Clinician Recognition of First Episode Psychosis

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A B S T R A C T

Purpose: Psychotic disorders develop during mid-adolescence through early adulthood, with the initial few months a "critical period" offering the greatest promise for recovery. However, the duration of untreated psychosis is typically over a year. This study aimed to identify aspects of care episodes contributing to delays in diagnosis of a first psychotic episode.
Methods: Study subjects included 161 adolescents and young adults referred to a first episode psychosis treatment program. We captured the various ways that people who experience a severe mental illness engage in treatment using standardized interviews with patients and informants (e.g., family member) and medical record review.
Results: A psychotic disorder diagnosis was not given for 38% of subjects at their initial episode of care. Time to first care episode was virtually the same for subjects that did and did not receive a psychosis diagnosis; 50% within 1 month and 84% within 6 months. Compared to initial care episodes with a psychosis diagnosis, those without a psychosis diagnosis less often involved emergency services (80% vs. 38%, respectively; p value $= 1 \times 10^{-7}$) and more often outpatient primary care (6% vs. 18%; p value $= .032$) and mental health (32% vs. 49%; p value $= .045$) services. However, dangerousness indicators were similar (29% vs. 28%; p value $= 1$). Dangerousness indicators increased to 54% (p value $= .002$) by the time of eventual diagnosis for those requiring multiple care episodes.
Conclusions: Clinicians were important contributors to delays in diagnosis and treatment of psychosis. Interventions targeting outpatient health care providers may be fruitful in reducing the duration of untreated psychosis.

IMPLICATIONS AND CONTRIBUTION

Misdiagnosis of a new onset psychotic disorder contributed to treatment delays and higher risks of suicidal, aggressive, and criminal behaviors. Interventions targeting outpatient health care providers may be especially fruitful in reducing duration of untreated psychosis during adolescence and early adulthood.

Schizophrenia and related psychotic disorders develop during mid-adolescence through early adulthood. Emergent psychosis impairs psychosocial maturation processes, impedes academic and vocational progress, and disrupts family and social networks. In addition, longer durations of untreated psychosis are associated with elevated risk of aggression, suicidality, and law enforcement involvement [1–3]. Thus, the initial few months of a psychotic disorder are considered a "critical period" [4] where early diagnosis and treatment offer the greatest promise for symptomatic and functional recovery [5,6]. Clinical trials

demonstrated the effectiveness of services that combined pharmacological and psychological interventions to adolescents and young adults recovering from psychosis [7]. Importantly, the likelihood of remission and prevention of disability are greatest when interventions were initiated soon after the emergence of psychosis [8]. Despite this importance, the average duration of undiagnosed/untreated psychosis ranges from 1 to 3 years, and the median ranges from 1 to 11 months [9,10].

Development of interventions designed to reduce the duration of undiagnosed and untreated psychosis hinges on understanding the bottleneck(s). A "care episode" occurs when the patient and/or their advocate(s) recognize the development of a health problem and seek help from a clinician. The Goldberg-Huxley framework conceptualized the most basic elements of care episodes as "filters" that include the clinician's perception of the presenting problem, the actions taken by the clinician, and the various "levels" of expertise required for diagnosis and treatment [11]. Within this framework, differentiating psychotic disorders from other mental disorders that similarly emerge during adolescence and young adulthood may require specialized training, as psychotic patients often present with nonspecific behavioral issues such as decline in social, school, or work function, mood disturbances, and dangerousness. Such nonspecific behavioral and symptomatic disturbances are also characteristic of more common disorders that emerge at this time, including major depression, adjustment and anxiety disorders, and substance use disorders. The Goldberg-Huxley framework thus suggests a primary care provider might be expected to recognize the need for and thus refer to a specialist but not necessarily provide a definitive diagnosis.

The aim of this project was to better understand clinician-related factors that contribute to delays in the diagnosis of a first psychotic episode. Based on comprehensive patient and informant interviews and medical record reviews, we determined the care episodes that occurred over the period from the onset of psychosis to the first diagnosis with a psychotic disorder. We evaluated each care episode in terms of the circumstances leading to the encounter and the clinician's response. Consistent with the Goldberg-Huxley framework, a care episode could have included contact with more than one health care provider. For instance, a primary care provider recognized symptoms of a serious mental disorder, referred to an emergency services provider, who then referred to inpatient psychiatric services for further evaluation. Given our interest in clinician-related factors, we hypothesized duration of undiagnosed psychosis would be shorter for subjects who were given versus subjects who were not given a psychotic disorder diagnosis at their initial care episode. Furthermore, we reasoned that psychotic disorders would be easier for clinicians to recognize if the presenting symptoms were more unusual or severe. Thus, we hypothesized that bizarre or dangerous behaviors would be more common in subjects where the care episode resulted in a psychosis diagnosis versus those where the psychosis was missed.

Materials and Methods

Subjects

Subjects included 161 persons sequentially enrolled in a coordinated specialty care first episode psychosis program between 2013 and 2017. Program criteria included the onset of a first psychotic episode within the past 5 years. For this reason, our final cohort of 161 subjects did not include six subjects who had entered the program with a duration of psychosis that exceeded 5 years. Other program criteria were age between 15 and 30 years and no evidence of premorbid intellectual disability. Program participants were required to be North Carolina residents, and most lived within 45 minutes travel to the clinic, including urban (e.g., Raleigh, Durham), small town (e.g., Carrboro, Chapel Hill, Roxboro), and rural areas. About 10% of program participants were uninsured, about 20% had Medicaid, and the remainder had a mix of private insurance. The University of North Carolina at Chapel Hill Institutional Review Board reviewed the study, and subjects provided written informed consent or assent with a parent or guardian consenting for subjects aged <18 years. Demographics and psychosis diagnoses are provided in Table 1.

Measures

Interviews were conducted by two masters-level clinicians with clinical experience evaluating first episode psychosis and trained on the assessment interviews. Diagnoses were confirmed by Structured Clinical Interview for DSM IV [12]. Onset of psychosis was determined from the Symptom Onset in Schizophrenia Interview (SOS) [13]. The SOS includes criteria for rating the presence of nonspecific symptoms (dysphoric moods, sleep disturbance, trouble with thinking, deterioration in role function, social withdrawal, reduced motivation, and decreased emotional range), prodromal severity "attenuated psychosis-like" symptoms (ideas of reference, suspiciousness, unusual thought content, and perceptual abnormalities), and psychotic symptoms (hallucinations, delusions, and disorganization; Supplemental Methods for SOS copy). The duration of undiagnosed psychosis was calculated from the date of the onset of psychosis to the time subjects were first given a psychotic disorder diagnosis.

The Pathways to Care Interview [14] is designed to capture the various ways that people who experience a severe mental illness engage in help-seeking behaviors and characteristics of their care episodes. The evaluation includes a semistructured interview and incorporates information from the subject, an informant close to the subject (generally a family member), and medical records (we obtained consent for release of medical records for each clinical encounter identified by the subject/informant). Interviewers determined behaviors/symptoms, the use of substances (a substance use disorder diagnosis or confirmation by urine drug screen was not required), and the role(s) of persons involved in the help-seeking attempt. A breakdown of substances used is provided in Table 1.

Behaviors/symptoms were rated as "present" if described by the subject, the informant, or the medical record. Threshold criteria for a rating of "present" were from the SOS. We used the following criteria to define indices of dangerousness. Criteria for the presence of aggression required the subject to attempt or threaten to harm another person (e.g., attempt to push, hit, or kick another and threaten with a weapon) or to destroy an object (e.g., punching a hole in a wall). Criteria for the presence of suicidality required suicidal thoughts to be reported as having a compelling quality or to be not easily dismissed or report of self-harm with suicidal intent. Fleeting suicidal thoughts or self-harm behaviors without suicidal intent (such as "cutting") were not considered as suicidality. Criteria for the presence of criminal behaviors required acts such as trespassing, stealing, or reckless driving or

Table 1
Demographics

	First care episode: Psychosis diagnosis (n = 100)		First care episode: No psychosis diagnosis (n = 61)		P value
	Mean	SD	Mean	SD	
Age of onset of psychosis	21.5	4.0	20.7	3.6	.20
Mother education[a]	7.2	1.4	7.0	1.2	.50
Father education[a]	7.0[a]	1.6	7.1	1.6	.56
Patient education[a]	6.2	1.0	6.0	1.2	.25
	n	%	n	%	
Sex = male	74	74%	44	72%	.94
Ethnicity					.50
Caucasian	63	63%	44	72%	
African American	21	21%	12	20%	
Central/South American	1	1%	0	0%	
Interracial	6	6%	1	2%	
Asian	7	7%	2	3%	
First nations (%)	1	1%	2	2%	
Native Hawaiian or Pacific Islander (%)	1	1%	0	0%	
Hispanic	8	8%	8	13%	
Psychotic disorder diagnosis					.35
Schizophrenia	47	47%	30	49%	
Schizoaffective disorder	22	22%	13	21%	
Psychotic disorder not specified	24	24%	15	25%	
Schizophreniform disorder	5	5%	0	0%	
Bipolar disorder with psychotic features	4	4%	3	5%	
Drug use					
Cannabis use	54	54%	41	67%	.10
Stimulant use	9	9%	6	10%	1.00
Opiate use	2	2%	7	11%	.03
CNS depressant use	1	1%	2	3%	.56
Hallucinogen use	11	11%	11	18%	.16

CNS = central nervous system; SD = standard deviation.

[a] Father education missing data point.

[b] Education number ranges on a scale of 1−9, with 1 = no schooling, 2 = some primary school, 3 = completed primary school, 4 = some high school, 5 = completed high school, 6 = some college/technical school/undergraduate, 7 = completed college/technical school/undergraduate, 8 = some graduate/professional school, 9 = completing graduate or professional school.

acts that resulted in an arrest. The use of illegal substances or minor traffic violations were not considered criminal behavior.

This analysis includes the period from onset of psychosis to the first episode of care with a diagnosis of a psychotic disorder. In addition to scoring the interview, the interviewer created a summary narrative of each subject's pathway to care (e.g., vignettes are included in the Supplemental Material). The Pathways to Care Interview scores were checked against the narratives by K.A., and any discrepancies were resolved by discussions with the principal investigator (D.O.P.) and interviewers.

A care episode often consisted of a chain of events where the action of one person was directed toward the involvement of other persons. For example, a school nurse was asked to evaluate the person's "odd behaviors," prompting the nurse to call the person's parents, who in turn brought the person to a primary care provider. Although this chain involved two clinicians and four people, their actions were considered as one coordinated care episode. However, scenarios involving different people acting independently are considered separate care episodes even if these episodes occurred on the same day. For example, the person may have seen their therapist in the morning. Later that day, the person's co-worker noticed the person's unusual behavior and brought them to the emergency room for evaluation.

Data analysis

The 161 subjects were divided into two groups: those diagnosed with psychosis at their initial care episode (n = 100) and those not diagnosed with psychosis at their initial care episode (n = 61). For subjects not diagnosed at their initial care episode, we considered both their initial and their subsequent diagnostic care episodes. We compared initial care episodes with psychosis diagnosis to both the initial and the final diagnostic care episodes for subjects not diagnosed at their initial care episode. We hypothesized differences in three predictors: duration of undiagnosed and untreated illness, indicators of dangerousness, and bizarre behaviors. For the six comparisons testing the hypothesized relationships, we accepted a p value of $<.008$ as significant. Other analyses were considered exploratory, and so a p value of $<.05$ was considered significant. We conducted analyses and produced figures using IBM Corporation SPSS (version 25.0), Microsoft Excel (2016), and Python (version 3.7). We used Fisher exact tests to compare proportions and Wilcoxon rank-sum tests to compare durations of untreated psychosis.

Results

Demographics and psychotic disorder diagnoses are provided in Table 1. Subjects were primarily male (73%), with an age of onset that ranged from 15 to 30 years and averaged 21 years. Most self-reported to be Caucasian (66%) or African American (20%).

Provider involvement with care episodes

Given that all subjects were in treatment for a psychotic disorder at the time of their study participation, every subject

Table 2
Involvement of primary care, outpatient mental health, emergency services, and inpatient psychiatric services in care episodes

	A: Initial care episode: Psychosis diagnosis (n = 100)		B: Initial care episode: No psychosis diagnosis (n = 61)		C: Diagnostic care episode following initial nondiagnostic care episode (N = 61)		Fisher exact test P value: A versus B	Fisher exact test P value: A versus C
	n	%	n	%	n	%		
Primary care: total	6	6%	11	18%	4	6%	**.032**	1.000
Primary care to ER	3	3%	0	0%	2	3%	.290	1.000
Primary care to mental health	1	1%	1	2%	2	3%	1.000	.558
Primary care no referral	2	2%	10	16%	0	0%	**.001**	.526
Mental health outpatient: total	32	32%	30	49%	24	39%	**.045**	.395
Mental health to emergency services	14	14%	2	3%	8	13%	**.030**	1.000
Mental health no referral	18	18%	28	46%	16	26%	$\mathbf{3 \times 10^{-4}}$	.236
Emergency services total	80	80%	23	38%	45	74%	$\mathbf{1 \times 10^{-7}}$	.436
Emergency services to inpatient	73	73%	8	13%	41	67%	$\mathbf{4 \times 10^{-14}}$	.447
Emergency services no referral	7	7%	15	25%	4	7%	**.004**	1.000

Bolded values indicate statistical significant ($P < .05$).
ER = emergency room.

had a diagnostic care episode. However, 61 of 161 subjects (38%) were not diagnosed with psychosis at their initial care episode. The subjects without a psychosis diagnosis at their initial care episode were then diagnosed at a subsequent care episode (mean number of nondiagnostic care episodes = 1.7, standard deviation [SD] = 1.3).

The initial and the diagnostic care episodes for subjects with multiple care episodes were compared with initial care episodes that resulted in a psychosis diagnosis. The distributions of providers (primary care, outpatient mental health, emergency services, and inpatient psychiatry) were similar for care episodes that resulted in a psychosis diagnosis, regardless of whether initial or subsequent to the initial care episode (Table 2). Care episodes resulting in a psychosis diagnosis most frequently involved emergency services whether the initial (80%) or subsequent to the initial (74%) care episode.

However, initial care episodes without a psychosis diagnosis less often involved emergency services (38%, *p* value = 1×10^{-7}), especially those that included emergency services referral to psychiatry inpatient (initial care episode with psychosis diagnosis 73%, without psychosis diagnosis 13%, *p* value = 4×10^{-14}). Accordingly, outpatient providers were involved in a greater proportion of initial care episodes without a psychosis diagnosis (49% mental health and 18% primary care) compared to initial care episodes with a psychosis diagnosis (32% mental health, *p* value = .045; 6% primary care, *p* value = .032). In addition, considering care episodes that involved outpatient providers, initial care episodes with a psychosis diagnosis more often included the outpatient provider referring the patient to emergency services (17/38 (45%) of care episodes) compared to initial

care episodes without a psychosis diagnosis (2/41 (5%) of care episodes) (*p* value = 4×10^{-5}).

Persons initiating of care episodes

There were no differences in the relative involvement of family, police, and community members in care episodes resulting in psychosis diagnosis (Table 3). Initial care episodes with a psychosis diagnosis compared to initial care episodes without a psychosis diagnosis more often involved family members bringing the patient to emergency services (50% and 26%, respectively, *p* = .003) and less often involved family members engaging with primary care providers (2% and 16%, respectively, *p* value = .001). The results were similar for care episodes involving mental health providers initiated by the patient without family involvement (9% vs. 24%, *p* value = .01).

Associations with delayed diagnosis

As shown in Figure 1A, the time from onset of psychosis to initial care episode was similar for episodes where psychosis was (median = .9 months) or was not diagnosed (median = 1.1 months; Wilcoxon rank-sum test *p* value = .80). However, time from onset of psychosis to diagnosis was longer when multiple versus single care episodes were involved (Figure 1B; median = 3.9 months; Wilcoxon rank-sum test *p* value = 6×10^{-8}). Similar to reports from other studies, these distributions were skewed (first care episode psychosis diagnosis: mean = 3.4 months, SD = 8.1; first care episode no psychosis diagnosis: mean = 3.9 months, SD = 6.2; psychosis diagnosis care episode,

Table 3
Involvement of the patient, family, community members[a], and police in the initiation of care episodes

	A: Initial care episode: Psychosis diagnosis (n = 100)		B: Initial care episode: No psychosis diagnosis (n = 61)		C: Diagnostic care episode following initial nondiagnostic care episode (N = 61)		Fisher exact test P value: A versus B	Fisher exact Test P value: A versus C
	n	%	n	%	n	%		
Community to police	5	5%	1	2%	4	7%	.410	.731
Community to family	9	9%	11	18%	7	11%	.138	.370
Community to patient	7	7%	1	2%	1	2%	**.261**	.261
Family to emergency services	50	50%	16	26%	28	46%	**.003**	.630
Family to police to emergency services	15	15%	3	5%	9	15%	.070	1.000
Family direct to emergency services	35	35%	13	21%	19	31%	.077	.731
Family to mental health	22	22%	14	23%	14	23%	1.000	1.000
Family to primary care	2	2%	10	16%	4	6%	**.001**	.201
Patient direct to emergency services	4	4%	1	2%	1	2%	.651	.651
Patient to police to emergency services	9	9%	4	7%	6	10%	.768	1.000
Patient to mental health	9	9%	15	24%	8	13%	**.011**	.437
Patient to primary care	4	4%	1	2%	0	0%	.651	.298

Bolded values indicate statistical significant ($P < .05$).

[a] Community members included peers, coworkers, school staff, landlords, and general public.

multiple care episodes: mean = 8.9 months, SD = 12.0). Time from onset of psychosis to diagnosis coincided with time to antipsychotic treatment for 98% of patients. For the three subjects that were not treated at the time of diagnosis, there were additional 1-, 3-, and 5-month delays before antipsychotic treatment initiation.

We examined whether indices of dangerousness, including suicidal, aggressive, and criminal ideation(s) or behavior(s), were reported for the care episodes (Table 4). At the initial care episode, indices of dangerousness were similar regardless of whether psychosis was diagnosed (29%) or missed (28%). Proportions of care episodes with suicidal (18% and 15%, respectively), aggressive (12% and 15%, respectively), and criminal (5% and 8%, respectively) indices were similar as well. However, for subjects with multiple care episodes, by the time of the diagnostic care episode, dangerousness was evident in 54% of subjects (p value = .002), driven by elevations in suicidality (36%, p value = .014), aggression (26%, p value = .031), and criminal behaviors (20%, p value = .006). Contrary to our hypothesis, the proportion of initial care episodes that included bizarre behaviors were similar. In addition, there were no differences in the proportions of subjects that reported decline in school, work, or social function, or in self-care, and nonspecific symptoms.

Clinician diagnoses

When initial care episodes did not result in psychosis diagnosis, clinicians most often attributed the clinical presentation to intoxication with drugs (23%) or other psychiatric disorders (62%). Less commonly, attributions included the clinician believed the psychotic experiences were real (e.g., patient reporting a delusion involving sexual abuse by a family member; 12%), stress reactions (7%), a nonpsychiatric medical problem (7%), or sleep deprivation (2%). Consistent with the Goldberg-Huxley framework, when care episodes resulted in a psychosis diagnosis, psychosis was not diagnosed by all the clinicians involved. For example, a mental health provider may have referred the patient to emergency services with a diagnosis of depression, emergency services similarly diagnosed as depression and referred to inpatient psychiatry, where the diagnosis was changed to a psychotic disorder. Specifically, when the episode of care led to psychosis diagnosis, some of the involved clinicians attributed the symptoms to drug use (single care episode 17% and multiple care episodes 5%), to a nonpsychotic mental disorder (singe care episode 4% and multiple care episodes 3%), and to a medical disorder (single care episode 4% and multiple care episodes 0%) or believed the psychotic experiences were real (single care episode 16% and multiple care episodes 5%).

Discussion

In our cohort, clinicians were important contributors to delays in diagnosis and treatment of psychosis, as there was no difference in time to initial care episode regardless of whether subjects received (62% of the cohort) or did not receive (38% of the cohort) a psychosis diagnosis. Furthermore, help-seeking occurred relatively soon after the onset of psychosis, as 50% of patients sought treatment within 1 month and 84% within 6 months of psychosis onset, generally considered within the critical period for treatment of psychotic disorders [15]. Thus, delays in help-seeking were important contributors to delays in diagnosis and treatment for only 16% of subjects.

Contrary to our initial hypothesis, there was no difference in the frequency of behavioral indicators of dangerousness or bizarre behaviors at initial care episodes where psychosis was diagnosed compared to initial care episodes where psychosis was missed. However, indices of dangerousness occurred more often for those subjects with multiple care episodes before diagnosis. It may have been that the longer duration of untreated psychosis provided greater opportunities for the dangerous consequences of active psychosis to occur, including suicidal, aggressive, and criminal ideation and/or behaviors. Other investigators have similarly reported dangerousness to be associated with longer times to diagnosis and treatment [3], supporting this possibility. However, previous interpretations of these findings proposed that help-seeking was delayed until

A

B
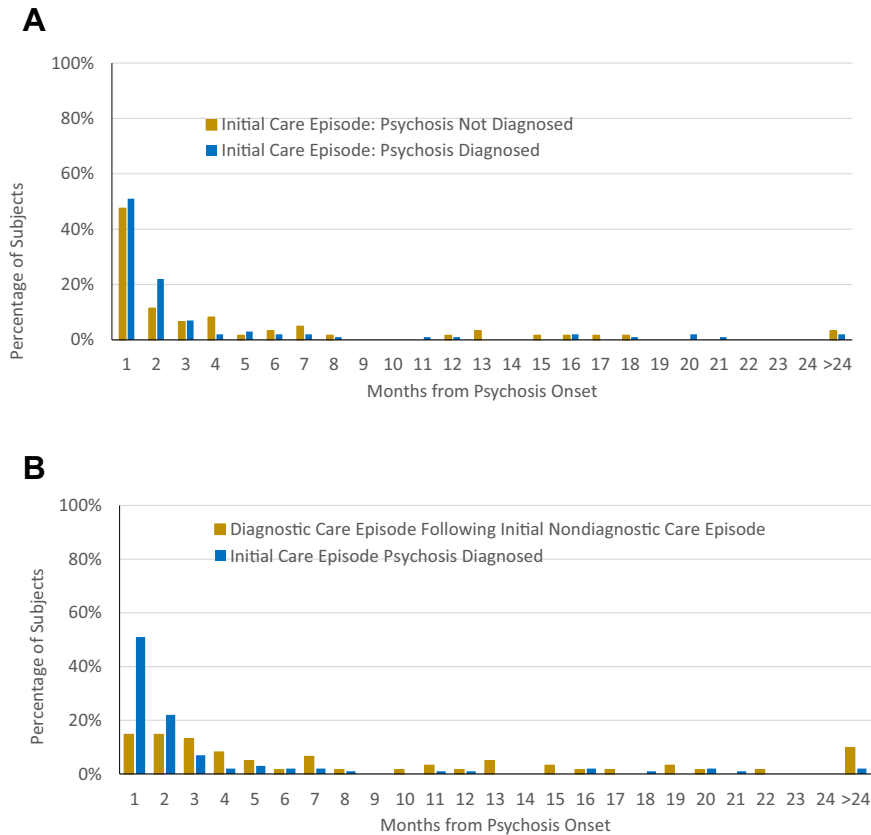
Figure 1. (A) Duration of untreated psychosis. Initial care episode with psychosis diagnosis versus initial care episode with no psychosis diagnosis. (B) Duration of untreated psychosis. Initial care episode with psychosis diagnosis versus diagnostic care episode following initial nondiagnostic care episode.

dangerousness occurred [10]. The findings from our study support a different interpretation: patients and their advocates sought treatment early in the course of illness, and consequences of health care providers not recognizing the presence of a psychotic disorder were subsequent elevations in dangerousness.

Our findings are only partially consistent with the Goldberg-Huxley framework, as care episodes often did not involve a systematic routing from generalists to specialists. In addition, mental health care providers were frequently involved in care episodes where psychosis was not diagnosed. Diagnosis of psychosis typically involved emergency services referring to psychiatric inpatient services, consistent with some but not all studies [10], whereas missed diagnosis more often involved outpatient mental health or primary care providers without referral to emergency services. Furthermore, in contrast to findings from studies outside of the U.S. [10], we found that primary care providers were rarely involved in care episodes.

The U.S. health care system varies fundamentally from that of most developed countries, perhaps explaining the previously mentioned findings. In contrast to the U.S., most developed countries provide universal health care coverage and an organized delivery system where the default is assignment to primary care services that offer 24/7 access and care coordination with specialty services [16]. In the U.S., health care is funded by a myriad of methods, typically with high premiums and out-of-pocket costs. Almost half of the persons aged 18–29 years in the U.S. do not have a primary care provider [17]. During the transition from adolescence to adulthood, patients often age out

of treatment with their pediatrician and may not engage with a new primary care provider [18]. This transition from adolescent to adult services has been described as one of the main factors contributing to difficulties with youth accessing mental health care [10]. Evidence from other studies suggest treatment delays are also associated with patient- and community-related factors such as the patient's age, cultural attitudes toward mental illness, and availability of health care resources [10]. It may be that the relative importance of such factors to treatment delays varies in different communities. Thus, further study is needed to determine the extent that our findings are generalizable to other settings.

Studies conducted within learning health care systems may provide opportunities to investigate clinician-, system-, and patient-related factors contributing to misdiagnosis of emerging mental disorders in adolescents and young adults and test the effectiveness of interventions. Learning health care systems aspire to identify barriers to optimal health care delivery and test solutions within a health care delivery system through the collection and analysis of quality assurance data [19]. Indeed, efforts are currently underway to establish a learning health care system linking first episode psychosis treatment programs across the U.S. [20].

In addition, psychotic disorders share behavioral features (e.g., suicidal ideation/behavior and decline in function) and symptoms (e.g., anxiety, distress, disrupted sleep) with other, more common, mental disorders such as major depression, substance use, and adjustment disorders, complicating the

Table 4
Behaviors and symptoms at care episode

	A: First care episode: Psychosis diagnosis (n = 100)		B: First care episode: No psychosis diagnosis (n = 61)		C: Diagnostic care episode after an unsuccessful care episode (N = 61)		Fisher exact test	
	n	%	n	%	n	%	P value A versus B	P value A versus C
Dangerousness[a]	29	29%	17	28%	33	54%	[a]1	[a].002
Suicidal risk	18	18%	9	15%	22	36%	.668	.014
Aggression risk	12	12%	9	15%	16	26%	.636	.031
Criminal risk	5	5%	6	10%	12	20%	.335	.006
Drug use	53	53%	42	69%	43	71%	.051	.032
Decline in school or work function	82	82%	50	82%	53	87%	1	.510
Self-care decline	45	45%	21	34%	29	48%	.248	.871
Sleep disturbances	60	60%	31	51%	36	59%	.326	1
Depressed or anxious mood	87	87%	54	89%	57	93%	1	.291
Social withdrawal/dysfunction	61	61%	40	66%	44	72%	.616	.174
Problems with focus/concentration	86	86%	49	80%	54	89%	.381	.826
Hallucinations	58	58%	32	52%	36	59%	.516	1.000
Delusions	97	97%	60	98%	60	98%	1.000	.987
Disorganized behavior	67	67%	32	53%	42	69%	.070	.944
Bizarre behaviors[a]	75	75%	40	66%	53	87%	[a].212	[a].074

Bolded values indicate statistical significant ($P < .05$).
[a] Bonferroni corrected significance threshold $P = .008$.

diagnostic process. Such nonspecific, cross-cutting symptoms and behaviors were reported by most of our study subjects, and we found that clinicians often diagnosed psychotic patients with such nonpsychotic mental disorders. This may relate to clinicians using the heuristic "availability" (the tendency to ascribe greater significance to more frequently encountered disorders) during their evaluation [21,22]. The use of availability and other heuristics, such as confirmation bias (seeking confirmatory and ignoring disconfirmatory evidence), are well-recognized, and common impediments to diagnostic accuracy [23] and interventions that focus only on providing information to clinicians do little to improve diagnostic capabilities [24,25]. Instead, diagnostic skills are more likely to benefit from educational strategies that address adaptive versus biasing use of heuristics [21,22,26,27], such as the epilogical approach [28].

There are several limitations to our study. The design was retrospective and used subject and informant self-report as the primary source of data. Thus, it is potentially subject to various recall biases. For example, the severity of symptoms/behavioral problems likely varied over time, and the severity at the specific care episode may not have been accurately recalled. Furthermore, not all care episodes may have been reported, and the subject/informant may not have fully understood the diagnosis given by the provider. However, we obtained medical records as source documentation for almost all reported care episodes and thus were able to verify the diagnosis given by the clinician. Another limitation is that all study subjects were recruited from a single coordinated specialty care service for first episode psychosis. We found the median duration of untreated psychosis to be at the low end of the range reported by other studies [9,10], suggesting that the program referrals may not be representative.

In conclusion, the results of our study highlight the potential importance of understanding features of episodes of care that are associated with delays in diagnosis and treatment of psychotic disorders. We did not find that the persons involved with help-seeking contributed to delays in diagnosis. In addition, we

were unable to identify aspects of the clinical presentation, including behavioral signs relatively specific to psychotic disorders, such as bizarre behaviors, as contributory. If confirmed by others, our findings suggest that interventions focused on improving clinician's diagnostic accuracy may reduce the duration and thus the negative consequences of untreated psychosis.

Supplementary Data

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jadohealth.2020.12.138

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