It is illegal to post this copyrighted PDF on any website.

Expert Consensus Survey on Medication Adherence in Psychiatric Patients and Use of a Digital Medicine System

Ainslie Hatch, DClinPsych, PhD[a,d,*]; John P. Docherty, MD[a,d]; Daniel Carpenter, PhD[a,d]; Ruth Ross, MA[b]; and Peter J. Weiden, MD[c]

ABSTRACT

Background: There is an unmet need to objectively assess adherence problems that are a common cause of unexplained or unexpected suboptimal outcome. A digital medicine system (DMS) has been developed to address this need in patients with serious mental illness.

Objective: To conduct a quantitative expert consensus survey to (1) assess relative importance of causes of suboptimal outcomes, (2) examine modalities used to assess adherence, (3) provide guidance on when and how to use the DMS in clinical practice once available, and (4) suggest interventions for specific reasons for nonadherence.

Methods: A panel of 58 experts in psychiatry completed a 23-question survey (October 13 through December 23, 2013) and rated their responses on a 9-point Likert scale. A χ^2 test of score distributions was used to determine consensus ($P < .05$).

Results: The panel rated adherence as the most important factor in suboptimal outcomes and yet the least likely to be assessed accurately. All predefined uses of the DMS received high mean first-line ratings (≥ 7.4). The experts recognized the utility of the DMS in managing adherence problems, identified clinical situations appropriate for DMS, and assessed potential benefits and challenges of this technology. Consensus was reached on first-line interventions for 10 of 11 reasons for nonadherence.

Conclusions: The results provide a guide to clinicians on the evaluation of suboptimal outcomes, when and how to use the DMS, and the most appropriate interventions to address detected adherence problems.

J Clin Psychiatry 2017;78(7):e803–e812
https://doi.org/10.4088/JCP.16m11252
© Copyright 2017 Physicians Postgraduate Press, Inc.

[a]Otsuka America Pharmaceutical, Inc, and Otsuka Pharmaceutical Development & Commercialization, Inc, Princeton, New Jersey
[b]Ross Editorial, Independence, Virginia
[c]Department of Psychiatry, University of Illinois, Chicago
[d]ODH, Inc, Princeton, New Jersey (current affiliation)
**Corresponding author:* Ainslie Hatch, PhD, ODH, Inc, 508 Carnegie Center Blvd, Ste 300, Princeton, NJ 08540 (ainslie.hatch@ODHsolutions.com).

Psychiatric patients often show variable response to treatment. Numerous factors contribute to suboptimal response, including adherence problems.[1] For those with serious mental illness (SMI), including schizophrenia, bipolar I disorder, and major depressive disorder (MDD),[2–5] ongoing adherence prevents recurrence, relapse, and rehospitalization. Nonadherence is common in patients with SMI[6,7]; however, it is very difficult to detect in practice. Mental health practitioners frequently underestimate the extent of nonadherence to prescribed treatments.[8,9] The ability to rapidly identify adherence problems as early as possible, however, is very important in preventing suboptimal outcome due to nonadherence leading to relapse or recurrence or to an enduring state of suboptimal outcome. Availability of information about medication disruptions and other differences between prescribed and taken medication is critical. A discrepancy between prescribed and actually ingested medication may lead the physician to flawed assumptions regarding the medication's efficacy or what appear to be treatment-emergent side effects. Unfortunately, methods currently used to assess adherence have limitations and do not detect actual medication ingestion.[10]

Various techniques and technologies have been proposed that may provide earlier, more accurate, or objective information about medication adherence. These include theory-based social psychology, such as assessment of patient self-efficacy to predict nonadherence and tailor intervention[11–13] and mobile phone video to directly observe medication ingestion.[14] A novel digital medicine system (DMS) developed for patients with SMI may offer objective and precise measurement of medication ingestion. The system is a drug-device combination that consists of an ingestible sensor embedded in a medication tablet, a wearable sensor-transmitter, and mobile- and cloud-based software that enables the secure collection and sharing of medication adherence information with health care providers. When the DMS technology becomes available, clinicians will need a practical guide to facilitate their use of this technology and guidance on the use of adherence data. The expert consensus survey methodology was used to address this need.

The survey methodology was developed to quantify and report expert opinion to inform clinical practice in areas not well covered by definitive research.[15] It has been applied to 26 areas of clinical practice, including schizophrenia, bipolar disorder, depressive disorders, attention-deficit/hyperactivity disorder, obsessive-compulsive disorder, and dementia, with data presented in more than 75 publications.[16,17] An expert consensus survey on adherence problems in SMI published in 2009 also used the expert consensus methodology.[17] Efforts to develop the DMS as a new objective method of assessing adherence created the need for an update and extension of a previously published expert survey to address questions that had not been covered.[17] The purpose of the study was to gather information from a curated panel of credentialed clinical experts to provide guidance for the psychiatry field in regard to the following 4 questions: Is there a need in psychiatry for this state-of-the-art technology? When

You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

Clinical Points

- This expert consensus survey rated adherence as the most important possible cause of suboptimal treatment outcome in psychiatric patients and the least likely to be assessed accurately.
- The utility of a digital medical system for assessing adherence, generating adherence alerts, and suggesting the need for interventions to improve adherence was strongly supported in the survey.
- Effective detection of nonadherence is a key first step in identifying underlying reasons and designing effective interventions. Once the reasons are identified, the current data provide expert opinion on the most appropriate interventions.

could this technology be used in clinical practice? How could this technology be used? and What actions should a clinician take when they have used this technology and detected adherence problems? Results from the survey may be used as recommendations for physicians and other health care providers (psychologists, case managers, social workers) concerning use of a future technology to objectively measure patient medication adherence and as guidance concerning the most appropriate approaches for targeting reasons for adherence problems.

METHODS

Survey

This survey contained 23 questions and 360 options (see eAppendix 1). The experts were asked to evaluate clinical appropriateness by rating the options on a 9-point Likert scale (eg, 1 = not at all appropriate; 9 = extremely appropriate) that was slightly modified from a format developed by the RAND Corporation (Santa Monica, California) for ascertaining expert consensus.[18] One question concerning timing of nonadherence alerts was answered by filling in 3 blank fields. The survey took approximately 1 hour to complete, and respondents were paid a fee ($450) for participating. The survey was conducted from October 13 through December 23, 2013.

The 23 questions in the survey focused on 4 main areas:

(1) Establishing the need for objective data in patients with suboptimal treatment outcomes (6 questions). This section asked about underlying causes of suboptimal clinical outcomes and accuracy of their assessment (4 questions) and the frequency of use and accuracy of 11 methods of assessing adherence used in routine clinical practice (2 questions).

(2) When to use the DMS (5 questions). This section explored the relative importance of assessing nonadherence in patients with schizophrenia, bipolar disorder, and MDD in 10 potential clinical situations (1 question for each disorder); the appropriateness of using the DMS in specific types of patients (1 question); and the usefulness of the DMS as a tool to target different reasons for adherence problems (1 question). In the survey, the DMS was described as "a digital medication platform that will give clinicians access to real-time empirical data concerning whether their patients are actually taking their oral antipsychotic medication."

(3) How to use the DMS (11 questions). This section was divided into 4 segments: usefulness of the DMS for patients with schizophrenia, bipolar disorder, and MDD (1 question for each disorder); nonadherence alerts generated by the DMS (3 questions); appropriate responses to nonadherence of a rapidly decompensating versus stable patient (1 question for each disorder); and potential benefits and challenges of using the DMS (2 questions).

(4) Interventions in the event of nonadherence (1 question). This section was divided into 11 subsections in which respondents rated the appropriateness of 15 potential interventions as a strategy for targeting different reasons for nonadherence (eg, related to logistic problems or problems with the therapeutic alliance).

Expert Panel

Experts on schizophrenia, bipolar disorder, or MDD (n = 119) were identified based on recent publication activity, funded research, previous participation in consensus surveys in psychiatry, and/or work on guidelines concerning psychiatric illnesses. Of the 119 invited experts, 21 did not respond and 34 declined to participate. Of the remaining 64 experts, 58 (91%) completed the survey. The mean age of the respondents was 59.9 years. The respondents reported being in practice for a mean of 29.1 years and being involved in research for a mean of 30.3 years. On the basis of the reported proportion of time spent on treatment or supervision of patients with the 3 psychiatric conditions, 24 were considered experts on schizophrenia, 14 on bipolar disorder, and 16 on MDD; 4 respondents were generalists. The majority worked in an academic clinical or research setting and spent > 25% of their time treating or supervising the treatment of patients; 41 (71%) had received federal research funding as principal investigator, and 48 (83%) had been principal investigator for an industry-sponsored grant.

Data Analysis

For each option scored on the 1 to 9 rating scale, the presence or absence of consensus was first defined as a distribution unlikely to occur by chance by performing a χ^2 test ($P < .05$) of the distribution of scores across the 3 ranges of appropriateness (1–3, 4–6, 7–9). Next, the mean and 95% confidence interval (CI) were calculated. A categorical rating of first, second, or third line was designated based on the lowest category in which the CI fell, with boundaries > 6.5 for first-line options and boundaries of 3.5 to 6.5 for second-line options. The 3 write-in options are presented as mean values.

RESULTS

Need for Objective Adherence Data in Patients With Suboptimal Treatment Outcomes

To evaluate whether there was any association between suboptimal outcomes and various underlying causes, suboptimal outcomes were presented as persistent residual

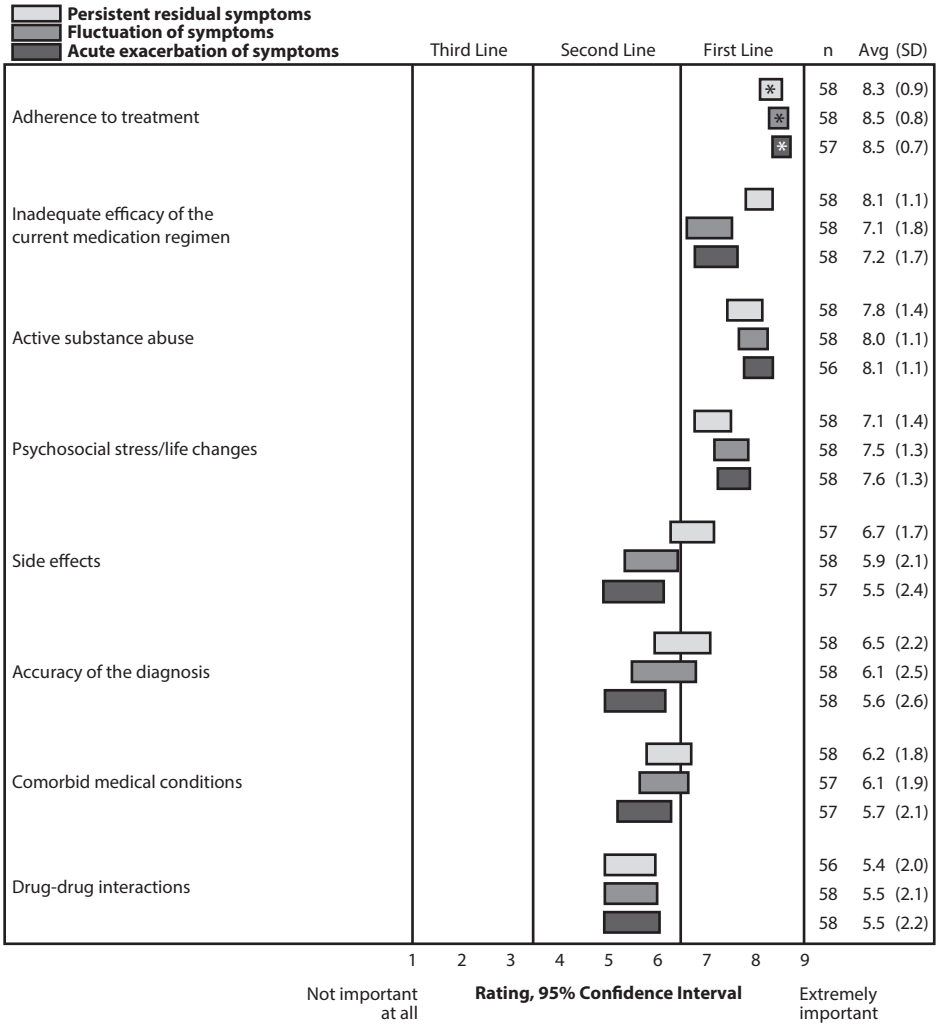
You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

Figure 1. Importance of Evaluating Possible Underlying Causes of Suboptimal Treatment Outcomes[a]

Survey question: How important do you consider it to evaluate the following as possible underlying causes of the specified symptoms in a patient with schizophrenia, bipolar disorder, or major depressive disorder?



[a]Horizontal bars indicate confidence intervals for each response; asterisk indicates that the response was rated 9 by ≥ 50% of experts.
Abbreviations: Avg = average, SD = standard deviation.

symptoms, fluctuation of symptoms, or acute exacerbation of symptoms. The experts rated the importance of 8 possible underlying causes of these outcomes. Regardless of the outcome, adherence was deemed to be the most important factor (Figure 1). Despite this result, adherence was also rated as the causal factor that was least amenable to accurate assessment in current clinical practice. Clinical assessment of adherence was rated as "not accurate at all" by 37% of experts and as "somewhat accurate" by 54%. A negative correlation ($r = -0.63$) was found between the responses to questions about the frequency with which various methods of assessing adherence are used and their perceived accuracy (Figure 2).

When to Use the DMS

In considering the most appropriate clinical situations for use of the DMS, the experts rated 10 hypothetical scenarios that trigger concern about adherence for patients with schizophrenia, bipolar disorder, or MDD. Regardless of the disorder, the respondents identified 4 situations in which measuring of adherence is particularly important: (1) patients with a history of recurrent adherence problems, (2) patients in transitional situations (such as recent discharge from the hospital or change from supervised to independent living), (3) previously stable patients showing an increase in symptoms and/or side effects, and (4) patients with a history of serious substance abuse. The usefulness of the DMS may vary depending on the cause of adherence problems; continuing medication after discharge from the hospital, lack of daily routine, and the presence of underlying cognitive deficits were rated as the most appropriate indications (Figure 3).

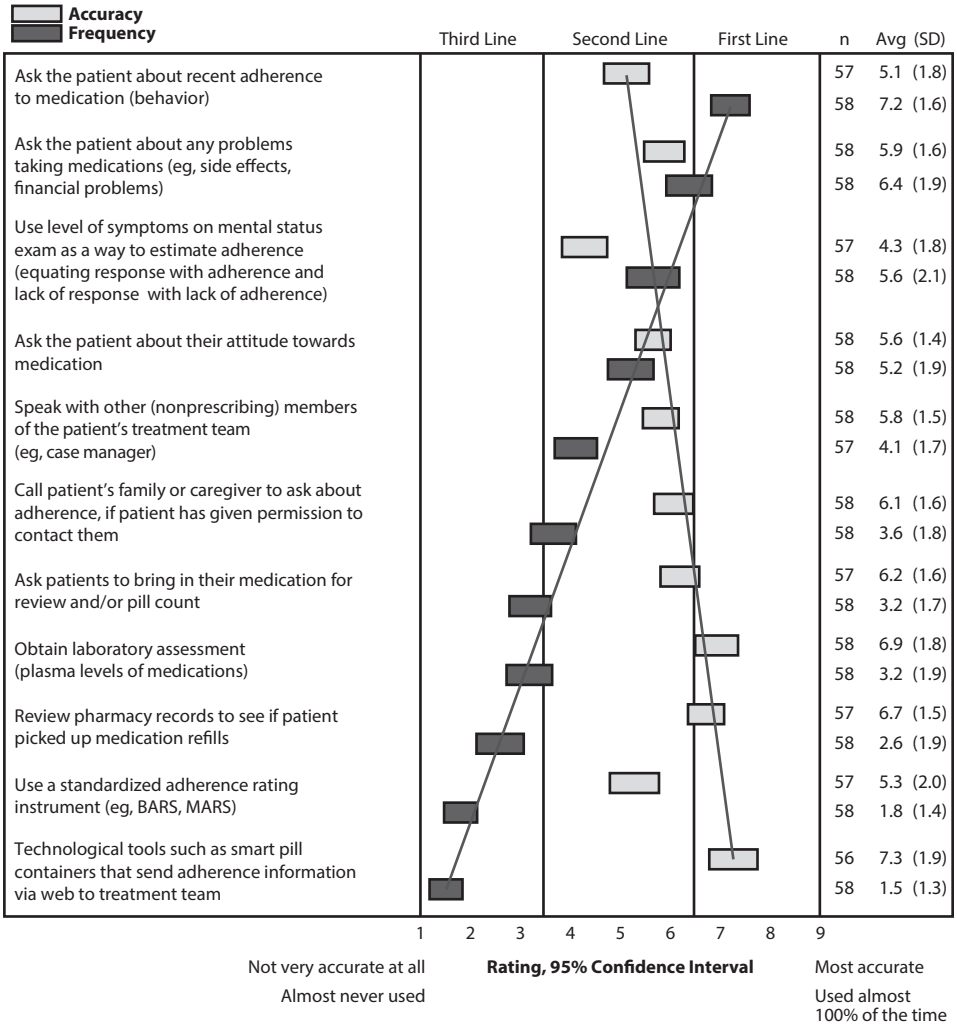
However, the DMS may not be equally useful for all patients and situations in which treatment nonadherence is a

You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

Figure 2. Negative Correlation Between Frequency and Accuracy of the Various Methods Used by Clinicians to Assess Medication Adherence[a]



[a]A negative correlation ($r = -0.63$) was found between the responses to questions related to frequency of use of various methods of adherence assessment and their perceived accuracy, meaning that the most commonly used tools for assessing adherence are also considered the least reliable.
Abbreviations: Avg = average, BARS = Brief Adherence Rating Scale, MARS = Medication Adherence Rating Scale.

problem. The experts considered patients who are unable to use simple technology as the least appropriate to use the DMS (mean [SD], 4.2 [2.4]) out of 8 specific patient characteristics that might complicate use of the system. However, 3 types of patients received first-line ratings as being appropriate for the DMS: patients with suicidal thoughts or plans (7.9 [1.5]), patients with a history of violent behavior (7.6 [1.5]), and patients who abuse substances (7.2 [1.9]). No consensus was reached on whether the DMS would be appropriate for patients who are homeless, are disorganized, or have illness characterized by persecutory delusions.

How to Use the DMS

The experts rated 4 potential uses for the DMS, all of which received high mean first-line ratings (≥ 7.4) regardless of the treated disorder (schizophrenia, bipolar disorder, MDD): (1) adherence assessment (to provide critical information concerning actual adherence when a patient presents with clinical worsening, in crisis, or with persistent symptoms), (2) monitoring alerts (to generate an alert for the clinician/treatment team after the patient crosses a predefined threshold of consecutive days of missed medication), (3) adherence intervention (to promote adherence in a patient with a pattern of intermittent adherence or premature discontinuations), and (4) routine monitoring (to provide information to be used during regular visits with the patient to integrate adherence assessment and its management into routine clinical care). Adherence assessment and monitoring alerts (1 and 2 above) received the highest rating on the 9-point scale from ≥ 50% of the experts.

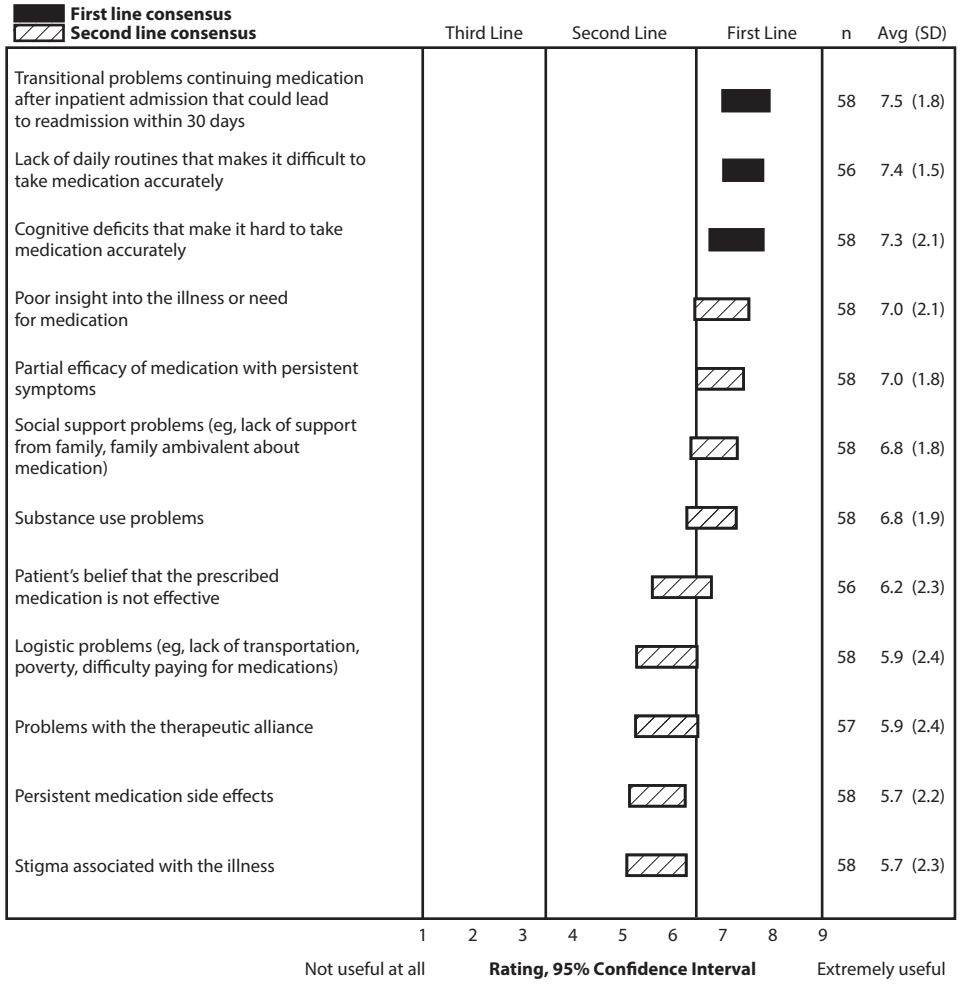
You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

Figure 3. Usefulness of the Digital Medicine System as a Tool for Tracking Adherence Problems Based on Different Reasons for Nonadherence[a]

Survey question: Rate the potential usefulness of the digital medicine system as an adherence assistance tool for a patient with schizophrenia, bipolar disorder, or major depression whose nonadherence you strongly suspect is due to one of the following problems, based on interviews with the patient or significant others or other information. (More than one of the problems may actually be contributing to the adherence difficulties.)



[a]Horizontal bar fill indicates consensus line of rating; open bars indicate lack of consensus among the experts.
Abbreviations: Avg = average, SD = standard deviation.

Monitoring Alerts

Timing. The DMS can send alerts about patients' nonadherence between visits. The experts were asked to write in the number of days of missed medication after which they would recommend sending an alert. They suggested 3 days, 2 to 3 days, and 4 to 5 days of missed medication before an alert for patients with schizophrenia, bipolar disorder, and MDD, respectively.

Purpose. The experts indicated that it would be useful to customize alerts based on individual patient characteristics. They also rated the helpfulness of sending alerts between visits for a variety of purposes. The ability to distinguish between inadequate response due to nonadherence versus poor efficacy received the mean rating of 8.2 on the 9-point scale and the highest rating from ≥ 50% of the experts.

Response. The experts rated the appropriateness of various potential responses to nonadherence alerts. Regardless of the disorder, for a patient who rapidly decompensates after missing medication, ≥ 50% of experts gave the highest rating to contacting the patient, the case manager, or a family member. Most experts also agreed that for individuals at high risk of relapsing soon after medication discontinuation, it was important to see the patient as soon as possible for an evaluation rather than wait for the next appointment. In the case of a patient who is stable, reliably takes medications, and is at no immediate risk of harm to self or others, contacting the patient after being alerted about recent medication discontinuation received the highest mean rating.

Potential Benefits and Barriers to Effective Use

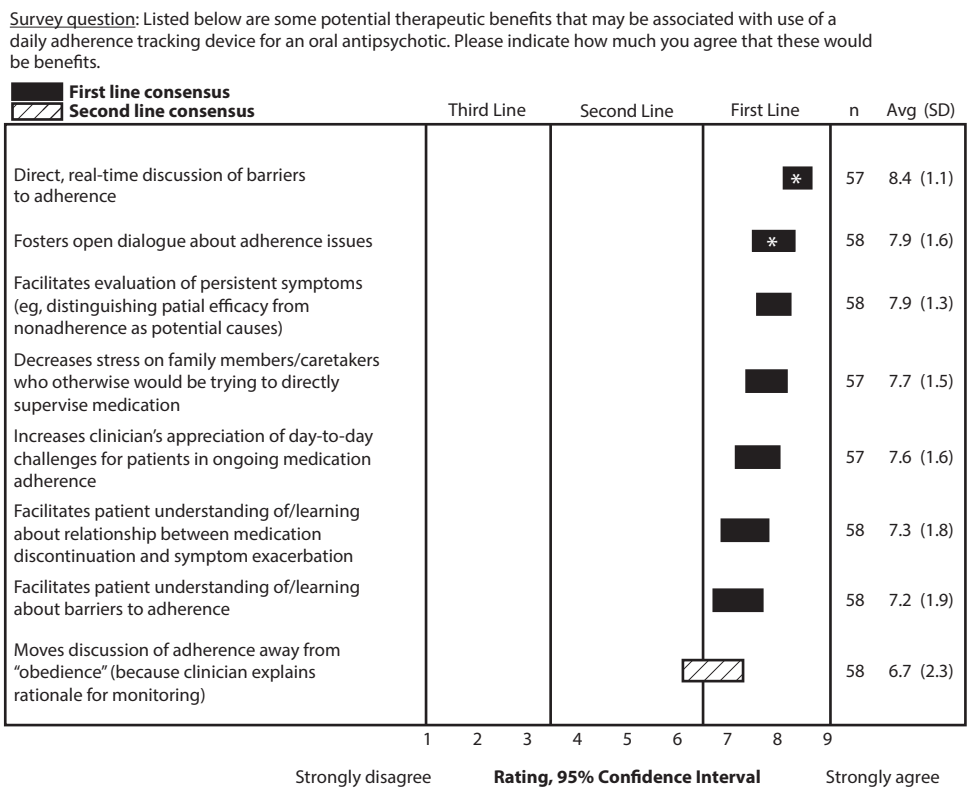
Respondents assessed therapeutic benefits as well as potential risks or challenges associated with using a DMS. Of 8 potential benefits listed in the survey, 7 received a mean first-line rating (Figure 4). The experts found it

You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

Figure 4. Potential Therapeutic Benefits Associated With Use of the Digital Medicine System in Psychiatric Patients[a]



[a]Horizontal bar fill indicates consensus line of rating; asterisk indicates that the response was rated 9 by ≥ 50% of experts.
Abbreviations: Avg = average, SD = standard deviation.

more difficult to assess challenges or risks of the DMS, as suggested by a lack of consensus on 10 of the 13 barriers or complications about which they were asked. A majority of the experts strongly agreed that patients being unable to handle or not having access to the required technology would be a significant barrier to the use of the DMS (Figure 5). Otherwise, responses tended to be split evenly on the other potential barriers that the experts were asked to rate. For example, when asked about the device being too time consuming and a hassle to use, 33% of the experts strongly agreed, 28% strongly disagreed, and 39% gave ratings in the middle of the scale.

Interventions When Adherence Problems Have Been Detected

It is important to identify not only adherence problems but also the reasons for these problems. There is no single cause of nonadherence, but rather multiple reasons that can be broadly categorized as intentional or unintentional.[19] Intentional nonadherence refers to a conscious decision by the patient to stop taking medication (eg, medication beliefs, side effects, partial efficacy, therapeutic alliance, stigma). Unintentional nonadherence occurs when signs or symptoms or problems in the patient's environment interfere with medication taking (eg, poor insight, cognitive deficits, substance abuse, logistics, absent daily routines, social support problems). The experts were asked to rate the appropriateness of different interventions as strategies for targeting 11 predefined potential reasons for treatment nonadherence. First-line consensus on interventions was achieved for 10 of the items; the interventions that received first-line or high second-line ratings are summarized in Table 1.[20]

DISCUSSION

The DMS represents a technological advance in the emerging area of digital psychiatry. Studies evaluating and refining its use and providing general information about its technology have been undertaken in patients with SMI.[21–22]

In the absence of a study portfolio that addresses the myriad of issues related to the use of a device such as the DMS in practice, clinicians will need guidance facilitating its first-time use. The expert consensus methodology provides a means to develop recommendations in areas where literature is scant.

Suboptimal response to treatment is ubiquitous in schizophrenia, bipolar disorder, and MDD as demonstrated in a number of large, naturalistic studies.[23–25] The expert respondents in the present survey indicated that adherence to medication is the most critical to evaluate when a patient is having a suboptimal treatment outcome. The experts also

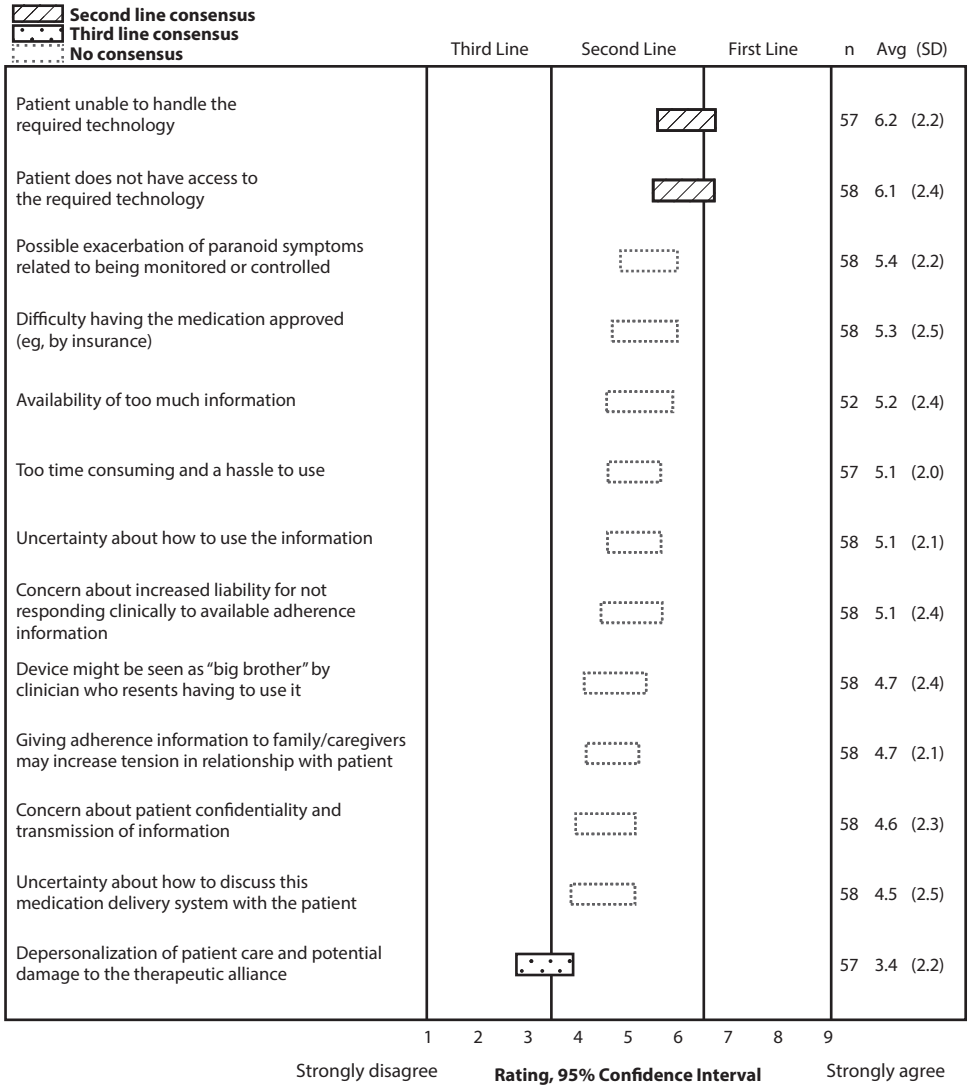
You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

Figure 5. Potential Therapeutic Challenges Associated With Use of the Digital Medicine System in Psychiatric Patients[a]

Survey question: Listed below are some potential barriers or complications that may be associated with use of a daily adherence tracking device for an oral antipsychotic. Please indicate how much you agree that these might be complications.



[a]Horizontal bar fill indicates consensus line of rating; open bars indicate lack of consensus among the experts; and asterisk indicates that the response was rated 9 by ≥ 50% of experts.
Abbreviations: Avg = average, SD = standard deviation.

believed that adherence is the causal factor that is the least accurately assessed with the methods currently available in clinical practice. The need for new approaches to adherence assessment is underscored by the finding that the strategies that clinicians most frequently use to assess adherence were perceived as the least accurate. The expert responses about adherence assessment in the 2008 survey were similar and showed that clinicians most often rely on asking patients,[17] which often leads to overestimating adherence.[9] The experts in the earlier survey had recommended using more objective measures to assess adherence; however, the present survey indicates that a majority of clinicians continue to use patient self-report, likely because of limitations of the more objective methods currently available.[10] The fact that nonadherence is still rated as a leading factor in suboptimal response suggests that accurate and clinically practical solutions to measuring adherence are needed.

Assessment of adherence is particularly important in situations that increase the risk of nonadherence. The experts considered accurate assessment of adherence most important in situations known to be associated with poor adherence: in patients with recurrent adherence problems[26]; in patients in transitional situations, such as recent discharge from hospital[27]; in patients with increased symptoms and/or side effects[28]; and in patients with a history of substance abuse.[29]

You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

Table 1. Intervention Recommendations to Address Common Reasons Associated With Nonadherence[a]

Nonadherence Reason	First-Line Intervention	High Second-Line Intervention[b]
Intentional		
Partial efficacy of medication with persistent symptoms	• Change in medication regimen to improve efficacy • Use an LAI antipsychotic • Behavioral interventions/environmental supports to establish medication routine[c]	• Patient-based psychoeducation[d] • Adjust or change medication regimen to reduce side effects • Increase level of medication supervision • Family psychoeducation[e] • Psychotherapeutic interventions[f] • Refer for medication financial assistance[g]
Persistent medication side effects	• ***Adjust or change medication regimen***	• Change medication regimen to improve efficacy
Patient's belief that the prescribed medication is not effective	• Patient-based psychoeducation[d] • Change in medication regimen	• Psychotherapeutic interventions[f] • Family psychoeducation[e]
Stigma associated with the illness	• Family psychoeducation[e] • Psychotherapeutic interventions[f] • Patient-based psychoeducation[d]	
Problems with the therapeutic alliance	• Psychotherapeutic interventions[f]	• Adjust or change medication regimen to reduce side effects • Patient-based psychoeducation[d] • Family psychoeducation[e] • More frequent/longer visits if possible • Change medication regimen to improve efficacy
Nonintentional		
Cognitive deficits that make it hard to take medication accurately	• ***Behavioral interventions/environmental supports to establish medication routine***[c] • Increase level of medication supervision • Use an LAI antipsychotic • Family psychoeducation[e]	• Institute home visits
Poor insight into the illness or the need for medication	• Family psychoeducation[e] • Patient-based psychoeducation[d]	• Use an LAI antipsychotic • Psychotherapeutic interventions[f] • Increase level of medication supervision • Behavioral interventions/environmental supports to establish medication routine[c] • Change medication regimen to improve efficacy • More frequent/longer visits if possible
Logistic problems[h]	• ***Refer for medication financial assistance***[g] • ***Social work targeting logistic problems***	
Lack of daily routines that makes it difficult to take medication accurately	• ***Behavioral interventions/environmental supports to establish medication routine***[c] • Use an LAI antipsychotic • Increase level of medication supervision	• Family psychoeducation[e] • Patient-based psychoeducation[d] • Change medication regimen to improve efficacy
Social support problems[i]	• ***Family psychoeducation***[e]	• Patient-based psychoeducation[d] • Psychotherapeutic interventions • Use an LAI antipsychotic • Behavioral interventions/environmental supports to establish medication routine[c]
Substance abuse problems	• Integrated dual diagnosis treatment program[j]	• Increase level of medication supervision • Use an LAI antipsychotic • Family psychoeducation[e] • Patient-based psychoeducation[d] • Behavioral interventions/environmental supports to establish medication routine[c] • Psychotherapeutic interventions[f]

[a]***Bold italics:*** options receiving the highest rating from at least 50% of the experts.
[b]The upper limit of the confidence interval touches or crosses the first-line boundary (ie, a score of 6.5).
[c]Eg, reminders, pill boxes, alarms.
[d]Eg, helping patient understand the biologic basis of symptoms and role of maintenance antipsychotic medication in relapse prevention.
[e]Evidence-based family interventions.
[f]Eg, working through psychological resistance to being ill and having to take medication.
[g]Eg, compassionate programs, reduced copays.
[h]Eg, lack of transportation, poverty, difficulty paying for medications.
[i]Eg, lack of support from family, family ambivalence about medication.
[j]This option was not included in the current survey but such programs were endorsed as a first-line strategy in an earlier expert consensus survey that asked specifically about programmatic interventions.[20]
Abbreviation: LAI = long-acting injectable.

You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

The utility of the DMS for assessing adherence, generating adherence alerts, and suggesting the need for interventions to improve adherence was strongly supported in the survey. The experts endorsed most of the potential benefits of the system that they were asked to rate. The majority considered the DMS to be a means to foster an open dialogue about adherence problems that may have a positive influence on the relationship between the patient and the physician. Because therapeutic alliance is associated with a patient's attitude toward medication,[30–32] an improved patient-physician relationship may result in improved medication adherence.

Assessing potential challenges of the system was somewhat difficult, as suggested by a lack of consensus on a majority of the rated factors. None of the challenges was rated as a first-line barrier. The experts had no experience with the DMS at the time of the survey, and it is also possible that additional or unanticipated barriers might arise once the technology becomes available in clinical practice. Future research could address potential issues related to provider liability, as well as the feasibility of integrating the DMS into clinical practice. The experts recognized that patient ability to use technology is important for effective use of the DMS. Moreover, as previously mentioned, certain patient and provider characteristics are likely to facilitate successful use of digital health tools in clinical practice. Indeed, a separate expert consensus survey has been conducted to assess patient and provider characteristics and features of the technology that would facilitate use of digital health tools.

Effective detection of nonadherence is a key first step in identifying underlying reasons and designing effective interventions.[33] Experts consistently recommended individualized interventions based on the underlying reason for nonadherence, for instance, behavioral interventions or environmental supports to establish medication routine, or the use of long-acting injectable antipsychotics, for patients with cognitive deficits or lacking a daily routine.[17] Varied approaches support the notion that there is not a universal intervention for adherence problems. In the present survey, the experts reached a high level of consensus on various first-line strategies for interventions, with the exception of interventions for patients with substance abuse problems.

CONCLUSIONS

Medication adherence was rated as the most important possible underlying cause of suboptimal treatment outcome but considered the least likely to be assessed accurately with current methods. Furthermore, the methods that are most frequently used to assess adherence were rated as being the least accurate. These results suggest an urgent need for more accurate and reliable adherence assessments in routine clinical practice. The experts recognized the potential utility of the DMS in managing medication adherence problems, identified clinical situations particularly appropriate for use of the DMS, and assessed potential benefits and challenges that may be encountered with the intended users of this technology. Detection of adherence problems with the DMS is a first step toward identifying the reasons for these problems. The results of this survey provide expert opinion on the most appropriate interventions to address adherence problems and a guide for clinicians on how to optimize the safe and effective use of the DMS when it becomes available.

Submitted: September 28, 2016; accepted March 8, 2017.

Online first: May 23, 2017.

Potential conflicts of interest: **Drs Carpenter**, **Docherty**, and **Hatch** are employees of ODH, Inc, and were employees of Otsuka America Pharmaceutical, Inc, and Otsuka Pharmaceutical Development & Commercialization, Inc, at the time of the survey development, execution, and interpretation. **Ms Ross** serves as a consultant for Otsuka and was reimbursed for work on the survey and data analysis. **Dr Weiden** has received research support and/or consulting honoraria from Allergen (Actavis), Alkermes, Boehringer-Ingelheim, Delpor, Forum, Johnson & Johnson (Janssen Pharmaceuticals), Lundbeck, Neurocrine, Novartis, Otsuka, Reckitt Benckiser Pharmaceuticals, Sunovion, Takeda, Teva, and Vanda and holds stock in Delpor.

Funding/support: Supported by Otsuka Pharmaceutical Development & Commercialization, Inc.

Role of the sponsor: Otsuka America Pharmaceutical, Inc, and Otsuka Pharmaceutical Development & Commercialization, Inc, were responsible for the design and conduct of the study; data collection, management, and analysis; and interpretation of the data. Otsuka Pharmaceutical Development & Commercialization, Inc, also reviewed the manuscript.

Previous presentation: IPS: The Mental Health Services Conference; October 8–11, 2015; New York, NY.

Acknowledgments: Editorial support for development of this manuscript was provided by C4 MedSolutions, LLC (Yardley, PA), a CHC Group company, and was funded by ODH, Inc.

Supplementary material: See accompanying pages.

REFERENCES

1. Trivedi MH, Rush AJ, Wisniewski SR, et al; STAR*D Study Team. Evaluation of outcomes with citalopram for depression using measurement-based care in STAR*D: implications for clinical practice. *Am J Psychiatry*. 2006;163(1):28–40.
2. Altman S, Haeri S, Cohen LJ, et al. Predictors of relapse in bipolar disorder: a review. *J Psychiatr Pract*. 2006;12(5):269–282.
3. Caseiro O, Pérez-Iglesias R, Mata I, et al. Predicting relapse after a first episode of non-affective psychosis: a three-year follow-up study. *J Psychiatr Res*. 2012;46(8):1099–1105.
4. Morken G, Widen JH, Grawe RW. Non-adherence to antipsychotic medication, relapse and rehospitalisation in recent-onset schizophrenia. *BMC Psychiatry*. 2008;8:32.
5. Weiden PJ, Kozma C, Grogg A, et al. Partial compliance and risk of rehospitalization among California Medicaid patients with schizophrenia. *Psychiatr Serv*. 2004;55(8):886–891.
6. Sajatovic M, Valenstein M, Blow FC, et al. Treatment adherence with antipsychotic medications in bipolar disorder. *Bipolar Disord*. 2006;8(3):232–241.
7. Valenstein M, Blow FC, Copeland LA, et al. Poor antipsychotic adherence among patients with schizophrenia: medication and patient factors. *Schizophr Bull*. 2004;30(2):255–264.
8. Velligan DI, Wang M, Diamond P, et al. Relationships among subjective and objective measures of adherence to oral antipsychotic medications. *Psychiatr Serv*. 2007;58(9):1187–1192.
9. Velligan DI, Lam YW, Glahn DC, et al. Defining and assessing adherence to oral antipsychotics: a review of the literature. *Schizophr Bull*. 2006;32(4):724–742.
10. Sajatovic M, Velligan DI, Weiden PJ, et al. Measurement of psychiatric treatment adherence. *J Psychosom Res*. 2010;69(6):591–599.
11. Lynam I, Catley D, Goggin K, et al; MOTIV8. Autonomous regulation and locus of control as predictors of antiretroviral medication adherence. *J Health Psychol*. 2009;14(4):578–586.
12. Barclay TR, Hinkin CH, Castellon SA, et al. Age-associated predictors of medication adherence in HIV-positive adults: health beliefs, self-efficacy, and neurocognitive status. *Health Psychol*. 2007;26(1):40–49.
13. Simoni JM, Frick PA, Huang B. A longitudinal evaluation of a social support model of medication adherence among HIV-positive men and women on antiretroviral therapy. *Health Psychol*. 2006;25(1):74–81.
14. Hoffman JA, Cunningham JR, Suleh AJ, et al. Mobile direct observation treatment for tuberculosis patients: a technical feasibility

You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website.

pilot using mobile phones in Nairobi, Kenya. *Am J Prev Med*. 2010;39(1):78–80.
15. Kahn DA, Docherty JP, Carpenter D, et al. Consensus methods in practice guideline development: a review and description of a new method. *Psychopharmacol Bull*. 1997;33(4):631–639.
16. Kahn DA; The Expert Consensus Panel for Bipolar Disorder. Treatment of bipolar disorder. *J Clin Psychiatry*. 1996;57(suppl 12A):3–88.
17. Velligan DI, Weiden PJ, Sajatovic M, et al; Expert Consensus Panel on Adherence Problems in Serious and Persistent Mental Illness. The expert consensus guideline series: adherence problems in patients with serious and persistent mental illness. *J Clin Psychiatry*. 2009;70(suppl 4):1–46, quiz 47–48.
18. Brook RH, Chassin MR, Fink A, et al. A method for the detailed assessment of the appropriateness of medical technologies. *Int J Technol Assess Health Care*. 1986;2(1):53–63.
19. Velligan D, Weiden PJ. Interventions to improve adherence to antipsychotic medications. *Psychiatr Times*. 2006;23(9):1–6.
20. McEvoy JP. The expert consensus guidelines series: treatment of schizophrenia. *J Clin Psychiatry*. 1999;60(suppl 11):1–80.
21. Rohatagi S, Profit D, Hatch A, et al. Optimization of a digital health feedback system in psychiatry. *J Clin Psychiatry*. 2016;77(9):e1101–e1107.
22. Peters-Strickland T, Pestreich L, Hatch A, et al. Usability of a novel digital medicine system in adults with schizophrenia treated with sensor-embedded tablets of aripiprazole. *Neuropsychiatr Dis Treat*. 2016;12:2587–2594.
23. Lieberman JA, Stroup TS, McEvoy JP, et al; Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE) Investigators. Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. *N Engl J Med*. 2005;353(12):1209–1223.
24. Perlis RH, Ostacher MJ, Patel JK, et al. Predictors of recurrence in bipolar disorder: primary outcomes from the Systematic Treatment Enhancement Program for Bipolar Disorder (STEP-BD). *Am J Psychiatry*. 2006;163(2):217–224.
25. Rush AJ, Trivedi MH, Wisniewski SR, et al. Acute and longer-term outcomes in depressed outpatients requiring one or several treatment steps: a STAR*D report. *Am J Psychiatry*. 2006;163(11):1905–1917.
26. Ascher-Svanum H, Zhu B, Faries D, et al. A prospective study of risk factors for nonadherence with antipsychotic medication in the treatment of schizophrenia. *J Clin Psychiatry*. 2006;67(7):1114–1123.
27. Berger A, Edelsberg J, Sanders KN, et al. Medication adherence and utilization in patients with schizophrenia or bipolar disorder receiving aripiprazole, quetiapine, or ziprasidone at hospital discharge: a retrospective cohort study. *BMC Psychiatry*. 2012;12:99.
28. Karow A, Czekalla J, Dittmann RW, et al. Association of subjective well-being, symptoms, and side effects with compliance after 12 months of treatment in schizophrenia. *J Clin Psychiatry*. 2007;68(1):75–80.
29. Novick D, Haro JM, Suarez D, et al. Predictors and clinical consequences of non-adherence with antipsychotic medication in the outpatient treatment of schizophrenia. *Psychiatry Res*. 2010;176(2–3):109–113.
30. McCabe R, Bullenkamp J, Hansson L, et al. The therapeutic relationship and adherence to antipsychotic medication in schizophrenia. *PLoS One*. 2012;7(4):e36080.
31. Baloush-Kleinman V, Levine SZ, Roe D, et al. Adherence to antipsychotic drug treatment in early-episode schizophrenia: a six-month naturalistic follow-up study. *Schizophr Res*. 2011;130(1–3):176–181.
32. Day JC, Bentall RP, Roberts C, et al. Attitudes toward antipsychotic medication: the impact of clinical variables and relationships with health professionals. *Arch Gen Psychiatry*. 2005;62(7):717–724.
33. Lacro JP, Dunn LB, Dolder CR, et al. Prevalence of and risk factors for medication nonadherence in patients with schizophrenia: a comprehensive review of recent literature. *J Clin Psychiatry*. 2002;63(10):892–909.

Supplementary material follows this article.

You are prohibited from making this PDF publicly available.

For reprints or permissions, contact permissions@psychiatrist.com. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

THE JOURNAL OF CLINICAL PSYCHIATRY
THE OFFICIAL JOURNAL OF THE AMERICAN SOCIETY OF CLINICAL PSYCHOPHARMACOLOGY

Supplementary Material

Article Title: Expert Survey on Medication Adherence in Psychiatric Patients and Use of a Digital Medicine System

Author(s): Ainslie Hatch, PhD; John P. Docherty, MD; Daniel Carpenter, PhD; Ruth Ross, MA; and Peter J. Weiden, MD

DOI Number: 10.4088/JCP.16m11252

List of Supplementary Material for the article

1. **eAppendix 1** Survey on the Use of a Digital Medication Platform in Patients With Serious and Persistent Mental Illness

Disclaimer

This Supplementary Material has been provided by the author(s) as an enhancement to the published article. It has been approved by peer review; however, it has undergone neither editing nor formatting by in-house editorial staff. The material is presented in the manner supplied by the author.

© Copyright 2017 Physicians Postgraduate Press, Inc.

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Survey on the Use of a Digital Medication Platform in Patients with Serious and Persistent Mental Illness

Last name

First name

Degree(s)

Title and organization

Professional address

Address for correspondence and payment

Social security number/Tax ID

Telephone

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Please tell us a few more things about yourself:

1. Gender

◯ Male ◯ Female

Age ☐

Years in practice ☐

Years in research ☐

2. Clinical time—please check portion of your professional time you spend seeing patients in any setting:

◯ 100% clinical ◯ majority ◯ about half ◯ about 25% ◯ < 10%

3. Practice setting—please check all that apply as settings where you see a significant number of patients:

☐ Private solo practice
☐ Private group practice
☐ Public sector
☐ Academic special clinical or research setting
☐ Academic general clinical setting
☐ Academic general research setting
☐ Private sector research
☐ Other

If "other" please specify

☐

4. What percent (full time = 100%) of time do you spend treating or supervising the treatment of patients with:

Schizophrenia ☐

Major depressive disorder ☐

Bipolar disorder ☐

5. Have you participated in a research project involving schizophrenia, major depressive disorder, or bipolar disorder during the past 5 years?

◯ Yes ◯ No

6. Have you participated in a research project using Ecological Momentary Assessment (EMA) techniques?

◯ Yes ◯ No

(Note: EMA involves the use of techniques that permit repeated sampling of patients' symptoms, behavior, and experience in real time as they are experienced in the patient's normal environment. Technologies used may range from written diaries or telephone monitoring to electronic diaries and various types of physiological sensors and monitors.)

7. Have you ever held a federal (NIMH or NIH) research grant as principal investigator (PI)?

◯ Yes ◯ No

8. Have you ever been PI for an industry-sponsored grant?

◯ Yes ◯ No

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

OVERVIEW OF THE PROJECT

Research has shown that a crucial component in preventing relapse and rehospitalization in patients with serious and persistent mental illness is ensuring that patients continue to take their medication as prescribed.(1,2) Yet epidemiological studies have found that non-adherence is a frequent and serious problem in this population.(3,4) However, up to now, clinicians have lacked effective methods to accurately assess non-adherence.(5,6)

A new medication delivery system in development involves an atypical antipsychotic agent with an embedded chip that signals when the medication is taken and a sensor that receives and amplifies that signal for transmission. This digital medication platform will give clinicians access to real-time empirical data concerning whether their patients are actually taking their oral antipsychotic medication. The sensor also concomitantly measures a number of physiological parameters including activity and heart rate. The digital medication platform also allows for the incorporation of a variety of psychosocial support and therapeutic applications.

This survey focuses on how clinicians might best use the information about adherence that this new system could provide. In the survey, we refer to this system as the ***digital medication platform*** and respondents should assume that this medication platform has the characteristics described above. The survey asks questions about the following:

- how to evaluate a patient with a suboptimal outcome to treatment,
- relative importance of assessing adherence in a range of clinical situations,
- how accurately you think clinicians are able to assess adherence in current real-world clinical settings,
- how you envision that this new digital medication platform could best be used in clinical practice, and
- how and when to intervene given objective data on non-adherence supplied by the digital medication platform.

Your answers to this survey will be used to develop a guide for clinicians on how to optimize the safe and appropriate use of this new digital medication platform when it becomes available. Many questions in the survey ask separately about schizophrenia, bipolar disorder and major depression. In responding to questions in this survey, assume the antipsychotic medication is being used appropriately for the patient (i.e., as a primary or adjunctive treatment depending on diagnosis and clinical situation).

References

1. Weiden PJ, Kozma C, Grogg A, et al. Partial compliance and risk of rehospitalization among California Medicaid patients with schizophrenia. Psychiatr Serv 2004;55:886–891
2. Altman S, Haeri S, Cohen LJ, et al. Predictors of relapse in bipolar disorder: A review. J Psychiatr Pract 2006;12:269–282
3. Valenstein M, Blow FC, Copeland LA, et al. Poor antipsychotic adherence among patients with schizophrenia: medication and patient factors. Schizophr Bull 2004;30:255–264
4. Sajatovic M, Valenstein M, Blow FC, et al. Treatment adherence with antipsychotic medications in bipolar disorder. Bipolar Disord 2006;8:232–241
5. Velligan DI, Lam YW, Glahn DC, et al. Defining and assessing adherence to oral antipsychotics: a review of the literature. Schizophr Bull 2006;32:724–742
6. Velligan DI, Wang M, Diamond P, et al. Relationships among subjective and objective measures of adherence to oral antipsychotic medications. Psychiatr Serv 2007;58:1187–1192

Chair: Peter J. Weiden, MD

Instructions for Completing the Survey

Please download the pdf file containing the survey and save it on your computer. Be sure to record your name at the beginning of the file. After you have completed the questions, please click the **SUBMIT** button at the end. This will send your responses to our database for analysis. The survey is divided into three sections.

I. Why and when is it important to assess adherence? What problems exist with current methods for assessing adherence? (Questions 1-9)

II. Potential uses for the digital medication platform (Questions 10-22)

III. Strategies for targeting different causes of adherence problems (Question 23)

If you have questions about completing the survey, please contact Monika Vance (mvance@santium.com).

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Section I.

A. Why and When Is It Important to Assess Adherence?
B. What Problems Exist with Current Methods for Assessing Adherence?

Questions 1-3: Evaluating Patients with Suboptimal Treatment Outcomes
In the following questions we ask about three types of suboptimal outcomes:
Persistent residual symptoms: patient has responded to treatment but continues to experience some significant symptoms
Fluctuation of symptoms: patient's level of symptoms changes frequently
Acute exacerbation of symptoms: recent acute worsening of symptoms

In responding to questions 1-3, please use the following consensus evaluation scale:
9: extremely important
7–8: very important
4–6: sometimes important
2–3: not generally important
1: not important at all

1. Persistent residual symptoms

Thinking back over a broad range of experiences, how important do you consider it to evaluate the following as possible underlying causes of persistent residual symptoms in a patient with schizophrenia, bipolar disorder, or major depressive disorder? *(Rating scale from 1 = not important at all to 9 = extremely important)*

	1	2	3	4	5	6	7	8	9
Accuracy of the diagnosis	○	○	○	○	○	○	○	○	○
Active substance abuse	○	○	○	○	○	○	○	○	○
Adherence to treatment	○	○	○	○	○	○	○	○	○
Comorbid medical conditions	○	○	○	○	○	○	○	○	○
Drug-drug interactions	○	○	○	○	○	○	○	○	○
Inadequate efficacy of the current medication regimen	○	○	○	○	○	○	○	○	○
Psychosocial stress/life changes	○	○	○	○	○	○	○	○	○
Side effects	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

2. Fluctuation of symptoms

Thinking back over a broad range of experiences, how important do you consider it to evaluate the following as possible underlying causes of fluctuating symptoms in a patient with schizophrenia, bipolar disorder, or major depressive disorder? *(Rating scale from 1 = not important at all to 9 = extremely important)*

	1	2	3	4	5	6	7	8	9
Accuracy of the diagnosis	○	○	○	○	○	○	○	○	○
Active substance abuse	○	○	○	○	○	○	○	○	○
Adherence to treatment	○	○	○	○	○	○	○	○	○
Comorbid medical conditions	○	○	○	○	○	○	○	○	○
Drug-drug interactions	○	○	○	○	○	○	○	○	○
Inadequate efficacy of the current medication regimen	○	○	○	○	○	○	○	○	○
Psychosocial stress/life changes	○	○	○	○	○	○	○	○	○
Side effects	○	○	○	○	○	○	○	○	○

3. Acute exacerbation of symptoms

Thinking back over a broad range of experiences, how important do you consider it to evaluate the following as possible underlying causes of an acute exacerbation of symptoms in a patient with schizophrenia, bipolar disorder, or major depressive disorder? *(Rating scale from 1 = not important at all to 9 = extremely important)*

	1	2	3	4	5	6	7	8	9
Accuracy of the diagnosis	○	○	○	○	○	○	○	○	○
Active substance abuse	○	○	○	○	○	○	○	○	○
Adherence to treatment	○	○	○	○	○	○	○	○	○
Comorbid medical conditions	○	○	○	○	○	○	○	○	○
Drug-drug interactions	○	○	○	○	○	○	○	○	○
Inadequate efficacy of the current medication regimen	○	○	○	○	○	○	○	○	○
Psychosocial stress/life changes	○	○	○	○	○	○	○	○	○
Side effects	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

For question 4, please use the following consensus evaluation scale:
9: extremely accurate
7–8: very accurate
4–6: sometimes accurate
2–3: not generally accurate
1: not accurate at all

4. ***Accuracy of assessments:*** In the situations above, you rated the importance of various factors as underlying causes of sub-optimal outcome. Now consider a clinician in current routine practice gathering information about each of these underlying causes to make an informed decision about what to do next to improve the outcome. For each of the possible underlying causes listed below, how accurate is the information generally obtained in current routine clinical practice?

	1	2	3	4	5	6	7	8	9
Accuracy of the diagnosis	○	○	○	○	○	○	○	○	○
Active substance abuse	○	○	○	○	○	○	○	○	○
Adherence to treatment	○	○	○	○	○	○	○	○	○
Comorbid medical conditions	○	○	○	○	○	○	○	○	○
Drug-drug interactions	○	○	○	○	○	○	○	○	○
Inadequate efficacy of the current medication regimen	○	○	○	○	○	○	○	○	○
Psychosocial stress/life changes	○	○	○	○	○	○	○	○	○
Side effects	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Questions 5-7. Clinical Situations That Trigger Concern about Adherence Problems

Non-adherence or intermittent adherence to antipsychotic treatment as monotherapy or adjunctive therapy may be an underlying cause of unresolved symptoms, relapse, and unnecessary side effects. We would like to ask you about specific situations in which adherence and adherence assessment may be more or less important. Please use the score of “5” as a reference point for situations in which you feel the “average” or “routine” level of assessment is appropriate. Use increasing scores up to 9 to indicate clinical situations in which assessing for nonadherence is increasingly important. Use decreasing scores down to 1 to indicate clinical situations in which you feel that adherence assessment is not as important to perform. For example, a “9” indicates that you think that adherence assessment would be extremely important while a “1” indicates that, given the clinical information available, there is no need to assess for adherence.

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

5. Please rate the relative importance of assessing for non-adherence in a patient with ***schizophrenia*** in each of the following situations. *(Rating scale from 1 = not at all important to assess for non-adherence to 9 = extremely important to assess for non-adherence)*

	1	2	3	4	5	6	7	8	9
Patient recently diagnosed with a first episode of schizophrenia discharged from the hospital in the past 2 weeks on a maintenance course of antipsychotic medication	○	○	○	○	○	○	○	○	○
Patient well known to you who is reluctant to discontinue medication because of fear of relapse but continues to exhibit symptom fluctuation	○	○	○	○	○	○	○	○	○
Patient with a history of multiple episodes of schizophrenia, recently discharged from the hospital, who comes to your clinic for the first time and for whom a good treatment history is not available	○	○	○	○	○	○	○	○	○
Patient in the transitional period after discharge from the hospital	○	○	○	○	○	○	○	○	○
Stable patient with a history of good adherence	○	○	○	○	○	○	○	○	○
A patient whose medication was until recently supervised by a family member but who has recently moved out of his or her parents' home and is now living independently	○	○	○	○	○	○	○	○	○
Patient exhibiting unexpected change in side effects (new or worsening side effects or unexpected absence of side effects that were previously present)	○	○	○	○	○	○	○	○	○
Patient with history of serious substance abuse problems	○	○	○	○	○	○	○	○	○
Patient with history of recurrent adherence problems	○	○	○	○	○	○	○	○	○
Previously stable patient who has begun to have increasing symptoms	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

6. Please rate the relative importance of assessing for non-adherence in a patient with ***bipolar disorder*** in each of the following situations. *(Rating scale from 1 = not at all important to assess for non-adherence to 9 = extremely important to assess for non-adherence)*

	1	2	3	4	5	6	7	8	9
Patient recently diagnosed with bipolar disorder after being hospitalized for a first manic episode, who was discharged from the hospital in the past 2 weeks on a course of antipsychotic medication	○	○	○	○	○	○	○	○	○
Patient well known to you who is reluctant to discontinue medication because of fear of relapse but continues to exhibit symptom fluctuation	○	○	○	○	○	○	○	○	○
Patient with history of multiple manic episodes recently discharged from the hospital after a manic episode that developed after 1 month off medications	○	○	○	○	○	○	○	○	○
Patient in the transitional period after discharge from the hospital	○	○	○	○	○	○	○	○	○
Stable patient with a history of good adherence	○	○	○	○	○	○	○	○	○
Patient whose medication was until recently supervised by a family member but who has recently moved out of his or her parents' home and is now living independently	○	○	○	○	○	○	○	○	○
Patient exhibiting unexpected change in side effects (new or worsening side effects or unexpected absence of side effects that were previously present)	○	○	○	○	○	○	○	○	○
Patient with history of serious substance abuse problems	○	○	○	○	○	○	○	○	○
Patient with history of recurrent adherence problems	○	○	○	○	○	○	○	○	○
Previously stable patient who has suddenly developed a recurrence of manic symptoms	○	○	○	○	○	○	○	○	○
Previously stable patient who has developed increasing depressive symptoms	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

7. Please rate the relative importance of assessing for non-adherence in a patient with ***major depressive disorder*** in each of the following situations. *(Rating scale from 1 = not at all important to assess for non-adherence to 9 = extremely important to assess for non-adherence)*

	1	2	3	4	5	6	7	8	9
Patient recently diagnosed with major depressive disorder after being hospitalized for a very severe depressive episode; discharged from the hospital in the past 2 weeks on a maintenance course of antidepressant and antipsychotic medications	○	○	○	○	○	○	○	○	○
Patient well known to you who is reluctant to discontinue medication because of fear of relapse but continues to exhibit symptom fluctuation	○	○	○	○	○	○	○	○	○
Patient with a history of recurrent depressive episodes that have often been associated with attempts to self-discontinue medications	○	○	○	○	○	○	○	○	○
Patient in the transitional period after discharge from the hospital	○	○	○	○	○	○	○	○	○
Stable patient with a history of good adherence	○	○	○	○	○	○	○	○	○
Teenage patient with history of severe recurrent depressions whose medication was until recently supervised by her mother but who has recently started college in another state and been referred to your clinic for follow-up care	○	○	○	○	○	○	○	○	○
Patient exhibiting unexpected change in side effects (new or worsening side effects or unexpected absence of side effects that were previously present)	○	○	○	○	○	○	○	○	○
Patient with history of serious substance abuse problems	○	○	○	○	○	○	○	○	○
Patient with history of recurrent adherence problems	○	○	○	○	○	○	○	○	○
Previously stable patient who has suddenly developed increasing depressive symptoms	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Questions 8 and 9. How Adherence is Currently Assessed

8. Frequency of use of sources of information on adherence. How frequently do you believe the following types of adherence assessment are used in routine clinical practice? Use a 9 to indicate methods used almost 100% of the time in routine "medication management" visits and a 1 to indicate methods that are almost never used and are not considered part of routine practice. Note that we are not asking here about the accuracy or helpfulness of these methods, just about whether they are routinely, occasionally, or rarely used. If you do not have enough experience to rate an item (e.g., adherence rating scales), leave that item blank.

	1	2	3	4	5	6	7	8	9
Ask the patient about recent adherence to medication (behavior)	○	○	○	○	○	○	○	○	○
Ask the patient about their attitude towards medication	○	○	○	○	○	○	○	○	○
Ask the patient about any problems taking medications (e.g., side effects, financial issues)	○	○	○	○	○	○	○	○	○
Use level of symptoms on mental status exam as a way to estimate adherence (equating response with adherence and lack of response with lack of adherence)	○	○	○	○	○	○	○	○	○
Call patient's family or caregiver to ask about adherence, if patient has given permission to contact them	○	○	○	○	○	○	○	○	○
Ask patients to bring in their medication for review and/or pill count	○	○	○	○	○	○	○	○	○
Obtain laboratory assessment (plasma levels of medications)	○	○	○	○	○	○	○	○	○
Review pharmacy records to see if patient picked up medication refills	○	○	○	○	○	○	○	○	○
Speak with other (nonprescribing) members of the patient's treatment team (e.g., case manager)	○	○	○	○	○	○	○	○	○
Technological tools such as smart pill containers that send adherence information via web to treatment team	○	○	○	○	○	○	○	○	○
Use a standardized adherence rating instrument (e.g., BARS, MARS*)	○	○	○	○	○	○	○	○	○

*Byerly MJ, Nakonezny PA, Rush AJ. The Brief Adherence Rating Scale (BARS) validated against electronic monitoring in assessing the antipsychotic medication adherence of outpatients with schizophrenia and schizoaffective disorder. Schizophr Res 2008;100:60–9; Thompson K, Kulkarni J, Sergejew AA. Reliability and validity of a new Medication Adherence Rating Scale (MARS) for the psychoses. Schizophr Res 2000;42:241–7

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

9. **Accuracy of currently available sources of information on adherence.** Now we would like you to rate the ***accuracy of the information*** that treating clinicians in current routine clinical practice can obtain from each of the following methods of assessing adherence. *Use a rating of 7–9 to indicate most accurate sources, 4–6 for sources that are sometimes accurate, and a 1–3 for sources that are not very accurate.* If you do not have enough experience to rate an item (e.g., adherence rating scales), leave that item blank.

	1	2	3	4	5	6	7	8	9
Ask the patient about recent adherence to medication (behavior)	○	○	○	○	○	○	○	○	○
Ask the patient about their attitude towards medication	○	○	○	○	○	○	○	○	○
Ask the patient about any problems they have been having or anticipate in the near future taking medications (e.g., side effects, financial problems)	○	○	○	○	○	○	○	○	○
Use level of symptoms on mental status exam as a way to estimate adherence (equating response with adherence and lack of response with lack of adherence)	○	○	○	○	○	○	○	○	○
Call patient's family or caregiver to ask about adherence, if patient has given permission to contact them	○	○	○	○	○	○	○	○	○
Ask patients to bring in their medication for review and/or pill count	○	○	○	○	○	○	○	○	○
Obtain laboratory assessment (plasma levels of medications)	○	○	○	○	○	○	○	○	○
Review pharmacy records to see if patient picked up medication refills	○	○	○	○	○	○	○	○	○
Speak with other (nonprescribing) members of the patient's treatment team (e.g., case manager)	○	○	○	○	○	○	○	○	○
Technological tools such as smart pill containers that send adherence information via web to treatment team	○	○	○	○	○	○	○	○	○
Use a standardized adherence rating instrument (e.g., BARS, MARS*)	○	○	○	○	○	○	○	○	○

*Byerly MJ, Nakonezny PA, Rush AJ. The Brief Adherence Rating Scale (BARS) validated against electronic monitoring in assessing the antipsychotic medication adherence of outpatients with schizophrenia and schizoaffective disorder. Schizophr Res 2008;100:60–9; Thompson K, Kulkarni J, Sergejew AA. Reliability and validity of a new Medication Adherence Rating Scale (MARS) for the psychoses. Schizophr Res 2000;42:241–7

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Section II. Potential Uses for the Digital Medication Platform

We anticipate that this digital medication platform may be a clinically useful tool for:

- **Adherence Assessment:** to provide critical information concerning actual adherence when a patient presents with clinical worsening, in crisis,or with persistent symptoms
- **Routine Monitoring:** to provide information to be used during regular visits with the patient to integrate adherence assessment and its management into routine clinical care
- **Monitoring Alerts:** to generate a “real time” alert for the clinician/treatment team after the patient crosses a predefined threshold of consecutive days of missed medication
- **Adherence Intervention:** to promote adherence in a patient with a pattern of intermittent adherence or premature discontinuations.

In this section of the survey, we will ask you to provide guidance concerning the potential uses of the digital medication platform in these different clinical situations. In answering questions 10-12, assume that

1. The patient has given permission for this form of treatment.
2. The antipsychotic medication being used is an appropriate choice for this patient.
3. Payment issues have been worked out.
4. Information is being relayed to you in a way that you find reasonably convenient and using whatever parameters you consider most useful for the particular situation.

For questions10-12, please use the followiing consensus evaluation scale.

9: extremely useful
7–8: very useful
4–6: sometimes useful
2–3: not generally useful
1: not useful at all

10. Based on the capability of the digital medication platform to provide real time objective information about adherence, please rate its potential usefulness in a patient with ***schizophrenia*** for the following purposes.
(Rating scale ranging from 1 = not useful at all to 9 = extremely useful)

	1	2	3	4	5	6	7	8	9
Adherence Assessment: when patient is in crisis or presents with clinical worsening or persistent symptoms	○	○	○	○	○	○	○	○	○
Routine Monitoring: as source of information to discuss with patient during routine visits	○	○	○	○	○	○	○	○	○
Monitoring Alerts: to generate “real time” alerts about non-adherence between routine visits	○	○	○	○	○	○	○	○	○
Adherence Intervention: to promote adherence in patients with a pattern of intermittent adherence	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

11. Based on the capability of the digital medication platform to provide real time objective information about adherence, please rate its potential usefulness in a patient with ***bipolar disorder*** for the following purposes. *(Rating scale ranging from 1 = not useful at all to 9 = extremely useful)*

	1	2	3	4	5	6	7	8	9
Adherence Assessment: when patient is in crisis or presents with clinical worsening or persistent symptoms	○	○	○	○	○	○	○	○	○
Routine Monitoring: as source of information to discuss with patient during routine visits	○	○	○	○	○	○	○	○	○
Monitoring Alerts: to generate “real time” alerts about non-adherence between routine visits	○	○	○	○	○	○	○	○	○
Adherence Intervention: to promote adherence in patients with a pattern of intermittent adherence	○	○	○	○	○	○	○	○	○

12. Based on the capability of the digital medication platform to provide real time objective information about adherence, please rate its potential usefulness in a patient with ***major depressive disorder*** for the following purposes. *(Rating scale ranging from 1 = not useful at all to 9 = extremely useful)*

	1	2	3	4	5	6	7	8	9
Adherence Assessment: when patient is in crisis or presents with clinical worsening or persistent symptoms	○	○	○	○	○	○	○	○	○
Routine Monitoring: as source of information to discuss with patient during routine visits	○	○	○	○	○	○	○	○	○
Monitoring Alerts: to generate “real time” alerts about non-adherence between routine visits	○	○	○	○	○	○	○	○	○
Adherence Intervention: to promote adherence in patients with a pattern of intermittent adherence	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

13. We are interested in the types of patients for whom you would be ***less likely*** to use this digital medication platform. Please rate the appropriateness of using this digital medication platform for each of the following types of patients *(Rating scale from 1 = less appropriate/would not recommend use of the digital medication platform for this type of patient to 9 = patient very appropriate for digital medication platform).*

	1	2	3	4	5	6	7	8	9
Patient who is homeless	○	○	○	○	○	○	○	○	○
Patient who is suicidal (thoughts and plan)	○	○	○	○	○	○	○	○	○
Patient who is unable to use simple technology (watch, cell phone)	○	○	○	○	○	○	○	○	○
Patient whose illness is characterized by persecutory delusions	○	○	○	○	○	○	○	○	○
Patient with a history of violent behavior	○	○	○	○	○	○	○	○	○
Patient with severe cognitive deficits	○	○	○	○	○	○	○	○	○
Patient with substance abuse	○	○	○	○	○	○	○	○	○
Patient whose disorganization would make it unlikely that he or she would keep track of devices, patches, etc.	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Questions 14-16. Using the Digital Medication Platform to Provide an Alert Between Visits

14. **Between-session adherence alerts.** How helpful do you believe an alert about non-adherence between treatment sessions provided by the digital medication platform would be for each of the following purposes? If you envision another clinical situation in which you would be likely to use such an alert, please write it in and rate it at the bottom. *(Rating scale from 1 = not at all helpful to 9 = extremely helpful)*

	1	2	3	4	5	6	7	8	9
To obtain “real time” information about why the medication has not been taken	○	○	○	○	○	○	○	○	○
To help disentangle inadequate response due to adherence problems from inadequate response due to poor efficacy	○	○	○	○	○	○	○	○	○
To be able to inform family, caregivers, case manager, and/or residential staff of change in adherence status (allowing for a reduction or increase in day-to-day supervisory burden)	○	○	○	○	○	○	○	○	○
As a tool to reduce adherence problems in a patient about to be discharged from the hospital to try to prevent readmission within 30 days	○	○	○	○	○	○	○	○	○
To be able to institute a “real time” psychosocial intervention with the goal of having the patient resume adherence before any symptomatic worsening occurs	○	○	○	○	○	○	○	○	○
To serve as a criterion for bringing the patient back in to the outpatient service for evaluation	○	○	○	○	○	○	○	○	○
To serve as a criterion for referring the patient to a crisis intervention team, emergency room, or other emergency services	○	○	○	○	○	○	○	○	○
Other situation (please describe below)	○	○	○	○	○	○	○	○	○

Other situation

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

15. **Timing of real-time notifications of non-adherence**
The goal of the digital medication platform is to be a clinically useful tool to alert clinicians to relevant behaviors that warrant attention either between scheduled visits or at the next scheduled visit. If the digital medication platform is being used to provide between-appointment alerts and the timing of alerts is set at intervals that are too sensitive (think about the annoying nature of car alarms when first introduced), this could be counterproductive. We recognize that the appropriate alert time would vary from patient to patient, but in the following question please provide your best estimate of the average time point at which you feel a between-appointment clinical alert about non-adherence would be valuable for a patient with each of these diagnoses.

On average, for a patient with each of the following disorders, after how many ***days of missed medications*** would you want to receive an alert from the system?

Schizophrenia	Bipolar Disorder	Major depression
☐	☐	☐

16. **Personalization of real-time notifications of non-adherence.** As you consider the practical use of the alert system described above, how helpful would it be to be able to customize alerts for individual patients *using a scale where 1 = not useful at all and 9 = extremely useful*?

	1	2	3	4	5	6	7	8	9
	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Questions 17-19. Responding to Alerts Concerning Nonadherence Between Appointments. In the following question, assume that you have calibrated the digital medication platform so that you or your treatment team are to be notified of a medication gap between appointments at a certain threshold for the specific patient. Please rate the appropriateness of each type of intervention in each of the following situations.

17. **Patient with Schizophrenia**

17a.You are treating a patient with ***schizophrenia*** who rapidly and consistently decompensates after not taking medication, placing the patient at immediate risk. Please rate the appropriateness of each of the following interventions should you receive a between-appointment alert about non-adherence. *(Rating scale ranging from 1 = extremely inappropriate to 9 = extremely appropriate)*

	1	2	3	4	5	6	7	8	9
Contact case manager	○	○	○	○	○	○	○	○	○
Contact family member/residential staff	○	○	○	○	○	○	○	○	○
Contact patient	○	○	○	○	○	○	○	○	○
Contact therapist (if one is involved in patient's care)	○	○	○	○	○	○	○	○	○
Make a note to discuss at next scheduled appointment	○	○	○	○	○	○	○	○	○
Refer to emergency room for evaluation for admission	○	○	○	○	○	○	○	○	○
Schedule appointment earlier than was originally scheduled	○	○	○	○	○	○	○	○	○
Schedule appointment immediately	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

17b. You are treating a patient with ***schizophrenia*** who is stable, reliably takes medications, and is at no immediate risk of harm to self or others. Please rate the appropriateness of each of the following interventions should you receive a between-appointment alert about non-adherence. *(Rating scale ranging from 1 = extremely inappropriate to 9 = extremely appropriate)*

	1	2	3	4	5	6	7	8	9
Contact case manager	○	○	○	○	○	○	○	○	○
Contact family member	○	○	○	○	○	○	○	○	○
Contact patient	○	○	○	○	○	○	○	○	○
Contact therapist (if one is involved in patient's care)	○	○	○	○	○	○	○	○	○
Make a note to discuss at next scheduled appointment	○	○	○	○	○	○	○	○	○
Refer to emergency room for evaluation for admission	○	○	○	○	○	○	○	○	○
Schedule appointment earlier than was originally scheduled	○	○	○	○	○	○	○	○	○
Schedule appointment immediately	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

18. **Patient with Bipolar Disorder**

18a. You are treating a patient with ***bipolar disorder*** who rapidly and consistently decompensates after not taking medication, placing the patient at immediate risk. Please rate the appropriateness of each of the following interventions should you receive a between-appointment alert about non-adherence. *(Rating scale ranging from 1 = extremely inappropriate to 9 = extremely appropriate)*

	1	2	3	4	5	6	7	8	9
Contact case manager	○	○	○	○	○	○	○	○	○
Contact family member/residential staff	○	○	○	○	○	○	○	○	○
Contact patient	○	○	○	○	○	○	○	○	○
Contact therapist (if one is involved in patient's care)	○	○	○	○	○	○	○	○	○
Make a note to discuss at next scheduled appointment	○	○	○	○	○	○	○	○	○
Refer to emergency room for evaluation for admission	○	○	○	○	○	○	○	○	○
Schedule appointment earlier than was originally scheduled	○	○	○	○	○	○	○	○	○
Schedule appointment immediately	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

18b. You are treating a patient with ***bipolar disorder*** who is stable, reliably takes medications, and is at no immediate risk of harm to self or others. Please rate the appropriateness of each of the following interventions should you receive a between-appointment alert about non-adherence. *(Rating scale ranging from 1 = extremely inappropriate to 9 = extremely appropriate)*

	1	2	3	4	5	6	7	8	9
Contact case manager	○	○	○	○	○	○	○	○	○
Contact family member	○	○	○	○	○	○	○	○	○
Contact patient	○	○	○	○	○	○	○	○	○
Contact therapist (if one is involved in patient's care)	○	○	○	○	○	○	○	○	○
Make a note to discuss at next scheduled appointment	○	○	○	○	○	○	○	○	○
Refer to emergency room for evaluation for admission	○	○	○	○	○	○	○	○	○
Schedule appointment earlier than was originally scheduled	○	○	○	○	○	○	○	○	○
Schedule appointment immediately	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

19. **Patient with Major Depressive Disorder**

19a. You are treating a patient with ***major depression*** who has a history of severe depressive relapse after stopping medication. Please rate the appropriateness of each of the following interventions should you receive a between-appointment alert about non-adherence. *(Rating scale ranging from 1 = extremely inappropriate to 9 = extremely appropriate)*

	1	2	3	4	5	6	7	8	9
Contact case manager	○	○	○	○	○	○	○	○	○
Contact family member	○	○	○	○	○	○	○	○	○
Contact patient	○	○	○	○	○	○	○	○	○
Contact therapist (if one is involved in patient's care)	○	○	○	○	○	○	○	○	○
Make a note to discuss at next scheduled appointment	○	○	○	○	○	○	○	○	○
Refer to emergency room for evaluation for admission	○	○	○	○	○	○	○	○	○
Schedule appointment earlier than was originally scheduled	○	○	○	○	○	○	○	○	○
Schedule appointment immediately	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

19b. You are treating a patient with ***major depression*** who is stable, reliably takes medications, and is at no immediate risk of harm to self or others. Please rate the appropriateness of each of the following interventions should you receive a between-appointment alert about non-adherence. *(Rating scale ranging from 1 = extremely inappropriate to 9 = extremely appropriate)*

	1	2	3	4	5	6	7	8	9
Contact case manager	○	○	○	○	○	○	○	○	○
Contact family member	○	○	○	○	○	○	○	○	○
Contact patient	○	○	○	○	○	○	○	○	○
Contact therapist (if one is involved in patient's care)	○	○	○	○	○	○	○	○	○
Make a note to discuss at next scheduled appointment	○	○	○	○	○	○	○	○	○
Refer to emergency room for evaluation for admission	○	○	○	○	○	○	○	○	○
Schedule appointment earlier than was originally scheduled	○	○	○	○	○	○	○	○	○
Schedule appointment immediately	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Question 20. Use of the Digital Medication Platform as An Adherence Assistance Tool
Please use the following evaluation scale:
9: extremely useful
7–8: very useful
4–6: sometimes useful
2–3: not generally useful
1: not useful at all

20. **Using the digital medication platform to target specific causes of nonadherence.** Please rate the potential usefulness of the digital medication platform as an **adherence assistance tool** for a patient with **schizophrenia, bipolar disorder, or major depression** whose non-adherence you strongly suspect is due to one of the following problems, based on interviews with the patient or significant others or other information. (We realize that more than one of the problems may actually be contributing to the adherence difficulties.) *(Rating scale ranging from 1 = not useful at all to 9 = extremely useful)*

	1	2	3	4	5	6	7	8	9
Partial efficacy of medication with persistent symptoms	○	○	○	○	○	○	○	○	○
Persistent medication side effects	○	○	○	○	○	○	○	○	○
Problems with the therapeutic alliance	○	○	○	○	○	○	○	○	○
Poor insight into the illness or the need for medication	○	○	○	○	○	○	○	○	○
Cognitive deficits that make it hard to take medication accurately	○	○	○	○	○	○	○	○	○
Substance use problems	○	○	○	○	○	○	○	○	○
Logistic problems (e.g., lack of transportation, poverty, difficulty paying for medications)	○	○	○	○	○	○	○	○	○
Transitional problems continuing medication after an impatient admission that could lead to readmission within 30 days	○	○	○	○	○	○	○	○	○
Stigma associated with the illness	○	○	○	○	○	○	○	○	○
Lack of daily routines that makes it difficult to take medication accurately	○	○	○	○	○	○	○	○	○
Social support problems (e.g., lack of support from family, family ambivalent about medication)	○	○	○	○	○	○	○	○	○
Patient's belief that the prescribed medication is not effective	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Questions 21 and 22. Potential Benefits and Complications of the Digital Medication Platform

21. Listed below are some **potential therapeutic benefits** that may be associated with use of a daily adherence tracking device for an oral antipsychotic. Please indicate how much you agree that these would be benefits.
(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)

	1	2	3	4	5	6	7	8	9
Fosters open dialogue about adherence issues	○	○	○	○	○	○	○	○	○
Allows for direct, real time discussion of barriers to adherence	○	○	○	○	○	○	○	○	○
Moves discussion of adherence away from “obedience” because clinician needs to explain rationale for monitoring by linking it to better outcome	○	○	○	○	○	○	○	○	○
Facilitates patient understanding of/ learning about barriers to adherence	○	○	○	○	○	○	○	○	○
Facilitates patient understanding of/ learning about relationship between medication discontinuation and symptom exacerbation	○	○	○	○	○	○	○	○	○
Increases clinician’s appreciation of day-to-day challenges for patients in ongoing medication adherence	○	○	○	○	○	○	○	○	○
Facilitates evaluation of persistent symptoms (especially by helping clinicians disentangle partial efficacy from nonadherence as potential causes)	○	○	○	○	○	○	○	○	○
Decreases stress on family members/ caretakers who otherwise would be trying to directly supervise medication	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

22. Listed below are some **potential barriers or complications** that may be associated with use of a daily adherence tracking device for an oral antipsychotic. Please indicate how much you agree that these might be complications. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Availability of too much information	○	○	○	○	○	○	○	○	○
Concern about potential for increased liability exposure due to not having effected or documented a clinical response to available adherence information	○	○	○	○	○	○	○	○	○
Concern about patient confidentiality and transmission of information	○	○	○	○	○	○	○	○	○
Depersonalization of patient care and potential damage to the therapeutic alliance	○	○	○	○	○	○	○	○	○
Device might be seen as “big brother” by clinician who resents having to use it	○	○	○	○	○	○	○	○	○
Difficulty having the medication approved (e.g., by insurance, formulary)	○	○	○	○	○	○	○	○	○
Giving adherence information to family/ caregivers may increase tension in relationship with patient.	○	○	○	○	○	○	○	○	○
Patient does not have access to the required technology	○	○	○	○	○	○	○	○	○
Patient unable to handle the required technology	○	○	○	○	○	○	○	○	○
Possible exacerbation of paranoid symptoms related to being monitored or controlled	○	○	○	○	○	○	○	○	○
Too time consuming and a hassle to use	○	○	○	○	○	○	○	○	○
Uncertainty about how to use the information the system provides	○	○	○	○	○	○	○	○	○
Uncertainty about how to discuss this medication delivery system with the patient	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Section III. Strategies for targeting different causes of adherence problems

23. A number of different interventions may be helpful in targeting different types of adherence problems. In this question we ask you to rate the appropriateness of different adherence interventions as a strategy for targeting the following problems that can contribute to non-adherence:

- Partial efficacy of medication with persistent symptoms
- Persistent medication side effects
- Problems with the therapeutic alliance
- Poor insight into the illness or the need for medication
- Cognitive deficits that make it hard to take medication accurately
- Substance use problems
- Logistic problems (e.g., lack of transportation, poverty, difficulty paying for medications)
- Stigma associated with the illness
- Lack of daily routines that makes it difficult to take medication accurately
- Social support problems (e.g., lack of support from family, family ambivalent about medication)
- Patient's belief that the prescribed medication is not effective

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23a. Please rate the appropriateness of each of the following interventions as a strategy for targeting ***adherence problems related to partial efficacy of medication with persistent symptoms.*** *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23b. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***persistent medication side effects***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23c. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***problems with the therapeutic alliance***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23d. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***poor insight into the illness or the need for medication***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23e. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***cognitive deficits that make it hard to take medication accurately***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23f. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***substance use problems.*** *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23g. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***logistic problems (e.g., lack of transportation, poverty, difficulty paying for medications).*** *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23h. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***stigma associated with the illness***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23i. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***lack of daily routines that makes it difficult to take medication accurately***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23j. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***social support problems (e.g., lack of support from family, family ambivalent about medication)***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

23k. Please rate the appropriateness of each of the following interventions as a strategy for targeting adherence problems related to ***a patient's belief that the prescribed medication is not effective***. *(Rating scale ranging from 1 = strongly disagree to 9 = strongly agree)*

	1	2	3	4	5	6	7	8	9
Adjust or change medication regimen to reduce distressing side effects	○	○	○	○	○	○	○	○	○
Behavioral interventions/environmental supports to establish medication routine (e.g., reminders, pill boxes, alarms)	○	○	○	○	○	○	○	○	○
Change medication regimen to improve efficacy for symptoms that may interfere with adherence	○	○	○	○	○	○	○	○	○
Family psychoeducation, using evidence-based family interventions	○	○	○	○	○	○	○	○	○
Increase level of medication supervision	○	○	○	○	○	○	○	○	○
Institute home visits	○	○	○	○	○	○	○	○	○
Involuntary outpatient commitment (if available and patient meets criteria)	○	○	○	○	○	○	○	○	○
More frequent/longer visits if possible	○	○	○	○	○	○	○	○	○
Patient-based psychoeducation (e.g., to help patient understand biologic basis of symptoms and role of maintenance antipsychotic medication for relapse prevention)	○	○	○	○	○	○	○	○	○
Psychotherapeutic interventions (e.g., to work through psychological resistance to being ill and having to take medication)	○	○	○	○	○	○	○	○	○
Refer for ACT/PACT services	○	○	○	○	○	○	○	○	○
Refer for medication financial assistance program (e.g., compassionate programs, reduced co-pays)	○	○	○	○	○	○	○	○	○
Refer for residential treatment services	○	○	○	○	○	○	○	○	○
Social work targeting logistic problems	○	○	○	○	○	○	○	○	○
Use a long-acting injectable antipsychotic instead of an oral antipsychotic	○	○	○	○	○	○	○	○	○

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.

Thank you for completing the survey. Please click the *SUBMIT* button below to send your responses to the database.

If you would like an email confirmation of receipt, please enter your email address below:

Submit

It is illegal to post this copyrighted PDF on any website. ♦ © 2017 Copyright Physicians Postgraduate Press, Inc.