CME ARTICLE

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CME Objectives
After completing this CME activity, participants should be able to:
- Discuss strategies for improving medication compliance in their patients.

Statement of Need and Purpose
Medication noncompliance may result in patient relapse, which adversely effects the patient's quality of life and is costly to society. Physicians responding to surveys in the Journal and its related CME activities have requested information on strategies for improving medication compliance in their patients. There are no prerequisites for participation in this CME activity.

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Date of Original Release/Review
This article was published in May 2001 and is eligible for CME credit through May 31, 2002. The latest review of this material was April 2001.

Faculty Disclosure
In the spirit of full disclosure and in compliance with all ACCME Essential Areas and Policies, the faculty for this CME activity were asked to complete a full disclosure statement. The information received is as follows:

Dr. Olfson has received research grant support from Lilly and Janssen.
Dr. Weiden is a consultant and a member of the speakers/advisory board for AstraZeneca, Janssen, Lilly, and Pfizer.
Dr. Grunebaum has no significant commercial relationships to disclose relative to the presentation.

Disclosure of Off-Label Usage
To the best of their knowledge, the faculty have determined that no investigational information about pharmaceutical agents has been presented in this article that is outside U.S. Food and Drug Administration–approved labeling.

Medication Supervision and Adherence of Persons With Psychotic Disorders in Residential Treatment Settings: A Pilot Study

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Background: Little is known about risk factors for and predictors of medication nonadherence within residential facilities. This pilot study examined the association between medication adherence and level of supervision and other environmental and clinical variables among patients with schizophrenia and related psychotic disorders living in supported housing.

Method: A convenience sample of 74 adult residents with schizophrenia and related psychotic disorders (DSM-IV criteria) living in 4 supported housing facilities in New York City were assessed by their treating psychiatrist for medication cessation during the previous month. Demographic characteristics, medications, supervision, global function as measured by the Global Assessment of Functioning (GAF), and substance abuse were also assessed. A priori hypotheses were that regimen complexity would be directly and medication supervision would be inversely related to medication nonadherence.

Results: In multivariate models, lack of direct medication supervision, negative medication attitude, and lower GAF score were associated with increased medication nonadherence in the recent past.

Conclusion: This pilot study suggests that direct supervision of medication is associated with better adherence in residential treatment settings. This finding is relevant for mental health service planners and clinicians working in these settings.

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Nonadherence with psychiatric medications is a major public health problem in the community treatment of persons with psychotic illnesses. Medication nonadherence rates among outpatients with schizophrenia are high, in the range of 40% to 50% within a year after hospital discharge.[1–4] Noncompliance accounts for a significant proportion of relapse and the "revolving door" phenomenon.[5,6] The costs of relapse are significant, both to individuals with serious mental illness and the communities in which they live.[7,8]

With the continued decline in the number of beds in state mental hospitals, more persons with psychotic illnesses are living in residential settings in the community. These living arrangements include supported housing, where on-site staff provide mentally ill residents with varying degrees of assistance and mental health services. A 1991 study estimated over 300,000 individuals with serious mental illness were living in community residences in the United States, with schizophrenia being the most common diagnosis.[9] In New York State, the number of community residence beds increased over 50-fold in 20 years, from 308 in 1978 to 4520 in 1986 to over 18,000 in 1998 (Cournos[10] and New York State Office of Mental Health, Community Care Systems Management, unpublished data, avaliable to the public). Given the continued growth of residential care for persons with severe mental illness, there is an urgent need to define resident and environmental characteristics that reduce the risk of medication nonadherence.

To investigate factors associated with psychopharmacologic nonadherence among persons with psychotic disorders living in supported housing, we systematically assessed a sample of such persons for medication adherence and a variety of clinical and facility-related characteristics. Prior to conducting the analyses, we hypothesized that medication nonadherence would be associated with more complex medication regimens, negative views of psychiatric medication, and lack of staff supervision of medication. This is the first survey, to our knowledge, to investigate specific risk factors for psychopharmacologic nonadherence among persons with schizophrenia and related psychotic disorders living in supported community housing.

METHOD

Subjects

The survey was a naturalistic, cross-sectional assessment of residents (N = 74) with schizophrenia and related psychotic disorders living in 4 supported housing facilities in New York City where one of the authors (M.F.G.) was a treating psychiatrist. For inclusion, residents had to have a DSM-IV[11] diagnosis of schizophrenia, schizoaffective disorder, psychotic disorder not otherwise specified (NOS), or delusional disorder; have lived in the facility for at least 1 month; and be prescribed an antipsychotic medication. Virtually all subjects were formerly homeless. Because the survey was part of a quality assurance project based on clinical data obtained by the treating psychiatrist, written informed consent was not obtained. Institutional review board approval was obtained for use of this data set for publication.

Sites

The 4 sites were supported, single-room occupancy–type housing facilities in New York City. Site 1 is a permanent residence (no time limit) for 283 persons (not all seriously mentally ill), site 2 is a permanent residence for 68 formerly homeless mentally ill persons, site 3 is a transitional residence (1-year limit) for 36 formerly homeless mentally ill persons, and site 4 is a permanent residence for 48 formerly homeless mentally ill women. Medication supervision is commonly provided at sites 2, 3, and 4, but rarely provided at site 1. Each site was staffed by masters- and bachelors-level case managers.

Measures

Residents were surveyed using a structured interview designed to assess medication adherence, degree of medication supervision, opinion about medication, regimen complexity, Global Assessment of Functioning (GAF)[11] score, and substance abuse. DSM-IV diagnosis was determined clinically by the interviewer (M.F.G.). The principal outcome variable and adherence measure was "cessation days," which was defined as the total number of days in the prior month on which a resident took no medication.

Medication supervision was rated on a 5-point Likert scale from independent medication management to direct supervision all the time. In the data analysis, medication supervision was dichotomized into any versus no supervision. Opinion of medication was assessed by asking whether in the resident's view good effects of the medication outweigh bad effects, good and bad effects are balanced, or bad effects outweigh good effects. The first 2 more favorable responses were combined in the analysis of this variable.

Each resident's medication regimen was reviewed. Regimen complexity was rated on a 5-point Likert scale from least complex (a single medication taken once a day) to highly complex (3 or more medications taken 2 or more times per day). In the data analysis, complexity was dichotomized into least/slightly (up to 1 drug twice daily or 2 drugs once daily) and moderately/very/highly complex regimens. The rater determined each subject's GAF score at the time of interview. In the data analysis, GAF score was dichotomized to a low functioning group ($GAF \leq 40$) and a higher functioning group ($GAF > 40$). Residents were also questioned about substance and alcohol use in the prior 6 months. Demographic variables were age, sex, race, and residential site.

All statistical analyses were performed with SPSS software (version 9.0; SPSS, Inc., Chicago, Ill.). Categorical variables were compared using the chi-square test. Continuous variables were compared using the t test and 1-way analysis of variance. A 2-tailed alpha level of 0.05 was chosen for all tests.

A multiple linear regression analysis was conducted to examine the association of nonadherence (total days of missed medication) with each of the variables found in the previous analyses to be at least marginally significant ($p \leq .15$). The strength of the association between each covariate and number of cessation days (β) and 95% confidence intervals (CIs) were calculated.

RESULTS

Resident Characteristics

Seventy-four residents with psychotic illnesses were surveyed between November 1997 and March 1999 (site 1, N = 17; site 2, N = 16; site 3, N = 28; site 4, N = 13)

Table 1. Demographic and Clinical Characteristics of Adults With Schizophrenia and Related Psychotic Disorders Living in Supported Housing Facilities in New York City[a]

Variable	Site 1 (N = 17)	Site 2 (N = 16)	Site 3 (N = 28)	Site 4 (N = 13)	χ^2/(F)[b]	df	p Value
Age, y, mean ± SD	55.4 ± 6.8	46.9 ± 9.6	41.7 ± 8.3	49.9 ± 10.2	(9.30); site 1 > 3	3,70	.000
Female	7 (41.2)	8 (50.0)	16 (57.1)	13 (100.0)	11.88; site 4 > 1,2,3	3	.008
White	5 (29.4)	13 (81.3)	9 (32.1)	6 (46.2)	11.89	6	.064
Schizophrenia diagnosis	12 (70.6)	10 (62.5)	21 (75.0)	9 (69.2)	2.02	6	.918
GAF score, mean ± SD	43.2 ± 9.5	42.5 ± 9.1	43.9 ± 7.7	42.9 ± 5.7	(0.11)	3,70	.955
Total days nonadherent, mean ± SD	3.2 ± 8.5	3.6 ± 9.1	0.4 ± 1.0	0.31 ± 1.1	(1.59)	3,70	.199
Supervised medication	4 (23.5)	9 (56.3)	28 (100.0)	12 (92.3)	35.04; sites 4,3 > 1,2	3	.000
New-generation type antipsychotic	9 (52.9)	6 (37.5)	18 (64.3)	5 (38.5)	5.29	3	.152
Medication attitude negative	2 (11.8)	3 (18.8)	1 (3.6)	1 (7.7)	2.77	3	.428
Regimen complexity moderate to high	6 (35.3)	7 (43.8)	11 (39.3)	7 (53.8)	1.17	3	.761
Drug or alcohol abuse	3 (17.6)	2 (12.5)	3 (10.7)	0 (0.0)	2.45	3	.485

[a]Abbreviation: GAF = Global Assessment of Functioning. All categorical variables reported as N (%); continuous variables reported as mean ± SD.
[b]Post hoc pairwise comparisons (Scheffe and chi-square).

(Table 1). There were no significant differences between the sites on any variable except for age, sex, and degree of medication supervision. Table 1 shows that site 4 was all female, site 1 residents were older than site 3 residents, and medication was more commonly supervised at sites 3 and 4 than at sites 1 and 2.

Across all sites, the mean ± SD age of the sample was 47.4 ± 9.9 years. The sample was 60% female (N = 44) and was 46% African American (N = 34), 45% white (N = 33), and 8% Hispanic (N = 6). The clinical diagnosis of 70% of the sample (N = 52) was schizophrenia, 23% (N = 17) had schizoaffective disorder, and 7% (N = 5) had psychotic disorder NOS.

All residents were prescribed antipsychotic medication, with 51% (N = 38) taking only new-generation antipsychotics, 38% (N = 28) taking only old-generation antipsychotics, 8% (N = 6) taking new- and old-generation antipsychotics simultaneously, and 5% (N = 4) taking depot antipsychotics. There were 30% (N = 22) taking an antiparkinsonian agent. A minority also received adjunctive agents, including anxiolytics (9.5%, N = 7), mood stabilizers (19%, N = 14) and antidepressants (16%, N = 12). Alcohol use in the prior 6 months was reported by 5% (N = 4) and illicit drug use by 7% (N = 5) of the sample.

Approximately two thirds of the residents (65%, N = 48) received medication supervision that included direct observation of medication taking. An additional 5% (N = 4) received supervision of medication dispensing only. There were also 7% (N = 5) who had medication supervision some of the time during the last month. Finally, one quarter of the residents (28%, N = 21) received no medication supervision during the last month.

Of the sample, 7 (9%) said psychiatric medication had more bad effects than good effects, 16 (22%) were indifferent, and 51 (69%) said their medication had more good effects than bad effects. Psychotropic regimen was least complex for 25 (34%), slightly complex for 18 (24%), moderately complex for 11 (15%), very complex for 1 (1%), and highly complex for 19 (26%) residents. GAF score was less than or equal to 40 (suggesting major impairment) for 39 (53%) and greater than 40 for 35 (47%), with a mean ± SD score of 43.3 ± 8.0.

All medications were missed on one or more days in the index month by 11 residents (15%). The maximum number of medication cessation days in the prior month was 30, with a mean ± SD of 1.7 ± 5.9 days.

Risk Factors for Medication Nonadherence

In bivariate tests, there were no significant associations between age, sex, race, diagnosis, or alcohol or drug abuse and total medication cessation days (Table 2). Marginally significant variables were GAF score (p = .153), medication supervision (p = .152), and regimen complexity (p = .063). Negative view of medication (p = .02) and prescription of a new-generation antipsychotic (p = .041) were significantly related to an increase in medication cessation days (see Table 2).

Regression Analysis

Multiple linear regression analysis was used to examine the association of medication cessation days with the variables found to be at least marginally significant on bivariate tests (Table 3). In the linear regression model, the dependent variable was total medication cessation days

Table 2. Total Days of Missed Medication by Residents in Relation to Demographic and Clinical Characteristics[a]

Variable	Days of Missed Medication Mean	SD	t	df	p Value
Age, y[b]					
30–47	0.9	3.9	–1.04	72	.302
48–73	2.4	7.3			
Sex					
Male	1.9	6.8	0.31	72	.756
Female	1.5	5.4			
Race					
White	1.9	6.5	0.19	72	.852
Other	1.6	5.6			
Diagnosis					
Schizophrenia	1.9	6.6	0.40	72	.689
Other	1.3	4.3			
GAF Score					
0–40	2.6	7.5	1.50	54.2	.153
≥ 41	0.7	3.4			
Alcohol abuse					
Yes	8.5	14.5	0.99	3.0	.394
No	1.3	5.1			
Drug abuse					
Yes	0.0	0.0	–0.66	72	.512
No	1.8	6.2			
Supervised medication					
Yes	0.8	3.3	–1.48	21.8	.152
No	4.0	9.7			
New-type antipsychotic					
Yes	3.1	8.2	2.12	37.0	.041
No	0.3	0.9			
Medication attitude					
Positive	0.2	0.9	–3.13	6.0	.020
Negative	15.7	13.1			
Medication complexity					
Lower	2.7	7.7	1.91	44.9	.063
Higher	0.4	1.2			

[a]Abbreviation: GAF = Global Assessment of Functioning.
[b]Above and below median.

Table 3. Multiple Linear Regression Analysis Summary for Clinical Variables Predicting Medication Cessation Days[a]

Variable	Expected Change in Days of Missed Medication (β)	95% Confidence Interval	p Value
Medication supervision (0 = no, 1 = yes)	–3.1	–5.9 to –0.3	.032
GAF score	–0.2	–0.3 to –0.1	.005
Medication attitude (1 = negative, 2 = positive)	–4.7	–6.3 to –3.1	.000
Residential site[b]	-9.4×10^{-2}	–1.3 to 1.2	.881
Antipsychotic type (1 = new generation, 2 = old generation)	–1.1	–3.4 to 1.3	.368
Regimen complexity (1 = least complex, 5 = highly complex)	–0.4	–1.1 to 0.4	.314

[a]$R^2 = 0.538$. Abbreviation: GAF = Global Assessment of Functioning.
[b]See Table 1 for characteristics of residential sites.

and the independent variables were medication supervision, GAF score, medication attitude, residential site, antipsychotic type, and regimen complexity. Site was included in the model given the difference in supervision practices among the study sites. In this analysis, a negative view of psychiatric medications (p = .000), a lower GAF score (p = .005), and lack of medication supervision (p = .032) were significantly associated with increased medication cessation days after controlling for type of antipsychotic (new vs. old generation), complexity of regimen, and site.

DISCUSSION

Nonadherence with psychiatric medications by persons with psychotic disorders living in supported residential facilities is a significant problem for both residents and communities. In this cohort, approximately 15% missed 1 or more days of medication during the previous month. The main finding of this survey is that medication supervision is inversely related to the duration of medication nonadherence. These data suggest that medication supervision is more important than medication type or regimen complexity in determining medication adherence within residential facilities.

Studies have shown that supervision of medication by family members or friends is associated with better adherence.[2,12–14] Yet, persons with psychotic disorders living in supported housing often are formerly homeless and without family or friends able or willing to supervise their treatment. The results of this pilot study suggest that residential facility staff can improve psychopharmacologic adherence by supervising medication administration.

It should be noted that although some sites supervised medication more than others, site did not emerge as a significant predictor of medication cessation days in the regression model. It is likely that there are other site-related factors, which this survey did not study, that affect treatment adherence. These factors may include staff-to-patient ratio, staff training, on-site psychosocial treatment resources, and residential community morale. Further research is needed to investigate such variables.

The association of nonadherence with lower GAF score (lower global function) is also consistent with prior investigations.[2,14–19] Though causality cannot be determined with a cross-sectional design, it was the first author's clinical impression that nonadherence contributed to lower GAF scores. The association of nonadherence with a negative attitude toward medications is not surprising, but further research is needed to identify determinants of medication attitudes.

A surprising finding was the lack of an association between nonadherence and substance abuse that has been observed in several other studies.[2,14,16,18] One study[17] of 96 subjects in the early course of schizophrenia also found no such association. It is possible that since residential facilities use sobriety as a criterion for admission, other factors may become more important for medication adherence in these settings. This sobriety requirement may also partially explain the low reported frequency of substance abuse in this sample.

The results of this survey must be considered in light of several limitations. Given the cross-sectional design, it is not possible to separate cause and effect. It is possible that lower levels of functioning, as indicated by GAF score, contribute to nonadherence rather than the reverse. Of note, a recent study found that lower GAF score at hospital discharge was a risk factor for loss of housing.[20] Medication nonadherence may also increase paranoia, thus leading to a more negative view of medication. It is difficult, however, to conceive of how nonadherence could increase the risk of a lack of medication supervision. In fact, residents who appear at risk of nonadherence are usually those selected by staff for medication supervision in facilities able to provide it. It is possible, however, that factors other than the monitoring of pills taken—such as increased supportive contact with staff when medications are taken—contribute to the positive effect of supervision on adherence. Other limitations include the reliability of resident self-report as a measure of adherence, the relatively small sample size, and the possibility of bias on the part of the rater, who was an author of this pilot study (M.F.G.). The survey sites were also all in New York City, thus the data may not be safely generalized to suburban or rural populations.

In summary, this cross-sectional survey suggests that a positive view of medication and supervision of medication administration are associated with better pharmacologic adherence in residential facilities for persons with schizophrenia and related psychotic disorders. The findings are consistent with previous studies in other treatment settings that demonstrate an association of better adherence with positive medication attitudes and family supervision.[2,12,13]

The key public health implication of this pilot study is that direct supervision in residential facilities may improve medication adherence. Put another way, the level of supervision from simply being in a psychiatric residence may not be as effective for maintaining treatment adherence as direct medication supervision within the residence.

Staffing facilities so that they can supervise medications will likely require added investment in order to hire nurses or train paraprofessionals. Also, a conflict may arise between "medicalizing" housing[21] and respecting residents' common wishes for noninstitutional homes in the community.[22] The additional resources may be cost-effective and ultimately more humane, however, if they prevent recurrent homelessness and hospitalization.

Prospective research is needed to more fully evaluate the effects of medication supervision on medication adherence in residential settings. Persons struggling with mental illnesses and the communities in which they live are both likely to benefit.

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1. A reasonable estimate of nonadherence with psychiatric medications among outpatients with schizophrenia within a year after hospital discharge is:
a. 5%
b. 10%
c. 80%
d. 50%

2. Since the 1970s, the number of persons with severe mental illness living in supported housing in the community has:
a. Dropped as medications have improved
b. Stayed level
c. Grown dramatically as a result of deinstitutionalization
d. Fluctuated with changes in managed care plans

3. For psychiatric patients living in community residential facilities in the United States:
a. The most common psychiatric diagnosis is dysthymic disorder.
b. There is a large body of research on predictors of psychotropic nonadherence.
c. Use of new-generation antipsychotics is virtually unknown.
d. Schizophrenia is the most common psychiatric diagnosis and a history of homelessness is common.

4. The results of this study suggest:
a. Direct supervision of psychiatric medication taking may outweigh the effects on nonadherence of specific medication type and overall regimen complexity.
b. There is no need to supervise medication administration in residential facilities.
c. The most important predictor of medication nonadherence is the facility where a person resides.
d. Medication nonadherence was not associated with GAF score.

5. In this study, multiple linear regression analysis showed that predictors of psychotropic nonadherence included:
a. Lower staff to resident ratio
b. Being a resident of one particular site
c. Recent history of substance abuse
d. Lack of medication supervision and lower global assessment of functioning (GAF) score

6. In this study, bivariate tests showed that a predictor of medication nonadherence was:
a. Younger age
b. Diagnosis of schizoaffective disorder
c. Negative view of psychiatric medication
d. Prescription of old-generation antipsychotics

7. Other studies have shown that:
a. Substance abuse has never been associated with medication nonadherence.
b. Medication nonadherence is usually associated with higher GAF score.
c. Medication supervision by a patient's friends and family members is associated with improved adherence.
d. Medication attitude does not tend to be associated with adherence.

8. Residential facilities for persons with severe mental illness:
a. Should be more "medicalized"
b. Are likely to become an insignificant setting for psychiatric treatment in the near future
c. Should have nothing to do with psychiatric treatment
d. May be able to improve medication adherence if given sufficient resources to be able to supervise medication administration

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Circle the one correct answer for each question.

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9. Please offer comments and/or suggested topics for future CME activities.

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10. How much time did you spend completing this CME activity?

    _____

11. Please rank the format for future activities in order of your preference (1 is most preferred):

    ___ Audiotape ___ CD-ROM ___ Telephone
    ___ Internet ___ E-Mail ___ Symposium
    ___ Journal ___ Supplement to Journal

12. Do you have convenient access to the Internet? ❑ Yes ❑ No

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