Attitudes Toward Antipsychotic Medication

The Impact of Clinical Variables and Relationships With Health Professionals

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Context: Nonadherence to antipsychotic medication is a major cause of psychotic relapse and is strongly influenced by attitudes toward treatment. Although patient variables such as insight and symptoms that contribute toward attitudes have been identified, the contributions of relationship and service factors have not been adequately studied.

Objective: To determine relations between clinical and service variables and attitudes toward medication in people with a diagnosis of schizophrenia and schizoaffective disorder.

Design: Consecutively admitted patients were approached to take part; 23 refused. Measures included symptoms, insight, drug adverse effects, self-reported adherence, attitudes toward treatment, perceived relationship with the prescriber, ward atmosphere, and admission experience. Data were analyzed by a proportional odds model and structural equation modeling to test predicted paths between experience of admission, relationship variables, attitudes toward treatment, and self-reported adherence to medication.

Setting: Twenty-eight inpatient wards at 8 hospitals in North Wales and the Northwest of England. Sites included hospitals with inner-city and rural catchment areas.

Patients: Two hundred twenty-eight patients meeting *DSM-IV* criteria for schizophrenia or schizoaffective disorder, assessed during acute admission.

Main Outcome Measures: Attitudes toward treatment and self-reported adherence to medication.

Results: The data fit a model in which attitudes toward treatment were predicted by insight, relationship with staff (especially the physician-prescriber), and the patient's admission experience (maximum likelihood $\chi^2_{49}=89.3$, $P<.001$). A poor relationship with the prescriber, experience of coercion during admission, and low insight predicted a negative attitude toward treatment.

Conclusions: The quality of relationships with clinicians during acute admission appears to be an important determinant of patients' attitudes toward treatment and adherence to medication. Enhancing such relationships may yield important clinical benefits.

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A DHERENCE TO PRESCRIBED antipsychotic medication by people with a diagnosis of schizophrenia has been identified as an important area of research for many years. This is with good reason, as nonadherence has been associated with increased rates of involuntary detention, longer hospital admissions, and slower recovery from psychotic symptoms[1] and has been described as the single most important cause of relapse and readmission to hospital.[2] Indeed, relapse rates have been shown to be up to 5 times higher in people who choose not to take medication compared with people who adhere to neuroleptic regimens,[3] resulting in significant costs to individuals, their families, and health service providers.

There are many problems in carrying out research in this area. Adherence to medication is difficult to define and measure, and it is not a dichotomous variable but a set of behaviors that is dynamic and varying even within individuals. The people who may be of most interest in a study of adherence, those who choose not to take medication, may also be those most likely to refuse to take part in a study or to drop out once recruited. Researchers have attempted to establish variables that predict adherence, but many of the studies concentrate on clinical and patient characteristics such as insight and medication adverse effects. Amador and Kronengold[4] suggested that lack of insight has 2 components: unawareness of illness and incorrect attributions about the causes of illness. This focus on clinical variables may

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reflect the medical framework that has informed the majority of research. Although there is often an a priori assumption that nonadherence is irrational, it is well established that up to one third of people with psychosis do not respond to antipsychotic medication,[5] and the adverse effects of antipsychotics are often severe and occasionally fatal.[6] It is also important to acknowledge that nonadherence is a common behavior; about 50% of people with any long-term medical condition choose not to take medication,[7] which is similar to the proportion of people with schizophrenia who act similarly.[8,9] Interestingly, research has shown similarities between the range of health beliefs held by people with schizophrenia and those of people with other long-term conditions such as asthma and diabetes.[10,11]

The adherence of health professionals to standard guidelines and evidence-based practice can be variable. Poor adherence may consist of giving prescriptions that are above the maximum recommended dose, polyprescribing, and the maintenance of patients on high doses of medication when they have failed to show any clinical response. Kissling[12] has suggested that inadequate prescribing is a cause of unnecessarily high relapse rates in patients with schizophrenia. Inappropriate prescribing may not meet patients' needs and this in turn may contribute to negative attitudes toward treatment and the service provider.

Notwithstanding the limitations of previous research, several factors have consistently been found to correlate with measures of adherence to medication. For example, lack of insight has been found to predict nonadherence.[13,14] However, analysis of this relationship has been confounded by the assumption that refusal of medication is always associated with denial of illness. Buchanan[15] found that the questions "Do you think you have been unwell during this admission?" and "Do you think you will become ill again?" did not discriminate between compliers and noncompliers, whereas the questions "Did drug treatment help?" and "Will you take treatment after discharge?" were significantly associated with compliance. This finding suggests that individual health beliefs and experiences of treatment may be more important determinants of adherence than patients' willingness to accept their psychiatric status.

The relationship between adverse effects and adherence to medication is even more complex. Many studies have focused on extrapyramidal adverse effects and have neglected hormonal, anticholinergic, cardiovascular, hematological, allergic, psychological, and other adverse effects such as weight gain that may have a major impact on the patient's quality of life. While some studies have shown a significant relationship between various adverse effects and adherence,[16-18] others have not.[19] These conflicting findings may result because adherence is a dynamic, rather than a dichotomous, behavior that is influenced by the complex interaction of many factors. For example, Adams and Howe[19] found that recognized benefits of medication had more influence on adherence than adverse effects. Other variables that have been associated with adherence include the therapeutic alliance, living alone, substance use, cognitive dysfunction, and negative symptoms.[9,20,21]

This study attempts to address some of the shortcomings of previous research by using a large sample size and by including a wide range of variables. We measured important clinical and personal attributes but also variables that reflect the social and clinical environment within which prescribing takes place. In 2 previous studies[22,23] the alliance between a clinician and the patient was found to predict adherence, and so we included this variable. However, we also measured perceived coercion during admission, and patients' experiences of ward staff attitudes. The social context and attitudes of professionals in shaping the experience of admission and long-term attitudes of patients toward psychiatric management have assumed greater salience in an era that seeks to develop effective "joined up" care between the hospital and the community.[24] In the United States, patients' experiences of coercion during admission have been found to affect their attitudes toward professionals and the length of their inpatient stay,[25] and a study in the United Kingdom[26] found that the feelings of coercion were associated with a more rejecting attitude toward psychiatric services. However, to our knowledge, no study to date has examined the relationship between experiences of coercion and adherence to antipsychotic medication.

The inclusion of a wider range of variables in attempting to predict attitudes toward treatment may aid the development of interventions to improve adherence and may also point to more appropriate ways of coordinating care for people who choose not to take medication.

METHOD

PARTICIPANTS

Patients 16 to 70 years of age who met the *DSM-IV* diagnosis of schizophrenia or schizoaffective disorder were systematically recruited from consecutive admissions to 28 inpatient wards at 8 hospital sites in the Northwest of England (Merseyside and Cheshire) and North Wales (Gwynedd and Clwyd) during a 3-year period. Recruitment from each ward was phased and took place during an approximately 1-year period. There were 23 refusals. Ethical approval and approval from individual clinicians were obtained at each hospital site before starting the study. Patients gave informed consent to participation in an ongoing randomized controlled trial of interventions designed to improve adherence to neuroleptic medication. The data presented herein were collected before the intervention.

PROCEDURE

The sample was not preselected by ward clinicians. All patients who met the diagnostic criteria were approached by a research assistant during an acute admission and asked to take part in the study. They were given written and verbal explanations of the study and, if they agreed, signed consent forms. The assessments, performed by trained research assistants (mental health nurses and psychology graduates), were carried out using semistructured interviews and self-completion questionnaires. These assessments were chosen on the basis of proven reliability and validity. Additional clinical information was obtained by consulting patient records. The time for an assessment varied from approximately 1 hour to 3 hours, and assessments were sometimes completed during an additional visit a few days later.

Psychotic Symptoms

Symptoms were measured using the Positive and Negative Syndrome Scale (PANSS), a 30-item validated rating instrument that is subdivided into positive symptoms, negative symptoms, and general psychopathology rated during the preceding 7 days.[27] The PANSS produces a normal distribution of scores, is internally consistent, and has demonstrated stability and reliability.[28] Before the study, the research assistants were trained to administer the PANSS and achieved adequate interrater reliability (at least 80% agreement for each subscale and at least 24 of 30 symptoms rated within 1 point).

Antipsychotic Side Effects

Antipsychotic adverse effects were assessed using the Liverpool University Neuroleptic Side Effect Rating Scale (LUNSERS), a means for schizophrenic patients to self-rate adverse effects that includes 41 known adverse effects of antipsychotic medication and 10 "red herring" items, rated during the past month. Previous studies have demonstrated its reliability and validity against a validated interview-based measure.[29] The scale has good internal consistency (Cronbach $\alpha = 0.89$), test-retest reliability ($r = 0.81$, $P < .001$), and concurrent validity with the clinician-administered UKU (Udvalg for Kliniske Undersøgelser) scale ($r = 0.83$, $P < .001$).

Attitudes Toward Medication

Attitudes toward neuroleptics were assessed using the Drug Attitude Inventory (DAI), the Van Putten dysphoria scale, and the Morisky Compliance Scale.

The DAI is a 30-item attitudinal scale on which respondents rate statements as true or false and that is scored from −30 to +30.[30] The DAI correlates with both clinician-rated adherence and biochemical measures of adherence.[31,32] In addition, the scale has good internal consistency (KR 20 [Kuder-Richardson Formula 20] = 0.93) and its test-retest reliability was $r = 0.82$, indicating good validity and reliability.

The Van Putten scale is a 4-item measure of subjective experience of antipsychotic medication and is scored from −44 to +44.[33] Although there are no formal data regarding the reliability and validity of this scale, its strengths are that it was developed from consumers' descriptions of the effects of neuroleptics and that a dysphoric response on this scale has been found to predict drug refusal and poor prognosis. It taps into subjective reactions to medication and correlates with DAI scores.

The Morisky Compliance Scale is a 4-item questionnaire asking patients whether they ever forget to take medication, whether they are careless about taking medication, and whether they ever stop taking medication when they feel better or experience adverse effects.[34] The scale has been shown to have good concurrent and predictive validity, with a Cronbach α of 0.61.

The DAI and Van Putten scales provide ratings of the participants' attitudes at the time of assessment; no time frame is specified in the Morisky scale, which is a potential limitation of the measure.

Medication Knowledge

Medication knowledge was assessed using a questionnaire developed by Day[35] from an earlier unpublished instrument designed by Malcolm Peet, MD, PhD, at the University of Sheffield, Sheffield, England. The scale consists of 2 sections: one to assess the respondent's knowledge of the name and dosage of his or her medication and the other to assess the respondent's more general knowledge of antipsychotic medication, including indication and adverse effects. The first section re-

quires the respondent to fill in the name, dose, and frequency of any medication being taken (answers are scored from 0 to 6 according to accuracy), and the second section comprises 6 multiple-choice questions assessing general knowledge of antipsychotics (the scale is negatively marked for incorrect answers; scores can range from −4 to +11).

Insight

Insight was measured using the Birchwood Insight Scale.[36] This is an 8-item scale that has been shown to have good reliability and validity in people who experience acute and chronic psychotic symptoms.

Item G12 on the PANSS, which yields a 7-point interviewer-rated measure of insight, was also used for the purpose of structural equation modeling.

Perceived Expressed Emotion of Staff Scale

To assess the contribution of ward factors to attitudes toward treatment, the Perceived Expressed Emotion of Staff Scale (PEESS) was used. This is a 20-item scale that is based on research showing associations between the expressed emotion of ward staff and patient outcomes.[37] It measures patients' perceptions of relationships with staff and is scored in 3 subscales that were derived by factor analysis: supportiveness, intrusiveness, and criticism. Forster et al[38] found that the scale had acceptable reliability and correlated significantly with both expressed emotion scored from 5-minute speech samples of key workers and patient ratings on the Ward Atmosphere Scale.[39]

Therapeutic Alliance

Patients rated their therapeutic relationship with their prescribing psychiatrists, particularly about medication issues, using the California Pharmacotherapy Alliance Scale, a 24-item Likert scale (Charles Marmar, MD, Louise Gaston, PhD, unpublished manual, 1988). There are no previously published reliability data for this scale; however, in the present study the scale achieved a Cronbach α coefficient of 0.87, indicating a high degree of internal consistency between the items.

Perceived Coercion Regarding Admission

Patient experience of the admission procedure was measured using the McArthur Admission Experience Survey, a 20-item scale consisting of the following 4 subscales: perceived coercion, negative pressures, voices scale (measuring whether or not the patient felt that their "voice" was heard during the admission process), and affective reactions to hospitalization. This quantitative scale was developed from earlier semistructured interview schedules in an attempt to improve measurement of coercion in the hospital admission process. The scale has been shown to have high internal consistency and validity.[40,41]

STATISTICAL METHODS

Structural equation models were used to examine the relationships between attitudes toward medication and the clinical variables and assessments measured at baseline. To apply structural equation modeling we first had to hypothesize relationships between the variables measured; we did this by examining previously published research. First, we hypothesized relationships between the patient's attitude toward drug treatment and adherence and between the patient's experience of adverse effects and adherence. From previous research we hypothesized that insight[13,14] and a positive relationship with the prescriber[22,23] would predict positive attitudes toward treatment. We

further hypothesized that insight and attitudes toward the prescriber would both be related to the patient's admission experience. However, we assumed that the relationships between admission experience, insight, and relationship with staff would all be bidirectional. For example, patients with low insight who do not think they are ill should be less likely to view their admission experience positively, but those who experience coercion and distress on admission to the hospital should be less likely to accept the psychiatrist's explanation that they have an illness (thus scoring lower on insight). Similarly, patients with an established positive relationship with a psychiatrist should have more positive admission experiences, but a positive admission experience should have a positive impact on the psychiatrist-patient relationship. Finally, patients with good insight should view psychiatric staff positively, but a positive relationship with psychiatric staff should foster good insight.

A major advantage of structural equation modeling is the inclusion of latent variables. This involves using more than one measure to map onto a theoretical variable, thus allowing measurement error to be accounted for to yield a more accurate estimation of the true value of the variable than would be possible using a single measure. For example, in our model we used 3 measures, the DAI, the Van Putten scale, and the Morisky scale, to estimate a latent variable for attitudes toward treatment. Theoretically, we can hypothesize a true measure of a person's attitudes toward treatment, but the scales we use to measure attitudes will all be affected by measurement error. The use of latent variables in this way should strengthen the models we test and thereby increase our confidence in the findings. In all the models we used latent variables for attitudes toward treatment (DAI, Morisky scale, and Van Putten scale), medication knowledge (general and specific), insight (Birchwood Insight Scale and item G12 from the PANSS), admission experience (affective reaction to hospitalization, negative pressures, perceived coercion, and voices scale subscale scores from the McArthur Admission Experience Survey). In models 1 and 2 we constructed a latent variable for staff attitudes (PEESS subscales and California Pharmacotherapeutic Alliance Scale [CALPAS]), and in model 1 we constructed a latent variable for symptoms (PANSS positive, negative, and general subscales).

Modeling was carried out using the AMOS 4.0 structural equation modeling software.[42] This permits models to be fitted to all available data rather than just to cases with complete data by using maximum-likelihood estimation. Models are constructed by identifying hypothesized pathways between different variables (latent varaiables or raw data where only 1 measure was available). Constructed models are then tested for fit against the data. Where data fit the model well the statistics will indicate minimum significant differences between hypothesized model data and the measured data. Model fit was assessed using the maximum-likelihood χ^2, the root-mean-square error of approximation (RMSEA), and by comparison of the pairwise correlation and covariance matrix with the estimates from the fitted model.

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RESULTS

SAMPLE

Two hundred twenty-eight patients agreed to take part in the study and 23 refused. The mean age of volunteers was 36.4 years (SD, 12.4 years; range, 16-67 years). There were 64 females and 164 males, 139 patients met the *DSM-IV* diagnostic criteria for schizophrenia, and 89 met the *DSM-IV* diagnostic criteria for schizoaffective disorder. The number of previous admissions ranged from 0

to 25, with a median of 3 previous admissions. At the time of data collection, 73 participants were prescribed atypical antipsychotic medication, 128 were prescribed conventional antipsychotics, and 27 were prescribed both conventional and atypical antipsychotics.

The mean scores for the variables measured with standard deviations) are provided in **Table 1**. The mean scores are similar to those found in other studies and provide a degree of confidence about the generalizability of the findings.

CORRELATIONS BETWEEN VARIABLES

Table 2 gives the pairwise covariance and correlation matrices for measured variables. Because of the large number of variables, only correlations between predictor variables and the main dependent variables that reach a criterion of $P<.001$ should be regarded as trustworthy. Inspection of the table reveals a strong correlation between 2 of the measures of attitudes toward medication: the DAI and the Van Putten scale, as expected. However, the Morisky Compliance Scale is poorly correlated with both of these measures. The correlation matrix also shows strong associations between both the DAI and the Van Putten scale and positive relationships with staff (assessed by the CALPAS) and poor insight (assessed by the Birchwood Insight Scale). Medication adverse effects (measured by the LUNSERS) were negligibly correlated with both the DAI and the Van Putten scale.

STRUCTURAL EQUATION MODEL

The structural equation model fitted to assess the hypothesized model is illustrated in **Figure 1**. A latent variable was estimated for attitudes toward treatment using scores on the DAI and the Van Putten and Morisky scales. Attitude was associated with insight, which was also indicated as a latent variable (estimated from the Birchwood Insight Scale score and insight item G12 of the PANSS); with relationships with staff, a latent variable estimated from the CALPAS and the PEESS subscales; and with symptoms, a latent variable modeled from the 3 PANSS subscales (excluding G12 in the case of general psychopathology). Insight and relationships with staff were associated with admission experience, a latent variable estimated from the subscale variables of the Admission Experience Survey. Finally, insight was also associated with knowledge of medication, a latent variable estimated from the 2 sections of the medication knowledge questionnaire. The estimates of the covariance and correlation coefficients for this model are given in a table that is available from the first author on request. The hypothesized model, model 1, which assumes that adverse effects measured by LUNSERS are uncorrelated with attitude, insight, admissions experience, and relationships with staff, had unsatisfactory goodness of fit (maximum likelihood $\chi^2_{145}=411.6$) with an RMSEA equal to 0.090. Although this model suggested a relationship between adverse effects and compliance measured with the Morisky scale, the poor fit may reflect covariance between LUNSERS and other factors within the model. Inspection of the covariance/correlation matrix suggests

Table 1. Summary Data for Variables Included in the Study

| Variable	No. of Patients	Score Possible Range	Score Mean (SD)	Score Range
Symptoms (PANSS)				
Positive	228	7 to 49	20.94 (4.99)	8 to 35
Negative	228	7 to 49	18.82 (6.00)	8 to 39
General	228	16 to 112	42.30 (8.90)	25 to 98
Antipsychotic adverse effects				
LUNSERS	225	0 to 164	43.51 (21.83)	0 to 108
Attitudes to treatment				
DAI	224	−30 to +30	6.54 (14.28)	−26 to +30
Van Putten	216	−44 to +44	13.08 (17.29)	−42 to +44
Morisky	219	0 to 4	2.42 (1.42)	0 to 4
Knowledge of medication				
Specific	220	0 to 6	2.24 (1.74)	0 to 6
General	224	−4 to +11	3.27 (2.11)	−2 to +9
Insight				
Birchwood Insight Scale	220	0 to 16	10.25 (4.44)	0 to 16
Relationships with staff				
PEESS supportiveness	221	9 to 36	14.52 (6.82)	9 to 33
PEESS intrusiveness	221	3 to 12	8.77 (2.88)	3 to 12
PEESS criticism	221	8 to 32	11.71 (5.44)	8 to 30
CALPAS	203	0 to 96	51.12 (23.31)	0 to 88
Admission experience (McArthur Admission Experience Survey)				
Perceived coercion	227	0 to 5	2.20 (1.91)	0 to 5
Negative pressures	226	0 to 6	2.00 (2.09)	0 to 6
Voices scale	226	0 to 3	1.13 (1.23)	0 to 3
Affective reaction to hospitalization	227	0 to 6	3.03 (1.78)	0 to 6

Abbreviations: CALPAS, California Pharmacotherapeutic Alliance Scale, relating to relationships with prescriber; DAI, Drug Attitude Inventory; LUNSERS, Liverpool University Neuroleptic Side Effect Rating Scale; Morisky, Morisky Compliance Scale; PANSS, Positive and Negative Syndrome Scale; PEESS, Perceived Expressed Emotion of Staff Scale, relating to relationships with ward staff; Van Putten, Van Putten dysphoria scale.

Table 2. Observed Pairwise Covariance/Correlation Matrices*

	Attitudes Toward Treatment DAI	Van Putten	Morisky	Insight Birchwood	PANSS G12	AES A	NP	PC	VS	Medication Knowledge GK	SK	CALPAS	PEESS S	C	I	PANSS POS	NEG	GEN	Side Effects (LUNSERS)
DAI	203.98	**0.54**	**0.26**	**0.54**	**−0.49**	**−0.21**	−0.39	**−0.29**	**−0.32**	0.26	0.08	**0.43**	**−0.25**	−0.21	−0.10	**−0.31**	−0.17	−0.12	0.03
Van Putten	131.99	299.08	0.09	**0.33**	−0.23	−0.15	−0.21	−0.16	−0.25	0.09	0.02	**0.39**	−0.18	−0.08	0.01	−0.14	−0.13	−0.06	0.01
Morisky	5.20	2.24	2.01	0.07	−0.18	0.04	0.07	0.05	0.05	0.06	0.08	0.09	−0.19	−0.11	−0.13	−0.09	−0.05	−0.04	−0.20
Birchwood	26.23	19.26	0.34	11.41	**−0.62**	−0.13	−0.38	**−0.28**	**−0.36**	0.26	0.13	**0.40**	−0.11	−0.22	0.00	**−0.33**	−0.16	0.04	**0.28**
PANSS G12	−11.60	−6.66	−0.43	−3.52	2.80	0.20	0.36	0.31	0.33	**−0.32**	−0.17	−0.34	0.14	0.25	0.02	**0.35**	0.21	−0.02	**−0.29**
AESA	−5.42	−4.68	0.11	−0.78	0.59	3.16	**0.55**	**0.51**	**0.37**	−0.05	−0.04	−0.25	0.06	0.08	**0.34**	0.23	0.07	0.13	0.16
AESNP	−11.69	−7.65	0.21	−2.69	1.28	2.06	4.39	**0.72**	**0.70**	−0.09	−0.02	−0.28	0.11	0.13	**0.28**	0.24	0.07	0.00	−0.10
AESPC	−7.96	−5.42	0.14	−1.80	0.98	1.72	2.91	3.66	**0.73**	−0.05	0.00	−0.24	0.09	0.02	**0.33**	0.13	−0.07	−0.03	−0.09
AESVS	−5.69	−5.21	0.08	−1.51	0.68	0.80	1.79	1.71	1.50	−0.16	−0.06	−0.31	0.06	0.05	**0.35**	0.11	0.03	−0.06	−0.13
GK	7.71	3.26	0.19	1.89	−1.15	−0.21	−0.38	−0.22	−0.40	4.45	**0.23**	0.17	0.08	−0.06	−0.09	−0.11	−0.16	−0.02	**0.28**
SK	2.06	0.70	0.19	0.75	−0.50	−0.13	−0.08	−0.01	−0.13	0.85	3.01	0.08	0.03	−0.06	−0.17	−0.12	−0.20	−0.19	0.06
CALPAS	144.37	161.88	2.83	31.90	−13.36	−10.50	−13.75	−10.53	−8.88	8.39	3.22	543.28	−0.21	−0.14	−0.01	−0.23	−0.17	−0.20	−0.02
PEESSS	−24.49	−21.09	−1.82	−2.38	1.64	0.76	1.55	1.17	0.49	1.19	0.06	−32.04	46.59	0.58	0.02	0.17	0.18	0.18	0.13
PEESSC	−16.29	−6.96	−0.80	−4.09	2.24	0.81	1.43	0.20	0.35	−0.66	−0.56	−17.30	21.71	29.63	0.22	0.20	0.15	0.17	0.03
PEESSI	−4.03	0.60	−0.51	−0.01	0.09	−0.29	−0.09	−0.45	0.02	−0.55	−0.83	−0.51	0.37	3.47	8.29	−0.04	0.13	0.06	0.07
PPOS	−22.57	−12.39	−0.61	−5.65	2.90	2.07	2.54	1.25	0.69	−1.14	−1.08	−27.51	5.73	5.55	−0.53	24.89	0.15	**0.37**	0.07
PNEG	−14.88	−13.10	−0.43	−3.18	2.13	0.74	0.89	−0.83	0.26	−2.02	−2.05	−23.38	7.50	4.90	2.19	4.59	36.00	**0.52**	−0.12
PGEN	−15.12	−8.68	−0.45	1.12	−0.35	2.00	0.09	−0.49	−0.61	−0.44	−2.88	−42.01	11.02	7.96	1.42	16.00	27.47	77.51	0.26
LUNSERS	8.24	4.52	−6.07	20.60	−10.58	6.34	−4.66	−3.55	−3.52	12.81	2.16	−7.69	18.80	3.79	4.28	7.21	−14.97	48.94	476.37

Abbreviations: *Attitudes Toward Treatment:* DAI, Drug Attitude Inventory; Van Putten, Van Putten scale; Morisky, Morisky scale. *Insight:* Birchwood, Birchwood Insight Scale; PANSS G12, insight item G12 from the Positive and Negative Syndrome Scale (PANSS). *Admission Experience:* subscale scores from the McArthur Admission Experience Survey (AES): A, affective reaction to hospitalization; NP, negative pressures; PC, perceived coercion; VS, voices scale. *Knowledge of Medication:* G, general knowledge; SK, specific knowledge. *Relationship With Staff:* CALPAS, California Pharmacotherapeutic Alliance Scale (indicating relationship with prescriber); PEESS, Perceived Expressed Emotion of Staff Scale (indicating relationship with ward staff); PEESS subscale scores: S, supportiveness; C, criticism; I, intrusiveness. *Psychotic Symptoms:* POS, positive symptoms; NEG, negative symptoms; GEN, general symptoms. *Antipsychotic Side Effects*: LUNSERS, Liverpool University Neuroleptic Side Effect Rating Scale.

*Correlation coefficients shown in boldface are significant at $P<.001$. Correlation matrix given in white upper triangle. For each scale and subscale, data were collected for a minimum of 195 patients and a maximum of 227.
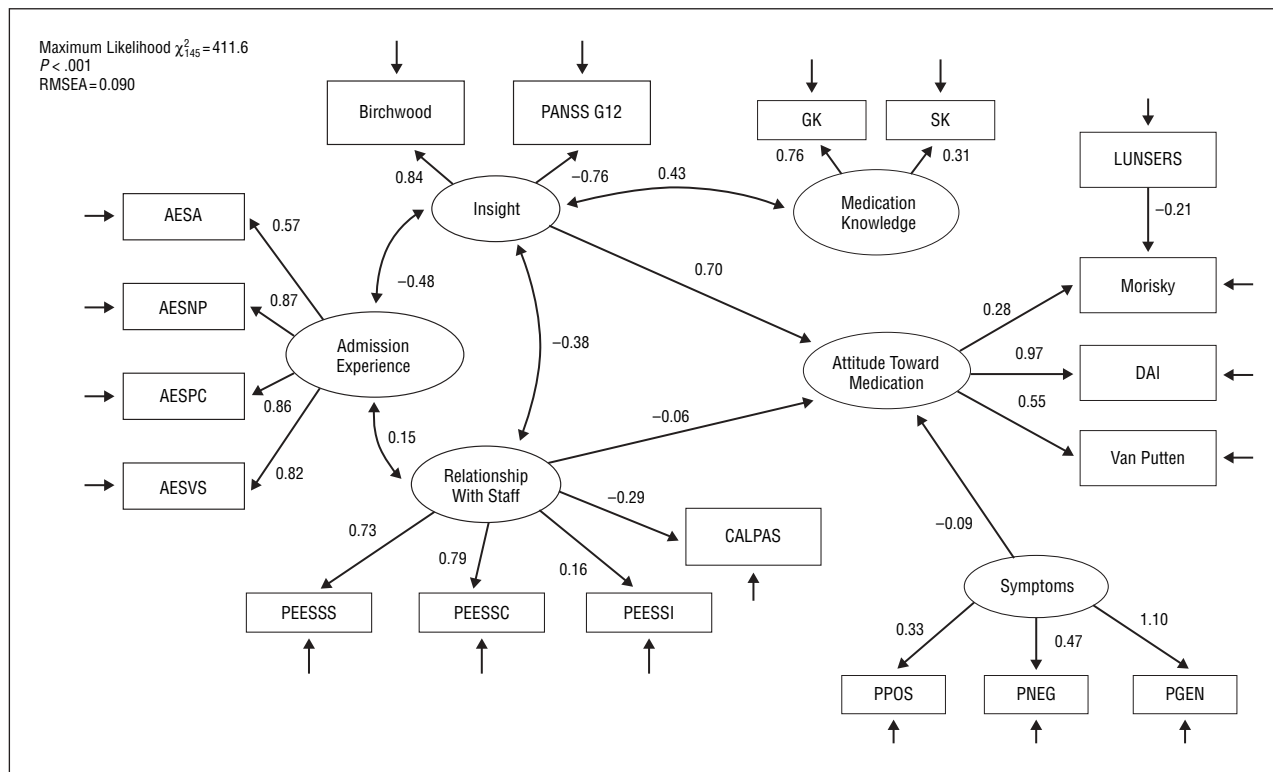
Figure 1. Hypothesized model with fitted coefficients (model 1). Admission experience, insight, medication knowledge, attitude toward medication, relationships with staff, and symptoms are latent variables. The California Pharmacotherapy Alliance Scale (CALPAS) gauges the patient's relationship with the prescribing physician, and the Liverpool University Neuroleptic Side Effects Rating Scale (LUNSERS) is a means for schizophrenic patients to rate adverse effects of antipsychotic medication. AESA indicates McArthur Admission Experience Survey [AES]–affective reactions to hospitalization; AESNP, AES–negative pressures; AESPC, AES–perceived coercion; AESVS, AES–voices scale; Birchwood, Birchwood Insight Scale; DAI, Drug Attitude Inventory; GK, general knowledge of medication; Morisky, Morisky Compliance Scale; PEESSC, Perceived Expressed Emotion of Staff Scale (PEESS)–criticism; PEESSI, PEESS–intrusiveness; PEESSS, PEESS–supportiveness; PANSS G12, insight item G12 from the Positive and Negative Syndrome Scale (PANSS); PGEN, general symptoms subscale of the PANSS; PNEG, negative symptoms subscale of the PANSS; PPOS, positive symptoms subscale of the PANSS; RMSEA, root-mean-square error of approximation; SK, specific knowledge of medication; and Van Putten, Van Putten scale measuring subjective experience of medication.

some covariance between LUNSERS and the attitude and admission variables. Because we did not theorize a relationship with these variables, LUNSERS was dropped from the model. The model also gave poor estimates of the covariances between CALPAS and several other variables, including those related to insight and attitude toward medication. CALPAS was retained because it was of primary theoretical importance as a measure of the therapeutic alliance. To improve the model fit, we removed the symptom variables because the covariance between the symptoms and attitude toward medication was weak (Figure 1) and because no other relationship had been theorized in the model. This model, which can be viewed in a table available from the first author, gave improved fit, with a reduction in the maximum likelihood χ^2 (maximum likelihood $\chi^2_{84}=189.0$) and an RMSEA of 0.074. Estimates of the covariance and correlation parameters for this model are given in a table available from the first author. From comparison of this with Table 2, it can be seen that the model still gave poor estimates of covariance between CALPAS and other variables. The model was therefore simplified further to a minimal model that retained the core theoretical assumptions that had driven our model fitting. In this final model, model 3 (**Figure 2**), the assumed relationships between attitude toward treatment, relationships with staff, admission experience, and insight were retained and the scores from the PEESS,

which relates to staff, were removed from the model, leaving CALPAS scores, which estimate the relationship with the prescriber. In this case, there was further substantial reduction in the maximum likelihood χ^2 (maximum likelihood $\chi^2_{48}=89.3$) with an RMSEA equal to 0.060, indicating a better model fit for model 3 compared with models 1 and 2. Comparison of the observed and the fitted covariance and correlation matrices, given in a table available from the first author, suggests that the model fit is good in this case.

The hypothesized relationships between insight, relationship with the prescriber, admission experience, and attitude toward medication were supported by all 3 models.

COMMENT

This study has derived a model to predict attitudes toward medication in psychosis that is substantially different from those found in previous studies, almost certainly because we have measured service-related variables rather than just patient characteristics. The study is limited by the fact that it is cross-sectional rather than prospective in design and is focused only on the acute phase of treatment. It is acknowledged that patients took part in the study during an acute admission, which may bias the findings toward people with more severe or refrac-
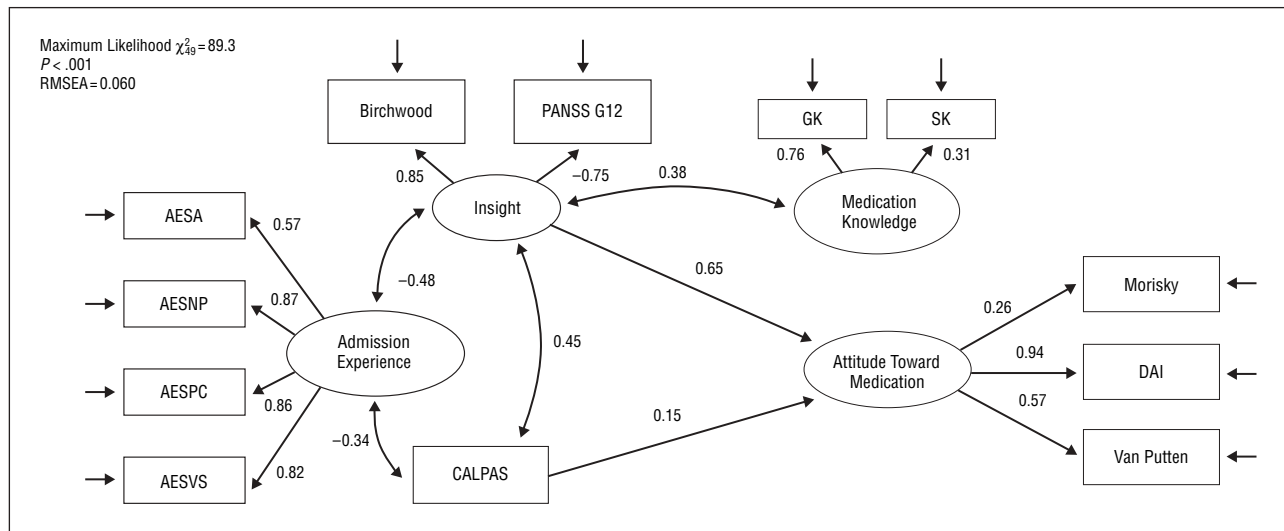
Figure 2. Final minimal model (model 3). See the legend to Figure 1 for an explanation of the terms and abbreviations.

tory illness and/or poor medication adherence and toward those who consented to the main trial. However, our data show that a wide range of patients were included in the study; because we had a relatively low refusal rate, we are confident that our sample was broadly representative of people with schizophrenia or schizoaffective disorder who were admitted to acute mental health wards in the United Kingdom. In addition, previous research[20,43] has shown that attitudes during an acute admission are a strong predictor of future attitudes and adherence. Therefore, a detailed understanding of the factors involved in forming attitudes toward treatment and self-reported adherence during an acute admission may have significant implications for the understanding of adherence in other phases of psychotic illness and social contexts. The fact that all participants were in a similar phase of their illness when the variables were measured could also be viewed as a strength of the study, as any variation in data due to stage of illness of the participants should be minimized.

In addition to confirming that insight and attitudes toward treatment are important variables in predicting adherence to medication, we have confirmed the importance of the therapeutic alliance with clinicians, as previously found by Frank and Gunderson[22] and Weiss et al.[23] We have also identified the important influence of the patient's experience of admission to the hospital. Thus, the present findings indicate that the most favorable conditions for encouraging adherence include lack of coercion during admission, a positive relationship with the prescriber, involvement of the patient in treatment decisions, and a medication regimen that minimizes adverse effects. One surprising finding was that the goodness of fit improved when adverse effects were removed from the model. This may have been because of covariance between LUNSERS scores and other variables, but this also indicates that adverse effects may have less influence on adherence than is currently presumed. Other authors have pointed out the inconsistencies in the relationship between attitudes toward treatment and adverse effects,[15,17] and yet new drugs are often marketed with the promise of fewer adverse effects and improved adherence. It may

be that these claims are not substantiated by research evidence, but that is not to say that we should not do all we can to minimize the distressing adverse effects of these drugs, which can markedly impair quality of life.

Many clinicians acknowledge the importance of patient adherence to a medication regimen but do not systematically assess it in their clinical practice. In many services, the optimum conditions for adherence that we have identified may not exist. Although complex interventions can be used to enhance insight into illness[44] and adherence,[45] it is possible that some relatively simple measures could provide these optimal conditions. For example, it may be possible to reduce the experience of coercion during the admission process by using nonthreatening language, by involving the patient in treatment decisions, and by showing respect for the patient's health beliefs. Findings from studies of coercion that show that feelings of being coerced at the time of admission are closely related to a patient's sense of procedural justice[46] have implicated the need for professionals to convey a sense of acting out of concern for the patient, treating the patient respectfully and fairly and giving him or her a say in treatment decisions.[25] Similarly, it should be possible to maximize the perceived benefits of treatment by ensuring that the patient's response is carefully monitored and that the treatment is adjusted if the patient is distressed by adverse effects or if the subjective well-being of the patient does not improve. There are many ways prescribers might seek to enhance their relationships with their patients, and our research supports a patient-centered approach where mental health workers actively seek the views of patients and collaboration is encouraged. This approach has proved to be successful in other areas of medicine,[47] and our findings support the need for more research to evaluate it in the context of mental health care.

In future studies it will be useful to establish whether the model reported herein is longitudinally robust, and whether the variables we have identified are valid prospective indicators of patient behavior. It will also be useful to assess the impact of the simple measures we have identified on clinical outcomes.

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