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Stability of early-phase primary psychotic disorders with concurrent substance use and substance-induced psychosis

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Background The stability of the diagnostic distinction between a substance-induced psychosis and a primary psychotic disorder co-occurring with substance use is not established.

Aims To describe DSM–IV diagnostic changes over 1 year and determine the predictive validity of baseline indicators of the substance-induced psychosis *v.* primary psychosis distinction.

Method We conducted a 1-year follow-up study of 319 psychiatric emergency department admissions with diagnoses of early-phase psychosis and substance use comorbidity.

Results Of those with a baseline DSM–IV diagnosis of substance-induced psychosis, 25% had a diagnosis of primary psychosis at follow-up. These patients had poorer premorbid functioning, less insight into psychosis and greater family mental illness than patients with a stable diagnosis of substance-induced psychosis. Reclassifying change cases to primary psychoses on follow-up, key baseline predictors of the primary/substance-induced distinction at 1 year also included greater family history of mental illness in the primary psychosis group.

Conclusions Further study of substance-induced psychoses should employ neuroscientific and behavioural approaches. Study findings can guide more accurate diagnoses at first treatment.

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Comorbid substance use is frequently observed among patients presenting for treatment with symptoms of psychosis (Serper *et al*, 1999; Weaver *et al*, 2003; Arseneault *et al*, 2004; Green *et al*, 2005). Among patients presenting with a first episode of psychosis, lifetime comorbidity with substance use disorder has been observed in a third to nearly a half of admissions (Van Mastrigt *et al*, 2004; Barnes *et al*, 2006; Mauri *et al*, 2006). Diagnostic certainty in early-phase psychotic disorder is often difficult to achieve (Drake *et al*, 2003) and is challenged further when psychosis co-occurs with the use of alcohol or drugs (Grech *et al*, 2005). Diagnostic change over time has been observed in longitudinal studies of primary psychotic disorders (McGorry, 1994; Schwartz *et al*, 2000). Despite the clinical significance of a differential diagnosis between a primary and a substance-induced psychotic disorder, surprisingly little is known about longitudinal diagnostic stability and change in psychotic disorders co-occurring with alcohol or drug use. A change in diagnosis from a substance-induced psychosis to a primary psychosis can reflect the evolution of an illness, the availability of new information about onset or course, or unreliable diagnostic assessments (Schwartz *et al*, 2000). Psychotomimetic drug use may precipitate a schizophrenia-like illness (Andreasson *et al*, 1988; Boutros & Bowers, 1996; Zammit *et al*, 2002) or may evolve into a chronic psychotic disorder over time (McLellan *et al*, 1979). Yet systematic evidence for such a diagnostic shift is lacking. The distinction between a substance-induced psychosis and a primary psychotic disorder is important because these two disorders require fundamentally different approaches to treatment.

In the study reported here we used follow-up data from participants in an earlier study to address the stability of DSM–IV primary and substance-induced psychotic disorders; predictors of change in diagnosis during the follow-up; and the 1-year predictive validity of the key variables that distinguished the primary and substance-induced psychosis groups at baseline.

METHOD

Study aims

Our study consisted of a 1-year follow-up assessment of a sample of 386 patients with early-phase psychosis and substance use (Caton *et al*, 2005). We reported previously that among this patient group at baseline assessment (Caton *et al*, 2005), patients with substance-induced psychosis had greater personal and parental substance use disorders and more often experienced visual hallucinations, whereas patients with primary psychosis had greater overall psychopathology on the Positive and Negative Syndrome Scale (PANSS; Kay *et al*, 1992).

To study diagnostic stability and change over the first year of follow-up, we compared diagnostic assessments made at baseline with diagnostic assessments made at the 6-month and 12-month follow-up points. We focused on the primary distinction between psychosis and substance-induced psychosis. We observed substance-induced psychotic episodes in participants with baseline primary psychotic disorder whose diagnostic designation by definition remained stable. However, the main focus of our research was on cases with a change from a baseline diagnosis of substance-induced psychosis to a follow-up diagnosis of primary psychosis. To study the predictive validity of key variables distinguishing the two diagnostic groups at baseline, we used baseline assessments of demographic, family and clinical variables, and the follow-up diagnosis at 1 year.

Design and setting

Research methods in this longitudinal cohort study have been described in detail elsewhere (Caton *et al*, 2005). Briefly, participants were recruited from five psychiatric emergency departments in upper Manhattan.

Participants

The study sought to identify people experiencing psychosis in an early phase. We followed the precedent established in prior research on early psychosis (Schwartz *et al*, 2000) by excluding those whose first admission to hospital for psychosis occurred

more than 6 months prior to the index admission. We did not include individuals who had experienced an extended duration of continuous psychotic symptoms in the absence of prior treatment, out of concern that psychotic symptoms might already be chronic. Participants were English- or Spanish-speaking, aged 17–45 years, had at least one psychotic symptom assessed during administration of the research protocol and had used alcohol or drugs within the preceding 30 days. All patients who met these criteria were eligible for the study, regardless of psychosis diagnosis.

Of the 386 participants meeting DSM–IV criteria for primary or substance-induced psychotic disorder at baseline, follow-up data were obtained on 319 (83%). Of the 67 who were not interviewed post-baseline, 31 were lost to follow-up, 16 left the region and could not be interviewed, 11 were incarcerated and could not be interviewed, 8 refused to continue their participation in the study, and 1 died. Compared with the interviewed group, those not interviewed had greater homelessness, more unemployment and poorer family support. There was no difference in gender, age, race, level of education, jail or prison history, or baseline diagnosis of primary or substance-induced psychosis. Characteristics of the interviewed group are shown in Table 1.

Data collection

Participants were initially interviewed at baseline after voluntary informed consent was obtained. They were contacted monthly to obtain information on clinical status and service use, and were re-interviewed in depth at 6 months and 12 months. Follow-up interviews were typically conducted in the community by trained assessors with master's degrees in psychology or social work. The research protocol was approved by the institutional review boards of the New York State Psychiatric Institute/Columbia University Medical Center and the other institutions from which participants were recruited.

Assessments

Research diagnostic assessments at baseline and follow-up

Research diagnoses were made using the Psychiatric Research Interview for Substance and Mental Disorders (PRISM; Hasin *et al*, 1996, 2006), which was developed to assess psychiatric and substance use comorbidity using DSM–IV criteria (American Psychiatric Association, 1994). A detailed description of the PRISM interview, DSM–IV guidelines to distinguish between a primary psychotic disorder and substance-induced psychosis, and the implementation of these guidelines is given by Caton *et al* (2005). Test–retest reliability for psychotic symptoms in the PRISM is good to excellent (κ=0.63–0.76; Hasin *et al*, 1996), and the PRISM differentiation between primary and substance-induced psychotic disorders was good to excellent (κ=0.75–0.86; Hasin *et al*, 2006). Validation of PRISM diagnoses using psychiatrists' re-evaluations of Spanish-speaking patients showed very good to excellent agreement (κ=0.74–0.85 for current psychosis; Torrens *et al*, 2004).

The PRISM follow-up interview was administered in community settings, hospital or in the project offices. Additional data sources for the PRISM diagnosis included diagnostic assessments of clinical staff, hospital charts (baseline only), family/collateral reports of substance use and onset/offset of psychosis, and urine toxicological screens at baseline and follow-up. Symptoms and substance use were considered present when indicated by any data source. When a source indicated that psychotic symptoms antedated heavy substance use, or persisted during at least 4 weeks of abstinence, the PRISM assigned a primary diagnosis.

We compared PRISM primary and substance-induced psychosis at baseline with the 1-year follow-up diagnosis. Diagnostic stability was defined as having the same category (primary or substance-induced psychosis) at baseline and follow-up, and diagnostic change was defined as a shift from baseline substance-induced psychosis to primary psychosis at either the 6-month or 12-month follow-up points. The strict decision rules of the PRISM/DSM–IV procedure minimise the probability of overdiagnosis of a primary psychotic disorder (e.g. a diagnosis of substance-induced psychosis is the 'default' in DSM–IV criteria when there is insufficient evidence to support a primary psychotic diagnosis). Sufficient evidence includes psychotic symptoms preceding the onset of substance use, persistence of symptoms for a substantial period after cessation of use, or substantially excessive symptoms given the type, duration and amount of substance used. A diagnosis of primary psychotic disorder is treated as a lifetime designation in this study, although DSM–IV specifies that substance-induced episodes can occur during the 12-month interval in people with a primary psychotic disorder at baseline. New substance-induced psychosis was

Table 1 Demographic characteristics of the three diagnostic groups

	Primary psychosis group (n=186)	Substance-induced psychosis group (n=99)	Change group (n=34)	Statistical test[1]	
				Primary *v.* change χ^2 (d.f.)	Induced *v.* change χ^2 (d.f.)
Gender, *n* (%)					
Male	127 (68)	74 (75)	25 (74)	0.38 (1)	0.02 (1)
Female	59 (32)	25 (25)	9 (26)		
Age, years: mean (s.d.)	27.5 (8.3)	30.2 (8.5)	28.3 (8.2)	0.29 (1)	1.34 (1)
Marital status, *n* (%)					
Single (never married)	148 (80)	68 (69)	23 (68)	0.20 (1)	0.13 (1)
Married/cohabiting	38 (20)	31 (31)	11 (32)		
Ethnicity, *n* (%)					
African–American	83 (45)	45 (46)	14 (41)		
Hispanic	70 (38)	44 (44)	16 (47)	1.37 (2)	0.21 (2)
White/other	33 (18)	10 (10)	4 (12)		
Level of education, *n* (%)					
No high school diploma	80 (43)	48 (49)	19 (56)		
High school diploma	40 (22)	19 (19)	7 (21)	2.35 (1)	0.98 (1)
Some college	66 (35)	32 (32)	8 (23)		

1. Likelihood ratio chi-squared test.

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diagnosed at follow-up only if the baseline episode remitted for at least 2 months. These cases, unlike those with a diagnostic change from substance-induced to primary disorder, do not represent a true change in diagnostic distinction. An illness classified as either primary psychosis or substance-induced psychosis could have been in remission at either the 6-month or 12-month follow-up with no change in diagnostic category.

Baseline assessment of the sample

To explore the predictive validity of baseline characteristics distinguishing primary from substance-induced psychosis at baseline, we used demographic data and information on living arrangement, education, employment, criminal justice contacts, out-of-home placement in childhood, current family support and participants' reports of family history from the Community Care Schedule (Caton, 1997). Family history of mental illness was indicated by a participant's report of a parent having undergone psychiatric treatment. Parental substance misuse was based on the participant's report of a parent's problems with drugs or alcohol (treated or untreated).

Psychiatric symptoms were assessed with the PANSS (Kay *et al*, 1992). The PANSS total score on overall psychopathology was used for the analyses reported here. The PRISM provided information on visual and auditory hallucinations.

Psychosocial, educational and occupational functioning in childhood, adolescence and adulthood were rated with the Premorbid Adjustment Scale (PAS, Cannon-Spoor *et al*, 1982). The PAS overall score was used in the analyses reported here. The Scale to Assess Unawareness of Mental Disorders (SUMD; Amador *et al*, 1993) indicated insight into having a mental illness or a reaction to heavy drug use. The instrument yields two scores: 'unawareness of symptom' score (lack of awareness of the existence of a psychotic symptom) and 'misattribution of symptom' score (lack of understanding that a psychotic symptom is a manifestation of a mental illness or is related to alcohol or drug use).

Analysis

Participants' diagnoses were classified as 'primary' or 'substance-induced' based on PRISM assessment at three points in time: baseline, 6 months and 12 months. In studying diagnostic stability and change, the distinction between the primary and substance-induced psychosis is the only diagnostic dimension herein reported (e.g. a change from schizophrenia to schizoaffective disorder would not be considered a change for this analysis). When baseline and follow-up diagnoses were compared, three diagnostic categories were created: stable primary psychosis, stable substance-induced psychosis and change from substance-induced psychosis to primary psychosis. Subsequent substance-induced psychotic episodes in participants with a prior diagnosis of primary psychosis did not warrant a change in diagnosis.

These three diagnostic groups were compared on the demographic, family and clinical domains outlined above. We were especially interested in the differences between the 'change' group and the stable primary psychosis and substance-induced psychosis groups, and for each domain we examined the binary distinctions between the change group and each of the stable groups. We used logistic regression analyses (Kleinbaum *et al*, 1998) with the binary diagnostic distinctions as the outcomes and the variables in the domains as explanatory variables. Because of the large number of possible comparisons in these analyses, we adopted the following procedure for containing type I error. Within each domain, we examined model-based likelihood ratio chi-squared test (LRT) omnibus tests to determine if there was evidence that the variables in the domain were related to either the change *v.* primary psychosis comparison or the change *v.* substance-induced psychosis comparison. If the omnibus test was significant, we examined tests of the individual variables within the domain. Each of these individual variables was also tested using the likelihood ratio test from the logistic regression. This allowed a unified treatment of continuous and categorical variables within the domain. The omnibus tests for the family and clinical domains were adjusted for demographic variables. We show both the adjusted and unadjusted LRT tests for the individual variables.

In a final analysis, the change group (n=34) and the stable primary psychosis group (n=186) were combined to create a group of people who all had a 1-year primary psychosis diagnosis (n=220). We compared this group with the stable substance-induced psychosis group at 1 year (n=99) using the set of baseline demographic, family and clinical characteristics that we had used previously (Caton *et al*, 2005) to examine the diagnostic distinction at baseline. We entered all these variables at once in a multivariate logistic regression (Kleinbaum *et al*, 1998) which estimated the unique effect of each variable. Statistical significance was determined using the $P<0.05$ level and two-tailed tests of significance.

RESULTS

Diagnostic stability and change

At follow-up, 285 participants (89%) retained their baseline diagnostic category. We identified 10 participants with a baseline diagnosis of primary psychotic disorder that remitted during the follow-up interval who experienced a new substance-induced psychotic episode at some point in the follow-up interval (e.g. onset of psychotic symptoms followed drug ingestion and later remitted within a 4-week drug-free period). This group shared many baseline characteristics with the stable primary psychosis group, including similar scores on positive symptoms (mean total PANSS score 66.5 in contrast to 66.7 for cases of primary psychosis without subsequent substance-induced episodes). However, 80% had a diagnosis of substance dependence in contrast to 45% of those with primary psychotic disorder and no substance-induced psychotic episode. The low number of people in this group obviates meaningful comparisons on baseline predictors. Since their diagnostic classification remained primary psychosis (i.e. the new substance-induced episode did not invalidate the baseline primary classification), these 10 cases were included in the primary psychosis group.

Thirty-four participants (11%) had a change in diagnosis from substance-induced psychosis at baseline to primary psychosis at follow-up (the 'change' group). Nearly three-quarters of these (74%; n=25) changed in the first 6 months post-baseline as a result of persistent psychotic symptoms in the absence of substance use. Significant numbers of those in the change group (71%) and the stable substance-induced psychosis group (61%) also carried a diagnosis of misuse of or dependence on any drug (including alcohol) at follow-up, in contrast to 33% in the stable primary psychosis group. The most common primary psychosis diagnoses in the change group were schizophrenia or schizophreniform disorder (n=15; 44%), psychotic mood disorder (n=9; 26%) and psychotic disorder not otherwise specified (n=8; 24%).

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Change group *v.* the stable primary psychosis group

There was no significant difference in demographic characteristics (omnibus LRT=6.2, d.f.=7, NS) (Table 1) or family history (omnibus LRT=5.45, d.f.=2, NS) (Table 2) when the change group and the primary psychosis group were compared. When the clinical domain was considered (Table 3), the difference between the change group and the stable primary psychosis group was significant (omnibus LRT=13.23 d.f.=4, $P<0.05$). Bivariate tests suggest that the difference between the two groups was owing to the lower baseline PANSS score – indicating less psychopathological disorder – in the change group compared with the stable primary psychosis group. Adjusted and unadjusted bivariate comparisons on the total PANSS score for the primary psychosis group and the change group were significant ($P<0.05$). There was no significant difference between the two diagnostic groups in bivariate tests of the premorbid adjustment scores or the unawareness of psychosis and misattribution scores.

Substance dependence and associated clinical characteristics (Table 4) differed significantly between the stable primary psychosis group and the change group (omnibus LRT=20.6, d.f.=3, $P<0.01$). Bivariate comparisons between the stable primary psychosis group and the change group suggest that the difference is chiefly a result of differences in substance misuse or dependence, and to a lesser degree to differences in suicidal ideation. Most (83%) of the change group had a baseline diagnosis of substance dependence, compared with 47% of the stable primary psychosis group. Bivariate tests showed significant group differences ($P<0.01$) for the unadjusted comparison and a comparison adjusted for demographic variables. Nearly half (47%) of the change group had suicidal ideation at baseline, compared with 28% of the stable primary psychosis group. The bivariate comparison was significant ($P<0.05$) for the unadjusted comparison, a finding that did not persist when a comparison was adjusted for demographic variables. The two diagnostic groups showed no significant difference in baseline visual hallucinations.

Change group *v.* the stable substance-induced psychosis group

The change group did not differ significantly from the stable substance-induced psychosis group on demographic characteristics: omnibus LRT=2.49, d.f.=7, NS (see Table 1). However, the family history variables differed between these two groups: omnibus LRT=9.95, d.f.=2,

Table 2 Family history characteristics of the three diagnostic groups

	Primary psychosis group (n=186) *n* (%)	Substance-induced psychosis group (n=99) *n* (%)	Change group (n=34) *n* (%)	Statistical test[1]			
				Primary *v.* change		Substance-induced *v.* change	
				Unadjusted χ^2	Adjusted[2] χ^2	Unadjusted χ^2	Adjusted[2] χ^2
Parental mental illness							
Yes	29 (16)	7 (7)	10 (29)	3.38	2.47	9.90**	8.90**
No	157 (84)	92 (93)	24 (71)				
Parental substance use							
Yes	57 (31)	40 (40)	16 (47)	3.35	3.78	0.46	0.59
No	129 (69)	59 (60)	18 (53)				

1. Likelihood ratio chi-squared test, d.f.=1.
2. Adjusted for age, gender, race, marital status and education level.
*$P<0.05$, **$P<0.01$.

Table 3 Clinical characteristics of the three diagnostic groups

	Primary psychosis group (n=186) Mean (s.d.)	Substance-induced psychosis group (n=99) Mean (s.d.)	Change group (n=34) Mean (s.d.)	Statistical test[1]			
				Primary *v.* change		Substance-induced *v.* change	
				Unadjusted χ^2	Adjusted[2] χ^2	Unadjusted χ^2	Adjusted[2] χ^2
Premorbid adjustment scale score	0.32 (0.14)	0.31 (0.12)	0.37 (0.15)	3.43	3.69	6.21*	5.34*
PANSS	66.72 (21.25)	54.65 (15.45)	57.71 (12.75)	6.35*	5.90*	1.07	0.50
Unawareness score	2.80 (1.57)	1.75 (1.70)	2.59 (1.70)	0.50	0.20	5.99*	5.31*
Misattribution score	2.97 (1.81)	2.21 (2.05)	2.75 (1.92)	0.45 (1)	0.44	1.81	1.41

PANSS, Positive and Negative Syndrome Scale
1. Likelihood ratio chi-squared test, d.f.=1.
2. Adjusted for age, gender, race, marital status and education level.
*$P<0.05$.

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Table 4 Substance use disorder and associated clinical characteristics of the three diagnostic groups

	Primary psychosis group (n=186) %	Substance-induced psychosis group (n=99) %	Change group (n=34) %	Statistical test[1]			
				Primary *v.* change		Substance-induced *v.* change	
				Unadjusted χ^2	Adjusted[2] χ^2	Unadjusted χ^2	Adjusted[2] χ^2
Any drug use or dependence							
Yes	87 (47)	85 (86)	28 (82)	15.76**	7.10	0.24	0.52
No	99 (53)	14 (14)	6 (18)				
Visual hallucinations							
Yes	25 (13)	26 (26)	6 (18)	0.40	0.18	1.08	1.91
No	161 (87)	73 (74)	28 (82)				
Suicidal ideation, past 12 months							
Yes	52 (28)	30 (30)	16 (47)	4.64*	3.41	3.06	2.85
No	134 (72)	69 (70)	18 (53)				

1. Likelihood ratio chi-squared test, d.f.=1.
2. Adjusted for age, gender, race, marital status and education level.
*$P<0.05$, **$P<0.01$.

$P<0.01$ (see Table 2). Bivariate tests suggest that the difference is owing to greater parental mental illness in the change group: 30% of the change group had a parent with mental illness, compared with 7% of the stable substance-induced psychosis group ($P<0.01$ for both unadjusted and adjusted comparisons). No significant difference was observed in the bivariate test for parental substance misuse.

Clinical variables (see Table 3) also differed significantly between these two groups (omnibus LRT=11.09, d.f.=4, $P<0.05$). Bivariate comparisons indicated that compared with the stable substance-induced psychosis group the change group had poorer premorbid adjustment ($P<0.05$ for both unadjusted and adjusted comparisons) and less awareness of psychosis ($P<0.05$ for both unadjusted and adjusted comparisons). No difference between the two groups was observed for overall psychopathology assessed with the PANSS, or for the misattribution score. Moreover, as shown in Table 4, the two groups did not differ on substance misuse/dependence or associated clinical characteristics: omnibus LRT=5.49, d.f.=3, NS.

Predictive validity of key baseline variables

To test the predictive validity of baseline differences between primary psychotic disorders and substance-induced psychoses in determining psychosis diagnosis at the 1-year assessment, the change group (n=34) was combined with the stable primary psychosis group (n=186) to create a new primary psychosis group (n=220) based on the 1-year diagnosis. The stable substance-induced psychosis group retained its sample size of 99 participants based on the 1-year diagnosis. Table 5 shows the results of a logistic regression for the test of the predictive validity of baseline demographic, family and clinical variables in determining the primary *v.* substance-induced psychosis distinction at 1 year. When 1-year psychosis diagnosis was the outcome, three variables that had been found to distinguish the primary and substance-induced psychosis groups at baseline remained the same. The primary psychosis group had greater overall psychopathology assessed with the PANSS, whereas the substance-induced psychosis group had greater substance misuse/dependence and greater visual hallucinations. Although parental substance misuse no longer remained significant at the $P<0.05$ level, the odds ratio of 1.5 remained within the 95% confidence interval. Importantly, we found that

Table 5 Logistic regression results for test of predictive validity of baseline variables in determining the distinction between primary psychosis and substance-induced psychosis at the 1-year follow-up (change group added to primary group)

Variables[1]	b	(s.e.)	OR	(95% CI)
Age	0.00	0.02	1.00	(0.96–1.04)
Female	−0.01	0.33	0.99	(0.52–1.87)
Hispanic	−0.34	0.33	0.72	(0.37–1.38)
White/other	−0.81	0.49	0.44	(0.17–1.16)
Married/cohabiting	0.45	0.37	1.56	(0.75–3.24)
High-school diploma	−0.11	0.38	0.90	(0.43–1.89)
Some college	0.16	0.36	1.17	(0.58–2.36)
Parental substance use	0.42	0.30	1.52	(0.84–2.74)
Parental mental illness	−0.98	0.49	0.38	(0.15–0.98)
Total PANSS score	−0.04	0.01	0.96	(0.95–0.98)
Any drug use/dependence	1.87	0.35	6.48	(3.25–12.91)
Visual hallucinations	1.11	0.37	3.04	(1.49–6.22)

PANSS, Positive and Negative Syndrome Scale.
1. The reference groups for categorical demographic variables were: male, African–American, single, no high-school diploma.

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parental mental illness was greater in the primary psychosis group.

DISCUSSION

The primary psychosis *v.* substance-induced psychosis distinction was remarkably stable over the 1-year follow-up period. Subsequent substance-induced psychotic episodes that occurred in 10 participants with a prior diagnosis of primary psychosis did not warrant a change in diagnosis by PRISM/DSM–IV convention, but clinicians should follow such patients closely to ensure that treatment prescriptions are appropriate, given these patients' excessive use of alcohol and drugs.

We observed a change in diagnostic category from substance-induced psychosis at baseline to primary psychotic disorder at the 1-year follow-up in 34 study participants, representing about 25% of those diagnosed with substance-induced psychosis at baseline. Greater instability in substance-induced psychosis diagnoses compared with primary psychosis diagnoses had been observed previously (Whitty *et al*, 2005). The frequency of our research diagnostic assessments over the course of follow-up revealed that the greatest number of diagnostic changes occurred in the first 6-month period of follow-up. The change group shared some of the characteristics of both the stable primary psychosis and the stable substance-induced psychosis groups, but important differences were observed. In contrast to the stable primary psychosis group, the change group had markedly greater rates of substance use disorder, a characteristic shared with the stable substance-induced psychosis group and a small group of participants with primary psychosis who experienced substance-induced psychotic episodes in the follow-up period. Heavy substance misuse overlying presentation of psychotic symptoms in these patients undoubtedly added greater complexity to the diagnostic process. Other factors possibly influencing the diagnostic process include language and cultural differences, unreliable histories, presence of Axis II disorders and cognitive problems.

The significantly lower level of baseline psychotic symptoms in the change group compared with the stable primary psychosis group indicates that at intake these patients' psychotic disorder was less severe compared with those whose primary psychosis was fully manifest. The greater suicidal ideation in the change group compared with the stable primary psychosis group despite less severe psychotic symptoms underscores their need for thorough assessment and appropriate crisis treatment.

The change group differed from the stable substance-induced psychosis group at the initial presentation on three important dimensions: they had more parental mental illness, poorer premorbid adjustment and less insight into psychosis. The first two of these factors suggest a greater inherent vulnerability to psychosis in the change group compared with their counterparts in the stable substance-induced psychosis group. Clinicians should therefore attend to these indicators and follow such patients longitudinally to monitor the course of psychotic symptoms to ensure diagnostic accuracy and the most appropriate treatment prescriptions, which may ultimately include antipsychotic medication.

Reasons for a change from substance-induced psychotic disorder at baseline to primary psychotic disorder at the 1-year follow-up include several possibilities. The first is that there really was no change in diagnostic status over the follow-up year. Some of the cases diagnosed as substance-induced psychosis at baseline might have actually been primary psychotic disorders that were misdiagnosed owing to the cross-sectional nature of the baseline assessment, and did not have the benefit of observation over time. Moreover, features of the DSM–IV diagnostic criteria for psychotic disorders as implemented in the PRISM may lead to unstable diagnoses, for example if psychotic symptoms co-occur with substance use and an adequate substance-free period does not occur. In such cases the default DSM–IV diagnosis is substance-induced psychosis, consistent with the intent of this diagnostic system to avoid overdiagnosing as primary psychiatric disorders syndromes that are largely the effects of intoxication or withdrawal. Upon follow-up it might be possible to determine whether psychotic symptoms persisted in a subsequent substance-free period, leading to a more accurate diagnostic determination. Thus, 'change' cases could be an artefact of the diagnostic criteria rather than indicating true evolution of the disorder. However, a second reasonable possibility is that a substance-induced episode might be a marker for an emerging primary psychosis that was not yet manifest at the first admission. Such individuals might be especially vulnerable to the psychotomimetic properties of substances in the prodromal period prior to the development of a full psychotic disorder. Third, the first episode of a substance-induced psychosis might be part of a process of moving toward an autonomous psychotic disorder in those chronically misusing drugs. Chronic, heavy drug use may alter the brain chemistry in individuals who would not otherwise develop a primary psychosis (Boutros & Bowers, 1996). A clearer delineation of the relationship of substance use and psychosis requires further study employing neuroscientific as well as behavioural approaches. Findings from this investigation should be viewed as preliminary, owing to the small sample size and the unique demographic and social characteristics of the study population.

Of the four key predictors that distinguished the primary psychosis group from the substance-induced psychosis group at baseline (Caton *et al*, 2005), three – diagnosis of drug misuse/dependence, total PANSS score and visual hallucinations – remained as key predictors of the diagnostic distinction at 1 year. These findings support conclusions from a cross-sectional investigation reported previously (Rosenthal & Miner, 1997). Parental substance misuse was no longer significant at the 0.05 level, although its odds ratio of 1.5 remained within the 95% confidence interval. In addition, parental mental illness was found to be greater in the primary psychosis group – a finding that emerged at the 1-year follow-up that was not observed at baseline.

Clinical implications

The predictive validity of these baseline variables underscores their utility in assisting psychiatric emergency clinicians to make more accurate diagnoses and more appropriate treatment prescriptions when patients with early-phase psychotic disorders and substance use comorbidity initially present for treatment. Longitudinal follow-up of patients initially presenting with psychosis and substance use comorbidity is warranted by the occurrence of heavy substance misuse overlying presentation of psychotic symptoms, adding greater complexity to the diagnostic process, and the greater instability of substance-induced psychosis diagnoses.

Limitations

Our findings are based on an ethnically mixed sample of substance-using patients

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recruited from New York City psychiatric emergency departments, and might not be generalisable to other populations selected from different types of service settings (Kirkbride *et al*, 2006), although further research could clarify this issue. In addition, our findings are based solely on behavioural data. A clearer delineation of the relationship of substance use and psychosis requires further study employing neuroscientific as well as behavioural approaches. Continued longitudinal follow-up beyond 1-year will clarify the long-term outcome of disorders characterised by psychosis and substance use comorbidity.

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