ORIGINAL ARTICLE

Congruence of Diagnoses 2 Years After a First-Admission Diagnosis of Psychosis

Joseph E. Schwartz, PhD; Shmuel Fennig, MD; Marsha Tanenberg-Karant, MD; Gabrielle Carlson, MD; Thomas Craig, MD; Nora Galambos, PhD; Janet Lavelle, MS; Evelyn J. Bromet, PhD

Background: Diagnostic changes may reflect evolution of an illness, emergence of newly disclosed information, or unreliability of assessment. This study evaluates the stability of research diagnoses in a heterogeneous first-admission sample with psychosis.

Methods: A group of 547 subjects initially diagnosed with a psychosis were reassessed 6 and 24 months after enrollment. The *DSM-IV* consensus diagnoses were formulated by psychiatrists blind to previous research diagnoses. The analysis focuses on agreement over time and the effects of demographic, family history, and clinical variables on the shift from a nonschizophrenia diagnosis to schizophrenia.

Results: Seventy-two percent of 6- and 24-month diagnoses were congruent. The most temporally consistent 6-month categories were schizophrenia (92%), bipolar disorder (83%), and major depression (74%); the least stable were psychosis not otherwise specified (44%), schizoaffective disorder (36%), and brief psychosis (27%). The most frequent shift in diagnosis at 24 months was to schizophrenia spectrum (n=45). These 45 subjects had a similar illness course after 6 months as the 171 subjects in this category at both assessments, but their prior clinical functioning was better. Risk factors predicting change to a schizophrenia spectrum diagnosis include facility variables (schizophrenia diagnosis, longer stays, and given antipsychotic medication on hospital discharge); prehospital features (psychotic ≥3 months before admission, poorer adolescent adjustment, lifetime substance disorder); and negative symptoms.

Conclusions: Changes in diagnosis, particularly to schizophrenia, are mostly attributable to the evolution of the illness. Rigid adherence to *DSM-IV* requirements may have led to underdiagnosis of schizophrenia. The findings support the need for a longitudinally based diagnostic process in incidence samples.

Arch Gen Psychiatry. 2000;57:593-600

From the Department of Psychiatry and Behavioral Science, State University of New York at Stony Brook, Stony Brook (Drs Schwartz, Tanenberg-Karant, Carlson, Galambos, and Bromet and Ms Lavelle); Department of Psychiatry, Shelvita Hospital, Tel Aviv, Israel (Dr Fennig); and Department of Veterans Affairs, Veterans Integrated Services, Network 3, Bronx, NY (Dr Craig).

SINCE THE introduction of *DSM-III*,[1] psychiatric clinicians and psychiatric epidemiologists have used a common set of diagnostic criteria, but application of these criteria differs. Clinicians observe patients' phenomenology longitudinally, integrating multiple sources of information before making a firm diagnosis. Epidemiologists usually rely on cross-sectional, retrospective assessments to formulate a differential diagnosis. Regardless of how diagnoses are formulated, they can shift over time because of changes in patients' clinical state, clarity stemming from treatment response, emergence of significant, previously unrevealed clinical information, or reinterpretation of previously gathered information.[2] However, in epidemiology, diagnostic changes are usually attributed to procedural unreliability rather than changes in the illness picture.

The stability of clinical diagnoses has been evaluated in several readmission populations, usually to the same facility.[3-10] Such studies are limited by inadequate reliability of clinical diagnoses and the bias inherent in sampling rehospitalized patients.[11] We identified 9 prospective studies of first-admission psychotic patients describing diagnostic stability over 6 months,[2] 9 to 18 months,[12] 4 years,[13] 7 years,[14] 12 to 17 years,[15] 13 years,[16] 18 years,[17] 25 years,[18] and 30 to 40 years.[19] These studies found schizophrenia to be the most stable initial diagnosis (about 90%), affective psychoses less stable (around 80%), and schizophreniform, schizoaffective disorder, and psychosis not otherwise specified (NOS) the least stable. Few studies have examined predictors of diagnostic instability.

This study's research diagnostic procedure was designed to partially mimic the clinical process.[2,20] Diagnoses were formulated at 6- and 24-month follow-up by integrating information gathered longitudinally from subjects, medical records, relatives, and

SUBJECTS AND METHODS

SUBJECTS

The Suffolk County (Long Island, NY) Mental Health Project is an epidemiologic study of first-admission patients with psychotic disorders.[20] From 1989 through 1995, 695 eligible subjects were recruited primarily from the 12 psychiatric inpatient facilities in the county: six 20- to 30-bed community hospital units, a 30-bed university hospital unit, a Veterans Administration hospital, the state adult and child psychiatric centers, and 2 private hospitals (added in 1994). Except for the university and state adult facilities, in which project staff handled recruitment, the chief nurse, social worker, or psychologist at each unit identified appropriate subjects. The screening criteria were subjects who were between ages 15 and 60 years, residents of Suffolk County, and showed clinical evidence of definite or possible psychosis. Exclusion criteria were first psychiatric hospitalization more than 6 months before current admission, moderate or severe mental retardation, and inability to speak English.

PROCEDURE

Separate written consents were obtained for each interview, medical record review, contact with treating clinician, and request for birth and school records. For minors, a parent also gave written permission. At state facilities, a physician precertified that patients were mentally competent to provide informed consent. All procedures were approved by the State University of New York and the individual facilities.

The initial interview usually took place at the hospital. The response rate at baseline was 72%. Follow-up assessments took place 6 and 24 months later, with interim telephone contact every 3 months. Nearly 80% of follow-up assessments were conducted face-to-face. The loss to attrition was 10% at 6 months and 12% at 24 months. Interviewers were masters-level mental health professionals (primarily psychiatric social workers).

DIAGNOSTIC PROCEDURE AND DIAGNOSTIC GROUPS INCLUDED IN ANALYSIS

After the 6- and 24-month assessments, 2 project psychiatrists independently reviewed all longitudinal information, except the previous research diagnoses, and then met to resolve disagreements on *DSM-III-R*[22] and *DSM-IV* diagnoses and supporting criteria. Information came from the Structured Clinical Interview for *DSM-III-R* (SCID) administered at baseline and at 6- and 24-month follow-up (to cover the subsequent intervals[23]) plus medical records, significant others, interviewers' ratings and written narratives, and school records. Each case was then presented to a meeting of several project psychiatrists and investigators, during which the final consensus diagnosis was decided. Criteria sheets were completed to substantiate all diagnostic decisions. "Probable" diagnoses were assigned if a specific diagnosis was strongly suggested but the clinical information failed to support all diagnostic criteria. In a few cases, a probable diagnosis could not be formulated, and the research diagnosis was considered "unknown" (deferred). Interviewers were blind to research diagnoses until after the 24-month assessment, at which time their input was included. At the 24-month consensus conferences, ratings of illness course were obtained.

The diagnoses analyzed here are bipolar and major depressive disorders with psychotic features; schizophrenia spectrum disorders (schizophrenia, schizoaffective and schizophreniform disorders); other nonaffective psychoses (delusional disorder, brief psychosis, psychosis NOS, and organic psychosis); diagnosis deferred (but definite/possible psychotic symptoms); and a residual category of "not psychotic." Definite and probable diagnoses were combined. Because of sample attrition or inadequate information, 25 subjects were missing diagnoses at both 6 and 24 months, 45 were missing just the 6-month diagnosis, and 56 were missing the 24-month diagnosis. Another 22 subjects had no evidence of psychosis. This article examines the 547 subjects diagnosed at both 6- and 24-month follow-up and categorized as psychotic or possibly psychotic, on at least one occasion.

MEASURES

Six clusters of variables were used to predict changes in diagnosis.

BACKGROUND CHARACTERISTICS

Seven variables were analyzed: age at admission, sex, race (African American vs other); education (whether finished high school); marital status (never vs ever married); social class of household (white collar vs blue collar or public assistance); and low intellectual functioning (either full-scale IQ below 85 in school record or 2 of the following if testing not available: Quick Test[24] score below 85 at baseline and 6-month follow-up; in a special education program; school dropout or graduated on a nonacademic track; unable to add/subtract; or unable to hold a job for reasons other than mental illness).

FAMILY HISTORY OF PSYCHIATRIC ILLNESS

Family history information was compiled from medical records and interviews, modeled on the Family History-Research Diagnostic Criteria,[25] with subjects and relatives at 6- and 24-month follow-up. Diagnoses of schizophrenia-like disorders, affective disorders, substance use disorders, or any Axis I disorder in first-degree relatives were considered.

CLINICAL HISTORY

Seven clinical history variables were analyzed: premorbid social adjustment (average social and school functioning at ages

when available, school records. Additionally, diagnoses were decided by consensus of several psychiatrists and *DSM-IV*[21] criteria were strictly embraced. This is the first report to examine the congruence between 2 such longitudinal research diagnoses, and to investigate demographic, clinical history, and early course variables associated with shifting to a schizophrenia spectrum diagnosis.

RESULTS

DESCRIPTIVE CHARACTERISTICS OF SAMPLE

The 547 subjects were predominantly male (56.5%), non–African American (85.7%), never married (63.9%), and had a high school education (80.3% of those older than 18 years).

5-11, 12-15, and 11-18 years[26]); time from first psychotic symptom until first hospitalization (≥3 months vs <3 months); prior outpatient treatment (any vs none); prior antipsychotic medication treatment (any vs none); level of functioning during best month of the year before baseline (Global Assessment of Functioning [GAF]); lifetime suicide attempt; and lifetime *DSM-III-R* substance use disorder.[23]

INITIAL HOSPITALIZATION CHARACTERISTICS

Four hospital variables were included: type of hospital where initially admitted (public vs community/private); facility diagnosis of schizophrenia; length of first hospitalization controlling for type of hospital and year of hospitalization (1989-1995); and whether given antipsychotic medication upon hospital discharge. Four clinical features were analyzed: current substance use disorder; negative symptoms (mean of global ratings on Scale for the Assessment of Negative Symptoms[27] [SANS]); positive symptoms (mean global score on Scale for the Assessment of Positive Symptoms[27] [SAPS]); and the Brief Psychiatric Rating Scale[28] (BPRS) clinical global rating. Ratings were completed by interviewers after the baseline interview, and interrater reliability was good to excellent.[20]

FUNCTIONING AT 6-MONTH FOLLOW-UP

From the 6-month follow-up, 9 variables were analyzed: rehospitalized in the interval; interviewer's rating of whether subject achieved partial or full remission (minimum duration of 1 month); receipt of antipsychotic medication during interval; GAF score for best month of the interval; GAF for worst week of the month preceding interview; current SANS; current SAPS; BPRS clinical global rating; and whether 6-month research diagnosis was probable vs definite.

FUNCTIONING AT 24-MONTH FOLLOW-UP

Ten variables from the 24-month follow-up were analyzed: rehospitalized between the 6- and 24-month follow-up; consensus rating of return to best premorbid level of psychosocial functioning[29] (1, complete return, to 4, marked deterioration); consensus rating of occupational functioning during 24-month period (1, steady, full time more than 50% of interval, to 5, not working most of interval); consensus rating of 24-month illness course (World Health Organization scale[30] dichotomized according to whether full remission of at least 6 months was ever achieved); same ratings as at 6 months; and whether 24-month diagnosis was probable vs definite.

DATA ANALYSES

The analysis of diagnostic stability between the 6- and 24-month follow-ups is based on a cross-tabulation of 11 diagnostic categories. Two measures of stability are presented for each diagnosis. One, called "prospective consistency," equals the proportion of individuals in a category at 6 months who retain the same diagnosis at 24 months; this would correspond to positive predictive value if the 24-month diagnosis was the gold standard. The second measure, "retrospective consistency," equals the proportion of individuals in a 24-month category who previously received the same diagnosis; this is conceptually similar to sensitivity.

Background and clinical characteristics are summarized for 7 groups: schizophrenia spectrum diagnosis at both 6- and 24-month follow-up (n=171); schizophrenia spectrum diagnosis at 24-month follow-up only (n=45); bipolar disorder at both follow-ups (n=117); major depressive disorder at both follow-ups (n=76); the same residual nonaffective psychotic disorder at both follow-ups (n=50); change among nonschizophrenia spectrum diagnoses (n=70); and change from a 6-month schizophrenia spectrum diagnosis to a nonspectrum diagnosis at 24 months (n=18).

The analysis of predictors of diagnostic change focus on the 45 subjects whose diagnosis shifted into the schizophrenia spectrum. These subjects are first compared with those who received a spectrum diagnosis at both evaluations. This analysis looks backwards from the perspective of the 24-month diagnosis, identifying those factors that discriminate those who did and did not receive a schizophrenia spectrum diagnosis at 6 months. Group differences are analyzed using a *t* test of means for continuous measures and the χ^2 test of independence for categorical measures. Nominal levels of significance (without correction for multiple comparisons) are shown in the tables, but only results with $P<.01$ are described in the text.

A second analysis compares the same 45 subjects whose diagnosis shifted into the schizophrenia spectrum with those receiving nonschizophrenia spectrum diagnoses at both times. Both groups had diagnoses outside the schizophrenia spectrum at 6 months, and this prospective analysis identifies factors predicting who was subsequently reclassified as having a schizophrenia-like condition. Each factor was entered into a logistic regression analysis that controlled for differences among the 3 broad nonschizophrenia spectrum diagnoses—bipolar disorder, major depressive disorder, or residual nonaffective psychotic disorder—at 6 months. Controlling for 6-month diagnosis is prudent since: (1) diagnostic groups differ on several background and clinical variables; (2) a higher proportion of the residual nonaffective psychotic disorder group shifted to a schizophrenia spectrum diagnosis; and (3) the number within each broad diagnostic group that changed to schizophrenia is insufficient to permit separate analyses. For each background and clinical variable, we also examined its interaction with 6-month diagnosis; only 1 of 45 tests was significant at $P<.05$, consistent with chance expectation.

Those variables that were significant at $P<.01$ in the bivariate analyses were entered into a stepwise logistic regression analysis to determine which factors independently predict change from a nonschizophrenia spectrum to a schizophrenia spectrum diagnosis vs remaining outside the spectrum. Based on the results, we suggest an algorithm for identifying those patients whose diagnosis is most likely to subsequently change to the schizophrenia spectrum.

The median age was 28 years (range, 15-58 years), and the primary breadwinner in 54.6% of subjects' households had a white collar occupation.

STABILITY OF DIAGNOSIS

The prospective consistency of the 3 most prevalent 6-month diagnoses was 74% for major depressive disorder, 83% for bipolar disorder, and 92% for schizophrenia (**Table 1**). The retrospective consistency was 73% for schizophrenia, 82% for major depression, and 85% for bipolar psychosis. Generally, diagnostic categories with fewer subjects had much poorer consistency. The overall rate of consistency in Table 1 was 72%; 394 of the 547 subjects received the same 11-category diagnosis at both follow-ups. Restrict-

Table 1. Cross-Tabulation of 6- and 24-Month *DSM-IV* Consensus Diagnosis in the Suffolk County Mental Health Project Cohort*†

		24-mo Diagnoses, No.												
	6-mo Diagnoses, No.	SZ Spectrum Disorders	SZ	SA	SF	BPD	MDD	All Other Psychoses	Brief Psychosis	Psychosis NOS	Del	Sub	No Diagnosis	Other
SZ Spectrum Disorder	**189**	**171**				**5**	**7**	**6**						
SZ	**145**		133	4	0	1	2		0	2	0	1	2	0
SA	**33**		14	12	0	2	5		0	0	0	0	0	0
SF	**11**		2	0	6	2	0		0	0	0	1	0	0
BPD	**141**	**12**	6	6	0	117	1	**11**	1	3	2	2	2	1
MDD	**103**	**9**	6	3	0	7	76	**11**	0	2	3	3	1	2
All Other Psychoses	**114**	**24**				**9**	**9**	**72¶**						
Brief Psychosis	**11**		1	0	1	1	2		3	2	0	0	0	1
Psychosis NOS	**25**		7	1	0	0	1		1	11	1	0	1	2
Del	**9**		2	0	0	0	0		0	1	6	0	0	0
Sub‡	**36**		3	0	0	3	2		0	1	0	23	3	1
No Diagnosis	**22**		6	1	0	4	3		1	0	0	3	2	2
Other	**11**		2	0	0	1	1		0	1	0	0	1	5
Totals	**547**	**216**	**182**	**27**	**7**	**138**	**93**	**100**	**6**	**23**	**12**	**33**	**12**	**14**
Prospective consistency, %§		90.5	91.7	36.4	54.6	83.0	73.8	63.2	27.3	44.0	66.7	63.9	9.1	45.4
Retrospective consistency, %‖		79.2	73.1	44.4	85.7	84.8	81.7	72.0	50.0	47.8	50.0	69.7	16.7	35.7

*SZ indicates schizophrenia; SA, schizoaffective disorder; SF, schizophreniform disorder; BPD, bipolar disorder; MDD, major depressive disorder; NOS, not otherwise specified; Del, delusional disorder; and Sub, substance-induced psychosis.

†Includes subjects diagnosed with psychotic features at baseline, 6-month, and/or 24-month follow-up.

‡Includes 2 subjects with medication-induced mania; 1 at 6 months only and 1 at 6 and 24 months.

§Percentage of 6-month cases with the same diagnosis at 24 months.

‖Percentage of 24-month cases with the same diagnosis at 6 months.

¶This cell includes 22 subjects whose diagnoses changed between 2 of the "other" nonaffective psychoses.

ing the analysis to those receiving a definite diagnosis at 6 and 24 months (n=386) increased the overall consistency rate to 80%, indicating that probable diagnoses are less stable than definite diagnoses.

One hundred seventy-one subjects (31%) received a schizophrenia spectrum diagnosis at both the 6- and 24-month follow-ups. This represents 170 (90%) of the 189 subjects within this broad category at 6 months, and 171 (79%) of the 216 in this category at 24 months. The shift into a schizophrenia spectrum diagnosis was the most frequent diagnostic change (n=45). Their most common 6-month diagnoses of these individuals were bipolar disorder (n=12), major depressive disorder (n=9), psychosis NOS (n=8), and diagnosis deferred (n=7). At the consensus diagnostic meetings, previous diagnoses were revealed after the current diagnosis was agreed on. When the current diagnosis differed from the previous one, psychiatrists rated the reason for the change: illness course, change in the symptom picture, new information from the subject or other sources, or new interpretation of previous information. The most commonly identified reasons were changes in the symptom picture or the course.

A similar analysis was also performed comparing the baseline with the 24-month diagnoses, although at baseline, far less information was available to the project psychiatrists and the extensive discussions characterizing the 6- and 24-month diagnosis meetings did not occur. In terms of prospective consistency, the percentages of those with schizophrenia, bipolar disorder, and depression at baseline who received the same diagnosis at 24 months were high (88%, 86%, and 70%, respectively), but other categories were low (eg, 23% for schizophreniform disorder, 39% for schizoaffective disorder, 38% for delusional disorder, 45% for substance-induced psychosis). The retrospective consistency levels were also mixed, with 55% of subjects with a 24-month diagnosis of schizophrenia receiving this diagnosis at baseline. The best retrospective consistency was found for schizophreniform disorder (86%), bipolar disorder (73%), and depression (74%). The figures were 26% for schizoaffective disorder, 50% for delusional disorder, and 30% for substance-induced psychosis. Overall, 57% of subjects had the same diagnosis at baseline and 24 months. This reduced consistency reflects greater instability because of the longer time interval and the poorer reliability of the cross-sectional baseline diagnoses.

FACTORS ASSOCIATED WITH THE DIAGNOSTIC SHIFT TO SCHIZOPHRENIA

The comparison of the 45 subjects who shifted into the schizophrenia spectrum with the 171 stably diagnosed schizophrenia spectrum subjects revealed no significant differences in demographic characteristics or family psychiatric history (**Table 2**, first 2 columns). With respect to clinical history, a smaller percentage of the change group had received antipsychotic medication prior to their first hospital admission, and the mean GAF rating for the best level of functioning during the year before baseline was better in the change group than the stably diagnosed. During the initial hospitalization (**Table 3**), the change group had lower SANS and SAPS scores. Their illness was also rated as less severe. At 6-month follow-up, the change group continued to have better GAF, SAPS, and BPRS ratings. However, by 24-month follow-up (**Table 4**), the 2 groups were indistinguishable, except that

Table 2. Background Characteristics of Subjects by Diagnostic Change Group*

	Stable Schizophrenia Spectrum Disorder (n = 171)	Change to Schizophrenia Spectrum Disorder (n = 45)	Stable Bipolar Disorder (n = 117)	Stable MDD (n = 76)	Stable Other Diagnoses (n = 50)	Change Within Nonschizophrenia Spectrum (n = 70)	Change From Schizophrenia Spectrum Disorder (n = 18)
Demographic Variables							
Male, No. (%)	111 (65)	30 (67)	58 (50)	33 (43)	32 (64)	34 (49)	11 (61)
Age, mean ± SD, y	28.4 ± 8.6	27.4 ± 8.7†	29.4 ± 10.1	31.5 ± 10.8	33.1 ± 10.5	29.6 ± 9.7	27.0 ± 8.2
Education (high school), No. (%)	123 (76)	31 (72)	96 (85)	57 (85)	39 (80)	57 (84)	14 (82)
African American, No. (%)	36 (21)	5 (11)	7 (6)	4 (5)	10 (20)	10 (14)	6 (33)
Never married, No. (%)	128 (79)	30 (70)	64 (57)	29 (43)	24 (49)	41 (60)	15 (88)
Low intellectual functioning, No. (%)	35 (20)	8 (18)	10 (9)	11 (15)	4 (8)	10 (14)	0 (0)
SES of household (white collar), No. (%)	74 (44)	25 (56)	75 (64)	42 (55)	26 (53)	44 (64)	11 (61)
Family History Variables, No. (%)							
Schizophrenia	26 (15)	8 (18)†	10 (9)	5 (7)	3 (6)	6 (9)	1 (6)
Affective disorder	59 (35)	16 (36)	65 (56)	38 (51)	18 (36)	30 (43)	5 (28)
Any Axis I disorder	91 (53)	26 (58)	78 (67)	44 (59)	24 (48)	40 (57)	7 (39)
Substance abuse disorder	67 (39)	17 (38)	49 (42)	31 (41)	19 (38)	39 (56)	8 (44)
Clinical History Variables							
>3 Mo from psychosis to admission, No. (%)	105 (69)	22 (59)‡	11 (11)	16 (26)	17 (41)	22 (37)	6 (37)
Prior outpatient treatment, No. (%)	66 (39)	16 (36)	41 (35)	26 (34)	14 (29)	21 (30)	5 (28)
Prior antipsychotic treatment, No. (%)	30 (21)§	2 (5)	7 (6)	8 (12)	5 (11)	5 (7)	2 (12)
GAF best month of year, mean ± SD	49.5 ± 13.9‖	58.5 ± 11.0	67.4 ± 10.3	60.2 ± 14.0	57.6 ± 15.4	59.1 ± 13.1	57.6 ± 12.1
Lifetime suicide attempt, No. (%)	43 (25)	13 (29)	17 (15)	34 (45)	13 (26)	22 (31)	8 (44)
Lifetime substance diagnosis, No. (%)	74 (43)	16 (36)¶	62 (53)	35 (46)	32 (64)	43 (61)	10 (56)
Adolescent social adjustment, mean ± SD	0.36 ± 0.17	0.37 ± 0.15¶	0.25 ± 0.15	0.31 ± 0.15	0.27 ± 0.14	0.30 ± 0.15	0.36 ± 0.17

*MDD indicates major depressive disorder; SES, socioeconomic status; and GAF, global assessment of functioning.
†P<.05 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 291 to 358.
‡P<.001 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 291 to 358.
§P<.01 for column 2 vs column 1; for t tests, df = 175-214; for χ^2 test, df = 1 (N = 186-216).
‖P<.001 for column 2 vs column 1; for t tests, df = 175-214; for χ^2 test, df = 1 (N = 186-216).
¶P<.01 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 291 to 358.

the certainty of the diagnosis was greater in the stably diagnosed than in the change group. This pattern of results is consistent with the finding that the most common reasons given for a change in diagnosis were the illness course and change in the symptom picture. In a stepwise logistic regression, only the 6-month BPRS severity rating and SAPS independently discriminated between the 2 groups.

We next compared the 45 who shifted to a schizophrenia spectrum diagnosis with those who remained outside the spectrum (Table 2, columns 3-6) (n=313). Controlling for 6-month diagnosis (bipolar, major depression, or other nonaffective disorder), those in the schizophrenia shift group had a lower rate of lifetime substance abuse, poorer psychosocial adjustment during adolescence, and a longer interval between onset of psychosis and hospital admission (Table 2). During their first hospitalization (Table 3), the change-to-schizophrenia group had a longer length of stay, worse negative symptoms, and were more likely to receive a facility diagnosis of schizophrenia and be given antipsychotic medication upon hospital discharge. At 6-month follow-up, this group continued to receive worse SANS, GAF, and BPRS ratings. At 24-month follow-up (Table 4), those whose diagnosis changed to schizophrenia functioned more poorly on all of the variables. However, their diagnosis was also less definitive.

Nine demographic and clinical variables ascertained at or prior to the 6-month follow-up significantly differentiated, at the $P<.01$ level, those who changed to a schizophrenia spectrum diagnosis from those with a nonschizophrenia spectrum diagnosis at both follow-ups. In a stepwise logistic regression analysis that controlled for broad 6-month diagnostic category, 7 of these predictors entered the final model (**Table 5**). The remaining 2 variables, baseline SANS and 6-month GAF score for highest functioning during the preceding 6 months, were both highly correlated with the 6-month SANS.

Based on the results of the logistic regression, and inspection of the distributions for the 2 groups, we created an 8-point index. After dichotomizing the 6-month SANS at a score of 1.5, the adolescent psychosocial adjustment scale at 0.28 (the median), and the adjusted duration of initial hospitalization at greater than 14 days, subjects could have between 0 and 7 risk factors. We then identified the following 4 subgroups: (1) those with fewer than 3 risk factors or a 6-month SANS score of 0 (no subject with this SANS score had his/her diagnosis changed to schizophrenia spectrum at 24 months [n=173]); (2) those with 3 risk factors (n=87); (3) those with 4 risk factors (n=58); and (4) those with at least 5 risk factors (n=40). This 4-group classification identifies individuals with markedly distinct levels of risk for having their diagnosis changed to a schizophrenia spectrum disorder. The first subgroup contains nearly half those with a nonschizophrenia spectrum diagnosis at 6 months, and almost no one (1.7%) in this subgroup changed to a schizophrenia spectrum diagnosis at 24 months. At the other extreme, 55% of those in the rela-

Table 3. Initial Hospital and 6-Month Follow-up Characteristics by Diagnostic Change Group*

	Stable Schizophrenia Spectrum Disorder (n = 171)	Change to Schizophrenia Spectrum Disorder (n = 45)	Stable Bipolar Disorder (n = 117)	Stable MDD (n = 76)	Stable Other Diagnoses (n = 50)	Change Within Nonschizophrenia Spectrum (n = 70)	Change From Schizophrenia Spectrum Disorder (n = 18)
Initial Hospital Characteristics							
Public (vs community) facility, No. (%)	67 (41)	15 (33)	31 (26)	14 (19)	21 (47)	21 (30)	5 (29)
Facility diagnosis schizophrenia, No. (%)	80 (50)†	14 (32)‖	11 (10)	8 (11)	2 (4)	4 (6)	6 (35)
Length of first hospitalization (controlling for facility type and year), mean ± SD, d	34.7 ± 34.3	36.6 ± 27.2‖	26.9 ± 22.7	24.5 ± 21.1	19.2 ± 15.0	28.8 ± 23.9	42.9 ± 65.5
Discharged on antipsychotics, No. (%)	141 (82)	39 (87)¶	85 (73)	49 (64)	30 (60)	39 (56)	15 (83)
SANS, mean ± SD	2.0 ± 0.9‡	1.6 ± 0.6‖	0.8 ± 0.8	1.4 ± 0.9	0.9 ± 0.7	1.2 ± 0.8	1.8 ± 0.9
SAPS, mean ± SD	2.0 ± 1.0‡	1.5 ± 0.9	1.9 ± 0.8	1.1 ± 0.6	1.5 ± 0.8	1.6 ± 0.9	1.8 ± 1.1
BPRS illness severity, mean ± SD	4.7 ± 1.0‡	4.2 ± 1.0	4.5 ± 1.0	4.6 ± 1.0	4.1 ± 1.2	4.2 ± 1.2	4.7 ± 1.1
Current substance disorder, No. (%)	40 (23)	12 (27)	40 (34)	16 (21)	23 (46)	27 (39)	7 (39)
Functioning at 6-mo Follow-up							
Rehospitalized in interval, No. (%)	37 (22)	11 (26)	16 (14)	17 (22)	8 (17)	15 (21)	5 (28)
No remission achieved, No. (%)	90 (54)	16 (37)	30 (26)	28 (39)	15 (31)	20 (29)	8 (44)
Given antipsychotic medication, No. (%)	121 (95)	28 (87)#	43 (60)	32 (68)	16 (76)	27 (71)	10 (83)
GAF best month of past 6 mo, mean ± SD	45.5 ± 12.2§	53.5 ± 14.3¶	66.1 ± 11.4	59.4 ± 13.6	58.4 ± 14.7	59.6 ± 14.5	55.3 ± 13.0
GAF worst week of past mo, mean ± SD	39.2 ± 12.1§	47.9 ± 14.3#	57.9 ± 14.5	51.6 ± 14.8	51.3 ± 15.6	52.3 ± 15.7	47.6 ± 14.3
SANS, mean ± SD	1.8 ± 0.9	1.6 ± 1.0‖	0.7 ± 0.7	1.1 ± 0.9	0.9 ± 0.8	0.9 ± 0.9	1.6 ± 1.0
SAPS, mean ± SD	0.9 ± 0.9§	0.4 ± 0.5	0.2 ± 0.5	0.3 ± 0.5	0.5 ± 0.7	0.5 ± 0.7	0.5 ± 0.5
BPRS illness severity, mean ± SD	4.0 ± 1.0§	3.3 ± 1.1#	2.5 ± 1.1	3.1 ± 1.2	2.7 ± 1.1	3.0 ± 1.3	3.5 ± 1.2
6-mo research diagnosis "probable" (vs definite), No. (%)	33 (19)	14 (31)	15 (13)	12 (16)	14 (28)	16 (23)	8 (44)

*MDD indicates major depressive disorder; SANS, Scale for the Assessment of Negative Symptoms; SAPS, Scale for the Assessment of Positive Symptoms; BPRS, Brief Psychiatric Rating Scale; and GAF, Global Assessment of Functioning.

†P<.05 for column 2 vs column 1, for t tests, df = 187-214; for χ^2 test, df = 1 (N = 204-216, except for use of antipsychotic medication, where N = 160).

‡P<.01 for column 2 vs column 1, for t tests, df = 187-214; for χ^2 test, df = 1 (N = 204-216, except for use of antipsychotic medication, where N = 160).

§P<.001 for column 2 vs column 1, for t tests, df = 187-214; for χ^2 test, df = 1 (N = 204-216, except for use of antipsychotic medication, where N = 160).

‖P<.001 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 291 to 358 (except for the use of antipsychotic medications, where N = 210).

¶P<.01 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 291 to 358 (except for the use of antipsychotic medications, where N = 210).

#P<.05 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 291 to 358 (except for the use of antipsychotic medications, where N = 210).

tively small fourth subgroup received a schizophrenia spectrum diagnosis at 24 months. This subgroup contains nearly half of those whose diagnosis changed. The 2 intermediate groups, those with 3 or 4 risk factors, had intermediate levels of risk (11.5% and 17.2%, respectively) of changing to a schizophrenia spectrum diagnosis.

COMMENT

The majority (72%) of the 6-month longitudinal diagnoses were consistent with those formulated at 24 months. The diagnoses with the best prospective consistency were schizophrenia (92% of subjects receiving this diagnosis at 6 months retained this diagnosis at 24 months), bipolar disorder (83%), and major depression (74%). These high levels of stability, and marked differences in course, support the distinct nature of these disorders.[31] The category receiving the largest influx of cases at 24 months was schizophrenia spectrum (45 new diagnoses). Compared with the stably diagnosed schizophrenia group, subjects who shifted into schizophrenia had better prehospital and 6-month GAF scores, lower 6-month SAPS scores, and lower 6-month BPRS scores, but their subsequent course between 6- and 24-month follow-ups was similarly poor. We note that there were no differences between these 2 groups on fixed characteristics, demographic, or family history of illness. Rather, it seems that those whose diagnosis changed were hospitalized at an earlier stage of illness and took longer for their true disorder to become evident.

The conceptually more intriguing comparison was between those who shifted into the schizophrenia spectrum and those whose diagnosis remained outside the spectrum. The multivariate analysis revealed that overall, the best predictors of a shift to schizophrenia spectrum were poorer premorbid adjustment in adolescence, lack of a lifetime substance use disorder, interval between onset of psychosis and hospitalization exceeding 3 months, being diagnosed by the initial facility as having schizophrenia, having a longer length of hospitalization, being given antipsychotic medications upon hospital discharge, and having more negative symptoms at 6-month follow-up. The presence of 5 or more of these risk factors conferred a risk of more than 50% that the 6-month research diagnosis would change to schizophrenia at 24 months. Thus, although a sizable subgroup of subjects did not meet criteria for a schizophrenia spectrum disorder until after the 6-month evaluation, they nonetheless differed from others receiving nonschizophrenia spectrum diagnoses in a variety of ways that foreshadowed their subsequent change

Table 4. Functioning at 24-Month Follow-up by Diagnostic Change Group*

	Stable Schizophrenia Spectrum Disorder (n = 171)	Change to Schizophrenia Spectrum Disorder (n = 45)	Stable Bipolar Disorder (n = 117)	Stable MDD (n = 76)	Stable Other Diagnoses (n = 50)	Change Within Nonschizophrenia Spectrum (n = 70)	Change From Schizophrenia Spectrum Disorder (n = 18)
SANS, mean ± SD	1.8 ± 0.9	1.9 ± 0.9‡	0.5 ± 0.6	0.9 ± 0.8	0.8 ± 0.6	1.0 ± 0.9	0.8 ± 0.8
SAPS, mean ± SD	0.8 ± 0.8	0.7 ± 0.8§	0.3 ± 0.6	0.3 ± 0.5	0.5 ± 0.7	0.6 ± 0.9	0.3 ± 0.5
BPRS, illness severity, mean ± SD	3.9 ± 1.1	3.9 ± 1.1‡	2.4 ± 1.3	2.7 ± 1.3	2.6 ± 1.4	3.1 ± 1.4	2.6 ± 1.5
GAF best month past 18 mo, mean ± SD	48.3 ± 12.8	51.0 ± 12.8‡	69.2 ± 10.6	63.8 ± 13.4	61.7 ± 14.0	59.8 ± 14.3	64.4 ± 11.0
GAF worst week of past month, mean ± SD	39.8 ± 11.8	40.0 ± 13.8‡	59.1 ± 14.7	55.3 ± 15.2	52.4 ± 16.1	49.3 ± 17.5	58.4 ± 12.8
Return to best premorbid functioning (1-4 [low]), mean ± SD	3.1 ± 1.1	3.1 ± 0.9‡	1.4 ± 0.7	1.7 ± 1.0	1.7 ± 1.0	1.9 ± 1.0	2.0 ± 1.1
Occupational functioning (1-5 [poor]), mean ± SD	4.4 ± 1.3	4.5 ± 0.9‡	2.3 ± 1.6	3.0 ± 1.8	2.9 ± 1.8	3.1 ± 1.8	4.0 ± 1.3
Rehospitalized between 6- and 24-mo follow-up, No. (%)	45 (30)	17 (42)§	24 (23)	12 (17)	7 (17)	23 (38)	6 (37)
Good overall outcome (World Health Organization/remission), No. (%)	25 (15)	10 (23)‡	89 (81)	40 (55)	30 (71)	36 (60)	7 (50)
24-mo research diagnosis was probable (vs definite), No. (%)	9 (5)†	17 (38)‖	15 (13)	5 (7)	9 (18)	17 (25)	7 (39)

*MDD indicates major depressive disorder; SANS, Scale for the Assessment of Negative Symptoms; SAPS, Scale for the Assessment of Positive Symptoms; BPRS, Brief Psychiatric Rating Scale; and GAF, Global Assessment of Functioning.

†P<.001 for column 2 vs column 1; for t tests, df = 165-204; for χ^2 test, df = 1 (N = 191-216).

‡P<.001 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 273 to 356.

§P<.05 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 273 to 356.

‖P<.01 for column 2 vs column 3 through 6, controlling for broad 6-month diagnostic category; for logistic regressions, N = 273 to 356.

in diagnosis. The predictive power of receiving a facility diagnosis of schizophrenia and being given antipsychotic medications upon hospital discharge implies that there were clinical indications early on that some subjects might have schizophrenia, even though they did not meet *DSM-IV* criteria at 6 months. Perhaps the *DSM-IV* criteria for schizophrenia are excessively conservative during the early phase of the illness, at least when used to generate research diagnoses. If true, this has the desirable effect of reducing the risk of falsely labeling a patient as schizophrenic.

The methods of this study enabled us to minimize measurement effects by basing the second interview on the first, focusing on the interval course of the symptoms, and clarifying contradictory information obtained over time and from multiple sources. The prospective epidemiological design and careful documentation of diagnostic decisions enhanced the study. In contrast, studies of changes in facility diagnoses of rehospitalized patients are limited by selection bias and unverifiable diagnoses. We note, however, that while the strengths of this study derive from the prospective nature of the study design, the Suffolk County Mental Health Project is a first-admission rather than a first-episode study. This means that some subjects had complicated histories that were difficult to reconstruct, and this may have contributed to some of the temporal instability in diagnosis. The other limitation of this study is that there were too few subjects available to permit analyses of the factors contributing to the instability of less prevalent diagnoses, such as psychosis NOS, delusional disorder, or brief psychosis.

The temporal consistency of schizophrenia disorders in our study is similar to that found in other longitudinal studies. The diagnostic system in part contributes to this high level of consistency because of the requirement that symptoms of schizophrenia be present for at least 6 months.

Table 5. Variables Predicting Shift to a Schizophrenia Spectrum Diagnosis at 24-Month Follow-up* and Summary of Results From Stepwise Logistic Regression† (N = 230)‡

	Odds Ratio (95% CI)
6-mo diagnosis	
Bipolar	1.07 (0.29-3.97)
Major depression	0.42 (0.10-1.74)
Other (reference)	. . .
Facility diagnosis of schizophrenia	3.62§ (1.13-11.60)
Negative symptoms at 6 mo, SANS	1.98§ (1.08-3.64)
Insidious onset at ≥3 mo to hospitalization	5.21‖ (1.64-16.5)
Given antipsychotic medication upon hospital discharge	10.33§ (1.67-63.8)
Duration of initial hospital stay (transformed to the 0.5 power and adjusted for year and facility)	1.34§ (1.01-1.78)
Psychosocial adjustment during adolescence (×10)	1.62§ (1.11-2.36)
Lifetime substance use disorder	0.27§ (0.09-0.86)

*The comparison group was all those with nonschizophrenia spectrum diagnoses at both the 6- and 24-month follow-ups.

†Variables are presented in the order they were entered into the stepwise analysis. Negative symptoms at baseline and 6-month Global Assessment of Functioning for highest level of functioning did not enter the equation.

‡CI indicates confidence interval; SANS, Scale for the Assessment of Negative Symptoms.

§P<.05.

‖P<.01.

Among the affective psychoses, a 6-month diagnosis of bipolar disorder with psychosis was somewhat more stable than that of major depression with psychosis. The

less frequent specific diagnoses, such as delusional disorder and substance-induced psychosis, were less stable. The unknown and nonspecific diagnoses, including psychosis NOS and brief psychosis, showed little stability. It should be noted that since our 24-month diagnoses were based, in part, on the same information used to formulate the 6-month diagnoses, the consistency is probably higher than would be obtained if the 2 diagnoses had been made from independently collected data.

Some of the shifts in diagnosis over time were conceptually plausible. For example, seven 6-month major depression cases shifted to bipolar disorder, seven 6-month schizoaffective disorder cases shifted to an affective disorder, and 7 subjects with psychosis NOS shifted to schizophrenia at 24 months. Others were unexpected, such as the three 6-month schizophrenia cases who shifted to affective disorder and the three 6-month bipolar cases who shifted to psychosis NOS. We rereviewed each of these unexpected shifts to verify that the psychiatrists had not overlooked information at 6 months and simply erred in their diagnosis.

CONCLUSIONS

Diagnostic changes over time may reflect the evolution of an illness, the emergence of new information, or unreliability of measurement. In the Suffolk County sample, diagnosed with a consensus procedure and nonblind reinterview information, the changes in diagnosis were mostly attributable to the evolution of the illness. The greatest instability occurred in the least frequent diagnostic categories. This is one of only a few studies to investigate factors associated with a change in diagnosis, finding that aspects of prehospital functioning, facility diagnosis, and treatment were strongly predictive a diagnostic shift to schizophrenia. Ironically, rigid adherence to *DSM-IV* criteria caused us to initially underdiagnose individuals whom the facilities diagnosed as having schizophrenia. These findings support the need for a longitudinally based diagnostic process in research that relies on existing nosological systems to diagnose first-admission patients.

Accepted for publication March 1, 2000.

This study was supported in part by grant MH-44801 from the National Institute of Mental Health, Bethesda, Md (Dr Bromet).

We thank Lina Jandorf, MA, for assistance with the data; Lynda Geller, PhD, for overseeing the field work during the first phase of the study; Susan Squires Malvese, BA, for organizing the diagnostic conferences; Joanne Caponi, MSW, Theresa Escobar, MSW, Elyse Everett, MSW, Wayne Gurnick, MSW, Jacqueline Lasher, MSW, and Maribeth McKeever, MSW, for conducting the interviews; Beatrice Kovasznay, MD, Noam Eitan, MD, Kinga Koreh, MD, Ramin Mojtabai, MD, Ranga Ram, MD, Charles Rich, MD, Joan Rubinstein, MD, and Gerard Tolentino, MD, for diagnosing the subjects; and the many mental health professionals, study participants, and their family members for the efforts they have given to this project.

Reprints: Joseph E. Schwartz, PhD, Department of Psychiatry, Putnam Hall-South Campus, SUNY-Stony Brook, Stony Brook, NY 11794-8790 (e-mail: jschwartz@mail.psychiatry.sunysb.edu).

REFERENCES

1. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Third Edition.* Washington, DC: American Psychiatric Association; 1980.
2. Fennig S, Kovasznay B, Rich C, Ram R, Pato C, Miller A, Rubinstein J, Carlson G, Schwartz JE, Phelan J, Lavelle J, Craig T, Bromet E. Six-month stability of psychiatric diagnoses in first-admission patients with psychosis. *Am J Psychiatry.* 1994;151:1200-1208.
3. Amara IB. Consistency in the diagnosis of the functional psychoses. *Can Psychiatr Assoc J.* 1978;23:329-336.
4. Babigian HM, Gardner EA, Miles HC, Romano J. Diagnostic consistency and change in a follow-up study of 1215 patients. *Am J Psychiatry.* 1965;121:895-901.
5. Chen YR, Swann AC, Burt DB. Stability of diagnosis in schizophrenia. *Am J Psychiatry.* 1996;153:682-686.
6. Jørgensen P, Mortensen PB. Admission pattern and diagnostic stability of patients with functional psychoses in Denmark during a two-year observation period. *Acta Psychiatr Scand.* 1988;78:361-365.
7. Kendell RE. The stability of psychiatric diagnoses. *Br J Psychiatry.* 1974;124:352-356.
8. Rabinowitz J, Slyuzberg M, Ritsner M, Mark M, Popper M, Ginath Y. Changes in diagnosis in a 9-year national longitudinal sample. *Compr Psychiatry.* 1994;35:361-365.
9. Stanton MW, Joyce PR. Stability of psychiatric diagnoses in New Zealand psychiatric hospitals. *Aust N Z J Psychiatry.* 1993;27:2-8.
10. Weeke A. Admission pattern and diagnostic stability among unipolar and bipolar manic-depressive patients. *Acta Psychiatr Scand.* 1984;70:603-613.
11. Cohen P, Cohen J. The clinician's illusion. *Arch Gen Psychiatry.* 1984;41:1178-1182.
12. Beiser M, Iacono WG, Erickson D. Temporal stability in the major mental disorders. In: Robins LN, Barrett JE, eds. *The Validity of Psychiatric Diagnosis.* New York, NY: Raven Press; 1989:77-97.
13. Tohen M, Tsuang MT, Goodwin DC. Prediction of outcome in mania by mood-congruent or mood-incongruent psychotic features. *Am J Psychiatry.* 1992;149:1580-1584.
14. Lenz G, Simhandl C, Thau K, Berner P, Gabriel E. Temporal stability of diagnostic criteria for functional psychoses: results from the Vienna follow-up study. *Psychopathology.* 1991;24:328-335.
15. Craig TJ, Wanderling JA, Janca A. Long-term diagnostic stability in international cohorts of persons with schizophrenia and related psychoses. In: Hooper K, Harris G, Janca A, Sartorius N, eds. *Prospects for Recovery From Schizophrenia—An International Investigation: Report From the WHO-Collaborative Project on the International Study of Schizophrenia.* Westport, Conn: Psychosocial Press. In press.
16. Mason P, Harrison G, Croudace T, Glazebrook C, Medley I. The predictive validity of a diagnosis of schizophrenia: a report from the International Study of Schizophrenia (ISoS) coordinated by the World Health Organization and Department of Psychiatry, University of Nottingham. *Br J Psychiatry.* 1997;170:321-327.
17. Lee AS, Murray RM. The long-term outcome of Maudsley depressives. *Br J Psychiatry.* 1988;153:741-751.
18. Marneros A, Deister A, Rohde A. Stability of diagnoses in affective, schizoaffective and schizophrenic disorders: cross-sectional versus longitudinal diagnoses. *Eur Arch Psychiatry Clin Neurosci.* 1991;241:187-192.
19. Tsuang MT, Woolson RF, Winokur G, Crowe RR. Stability of psychiatric diagnosis: schizophrenia and affective disorders followed up over a 30- to 40-year period. *Arch Gen Psychiatry.* 1981;38:535-539.
20. Bromet E, Schwartz J, Fennig S, Geller L, Jandorf L, Kovasznay B, Lavelle J, Miller A, Pato C, Ram R, Rich C. The epidemiology of psychosis: the Suffolk County Mental Health Project. *Schizophr Bull.* 1992;18:243-255.
21. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition.* Washington, DC: American Psychiatric Association; 1994.
22. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Revised Third Edition.* Washington, DC: American Psychiatric Association; 1987.
23. Spitzer RL, Williams JB, Gibbon M, First MB. The Structured Clinical Interview for *DSM-III-R* (SCID), I: history, rationale, and description. *Arch Gen Psychiatry.* 1992;49:624-629.
24. Ammons RB, Ammons CH. The Quick Test: provisional manual. *Psychol Rep.* 1962:11:111-161.
25. Endicott J, Andreasen N, Spitzer RL. *Family History-Research Diagnostic Criteria.* New York, NY: Biometrics Research, New York State Psychiatric Institute; 1985.
26. Cannon-Spoor HE, Potkin SG, Wyatt RJ. Measurement of premorbid adjustment in chronic schizophrenia. *Schizophr Bull.* 1982;8:470-484.
27. Andreasen NC, Arndt S, Alliger R, Miller D, Flaum M. Symptoms of schizophrenia: methods, meaning, and mechanism. *Arch Gen Psychiatry.* 1995;52:341-351.
28. Woerner ME, Manuzza S, Kane JM. Anchoring the BPRS: an aid to improved reliability. *Psychopharm Bull.* 1988;24:112-124.
29. Endicott J, Spitzer RL. A diagnostic interview: the Schedule for Affective Disorders and Schizophrenia. *Arch Gen Psychiatry.* 1978;35:837-844.
30. Jablensky A, Sartorius N, Ernberg G, Anker M, Korten A, Cooper JE, Day R, Bertelsen A. Schizophrenia: manifestations, incidence and course in different cultures: a World Health Organization ten-country study. *Psychol Med Monogr Suppl.* 1992;20:1-97.
31. Winokur G, Monahan P, Coryell W, Zimmerman M. Schizophrenia and affective disorder—distinct entities or continuum? an analysis based on a prospective 6-year follow-up. *Compr Psychiatry.* 1996;37:77-87.