have shown a reduction in positive symptoms (31–33), whereas many have not (34). SOAR’s significant influence on positive symptoms is consistent with the intervention’s goals and the details of its operation. An explanation may lie in the common topics for problem solving and discussion, which focused on managing positive symptoms, medications, and side effects, including talking to psychiatrists about these issues to minimize their interference with activities. Thus, although evaluation of possible mediating variables such as medication adherence, side effect management, and readiness to talk with the prescribing psychiatrist about these issues was beyond the scope of this study, it is possible that concerns about symptom-related problems were positively influenced by the forum discussions and answers from the Ask the Expert feature.

Web site usage is certainly an indicator of engagement and may be a sufficiently valid indicator for most users, but it likely falls short as a measure of ongoing engagement for all users. Exposure to treatment is paramount but also encompasses such qualities as valuing and being committed to treatment and participation in treatment activities, such as problem solving. Feedback from users indicated that a range of Web site usage may be observed even among those who believe in the effectiveness of the treatment and are engaged. Usage may be influenced by need, which can vary over time because of intervention success, degree of symptom control, medication difficulties, severity of stresses, changes in coping resources, and so on. It has also been noted that disengagement may be an indication of successful behavior change (35).

From this perspective, persons with schizophrenia who are more functional, have better personal and social resources, and have fewer problems taxing their ability to cope may still be engaged and benefit from intermittent use rather than more frequent or continuous use (see examples in the online appendix).

Because psychiatric symptoms and the underlying cognitive deficits of schizophrenia can interfere with an individual’s ability to engage in meaningful and appropriate face-to-face interaction, computer-based interaction offers significant advantages (36,37). The visual display of words on a monitor may help compensate for deficits in auditory processing, attention, and memory and may im-

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**Figure 1**

Changes in positive symptoms and knowledge about schizophrenia after exposure of 31 persons with schizophrenia to the SOAR Web site

<table>
<thead>
<tr>
<th></th>
<th>Baseline</th>
<th>12 months</th>
<th>6 months</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive symptoms</td>
<td>0</td>
<td>4 (95% CI)</td>
<td>3 (95% CI)</td>
</tr>
<tr>
<td>Knowledge</td>
<td>1</td>
<td>3 (95% CI)</td>
<td>2 (95% CI)</td>
</tr>
</tbody>
</table>

* SOAR, schizophrenia online access to resources
also likely to have been a contributing factor in their ability to access the site effectively.

Conclusions
Clearly there is a need for cost-effective ways of successfully delivering evidence-based programs to the community. Telehealth programs may offer an ideal solution. Experts based in central locations can provide a sophisticated intervention to underserved individuals and families living in widely dispersed areas, eliminating the need for individual agencies to have the necessary startup funds or clinical expertise. These findings suggest that when telehealth services are specifically designed to accommodate the cognitive deficits of persons with schizophrenia, the services can and will be used. Online delivery of psychotherapeutic treatment to consumers’ homes can improve consumer well-being and offers several advantages over standard clinic-based delivery models.

Acknowledgments and disclosures
This project was supported by grant R01 MH63484 from the National Institute of Mental Health.

Dr. Eack receives consulting fees from Abbott Laboratories. Dr. Ganguli is a consultant for Janssen Pharmaceuticals, Johnson & Johnson, and Eli Lilly and Company, and he works under a research grant funded by Bristol Myers-Squibb. The other authors report no competing interests.

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Chapter 1: The 5 Dimensions of Recovery: A Model to Guide Psychiatric Services

Chapter 2: A Controlled Trial of an Electronic System to Support Shared Decision Making

Chapter 3: An Analysis of Offense Patterns and Mental Illness to Test the Criminalization Hypothesis

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