Psychosocial Features of Clinically Relevant Patient Subgroups With Serious Mental Illness and Comorbid Diabetes

Douglas Gunzler, Ph.D., Martha Sajatovic, M.D., Richard McCormick, Ph.D., Adam Perzynski, Ph.D., Charles Thomas, B.A., Stephanie Kanuch, M.Ed., Kristin A. Cassidy, M.A., Edna Fuentes-Casiano, L.S.W., Neal Dawson, M.D.

Objective: Care for people with serious mental illness and diabetes is complicated by clinical heterogeneity. This cross-sectional analysis of 200 individuals with comorbid serious mental illness and diabetes explored differentiation between patient subgroups that were characterized on the basis of selected dimensions within a biopsychosocial framework.

Methods: Relationships between self-efficacy, treatment expectation, social support, and depression were first assessed via bivariate Spearman correlations among 200 individuals participating in a randomized controlled trial who had diabetes along with major depression, bipolar disorder, or schizophrenia. Next, latent profile analyses were conducted to determine underlying subgroups on the basis of these variables. The resultant groups were compared on diabetes control, function, and symptoms.

Results: Two subgroups emerged. One had more severe psychiatric symptoms, low scores on other psychosocial variables, and worse diabetes control. The other had low levels of psychiatric symptoms, better scores on other variables, and better diabetes control.

Conclusions: Symptom presentation and internal and external resources appeared to be related to diabetes control for people with comorbid diabetes and serious mental illness. Care approaches need to go beyond standard education and consider biopsychosocial variables.

Psychiatric Services 2017; 68:96–99; doi: 10.1176/appi.ps.201500554

Individuals with serious mental illness are particularly vulnerable to diabetes and related complications (1). As noted in a recent review, data on evidence-based care for these comorbid conditions are limited (2).

Psychosocial factors strongly associated with self-management of chronic health conditions, such as diabetes and serious mental illness, include social support, self-efficacy, and treatment outcome expectancies (3). Self-efficacy is related to illness self-management activities, including diet, exercise, and smoking cessation, among people with serious mental illness (4) and is an important factor for self-managing diabetes (3). Social support helps maintain healthy behaviors of people with serious mental illness (3). Outcome expectancies about whether a given treatment will result in positive outcomes help in predicting the likelihood of engagement in psychiatric and diabetes care (5).

Psychiatric symptoms, including mood, are important determinants of diabetes outcomes and are a core dimension of self-management (2). A recent review emphasizes the contribution of depression to poor glycemic control, general medical complications, poor outcomes, and reduced quality of life for diabetic patients. The specific relationship of mood and psychiatric symptom severity to diabetes management for people with more severe psychiatric illness is understudied (6).

Psychiatric symptom severity, including mood, and self-efficacy have been studied in large trials (2), but other psychosocial factors associated with effective self-management are less well understood. Given the limited information available on possible psychosocial correlates of illness status among patients with comorbid serious mental illness and diabetes, we conducted an exploratory statistical analysis to attempt to identify subgroups of individuals with common symptoms and psychosocial features. On the basis of the literature for chronic conditions in general, including mental illness and diabetes studied separately, we hypothesized that patterns of social support, self-efficacy, outcome expectancies, and mood could identify clinically relevant subgroups that differed on key psychiatric and diabetes-related factors. Understanding these interrelationships may aid in the future selection of personalized treatment approaches.

METHODS

This analysis used baseline data from 200 participants enrolled in a randomized controlled trial from November 21,

2011, through April 14, 2014, in a safety-net setting to test a novel self-management intervention versus treatment as usual among patients with serious mental illness and comorbid diabetes. The safety-net setting is the MetroHealth System, a non-profit, county-operated health care system for the residents of Cleveland and Cuyahoga County, Ohio. The inclusion criteria were having schizophrenia, schizoaffective disorder, bipolar disorder, or major depression confirmed with the Mini-International Neuropsychiatric Interview (7); having type II diabetes; and being ≥18 years old. The mean age of participants was 52.7±9.5 years; 64% (N=128) were women, 54% (N=107) African Americans, and 9% (N=17) Hispanics.

Depression symptom severity was measured with the Montgomery-Åsberg Depression Rating Scale (MADRS) (8). Global symptom severity was measured with the Brief Psychiatric Rating Scale (BPRS) (9). The Global Assessment of Functioning (GAF) measured function. Social support was measured with the Multidimensional Scale of Perceived Social Support (10), which measures perception of social support systems and sources of social support. Perceived therapeutic efficacy for diabetes treatment was measured with the Perceived Therapeutic Efficacy Scale, which measures outcome expectancy related to treatments (11). Self-efficacy for managing diabetes was measured with the Perceived Diabetes Self-Management Scale (PDSMS [12]), a diabetes-specific adaptation of the Perceived Medical-Condition Self-Management Scale. The generic template from which the PDSMS was adapted can be modified for use with other chronic medical conditions. Self-efficacy for serious mental illness management was measured with a modified template, the Perceived Mental Health Self-Management Scale.

Diabetes control was evaluated with an HbA1c measure, which represents an average blood glucose level over the previous three months. The American Diabetes Association recommends that HbA1c be <6.5%. Given the traditional focus in many standard diabetes education approaches, diabetes knowledge was assessed with the Brief Diabetes Knowledge Test (13).

The overall analysis explored potential differentiation of patient subgroups characterized by their similarity on selected dimensions within a biopsychosocial framework using depression, self-efficacy for serious mental illness and for diabetes, perceived therapeutic efficacy, and social support. We first assessed the relationships between self-efficacy, treatment expectation, social support, and depression via bivariate Spearman correlations. Next, we conducted a multivariate latent profile analysis (LPA) to determine underlying subgroups based on these variables. LPA relates a set of observed continuous variables in a multivariate analysis to a set of latent profiles (underlying subgroups) on a likelihood scale. The five scales were standardized to contribute equally to the analysis (that is, with similar ranges and variability).

The subgroups identified by LPA are not known a priori, but rather are determined empirically. The single-group model is first specified, which is then used as a comparison for models that each have an increasing number of subgroups until the best-fitting model is identified. For each individual, we estimated the probability of his or her membership in each subgroup. Individuals were then classified according to the subgroup for which they had the highest likelihood of membership, forming a categorical measure with a fixed number of profiles. Using the entropy statistic, we measured how well the models performed. Sample means of the variables used in the LPA in each subgroup helped assign meaning to each latent class. Finally, using t tests and chi-square tests, we calculated whether these subgroups differed on BPRS, GAF, HbA1c, diagnosis, and demographic factors.

RESULTS

Depression symptom severity was significantly negatively correlated with all the psychosocial variables: self-efficacy for managing diabetes (r=−.32, p<.001), self-efficacy for managing serious mental illness (r=−49, p<.001), social support (r=−31, p<.001), and expectancy for treatment outcomes (r=−.19, p<.02). The psychosocial variables were all significantly positively correlated, with the exception of the positive correlation between treatment expectancies and social support, which did not reach significance.

LPA yielded two subgroups based on the Lo-Mendell-Rubin test (14). The entropy for this LPA model was .883, denoting that the model classified participants relatively well. Group A (40% of the overall sample) was characterized by significantly higher levels of depression and significantly lower levels of self-efficacy for both diabetes mellitus and serious mental illness, perceived treatment efficacy, and social support (Table 1) compared with group B (60% of the overall sample).

Table 1 also presents the group means on clinically relevant variables not used in forming the groups. Group A had significantly worse psychiatric symptoms, significantly higher HgbA1c values (that is, worse control of diabetes), and significantly lower global functioning. The groups did not differ significantly on age, race-ethnicity, gender, body mass index, psychiatric diagnosis, or diabetes knowledge.

DISCUSSION

Self-management for patients with comorbid serious mental illness and diabetes is complex and includes a variety of elements, such as taking medications reliably and on time and working with challenging lifestyle commitments. Heterogeneity in the population with serious mental illness makes it unlikely that a "one size fits all" approach will be optimal in meeting diverse patient needs. In addition, resource constraints make the implementation of labor-intensive

TABLE 1. Latent profile analysis (LPA) of two distinct subgroups with serious mental illness and comorbid diabetes

Variable	All (N=200)		Subgroup A: More severe symptoms, fewer resources (N=81)		Subgroup B: Less severe symptoms, more resources (N=119)		p
	M	SD	M	SD	M	SD	
LPA variable							
MADRS (M±SD)[a]	24.0	9.1	31.0	6.4	19.4	7.6	<.001
MSPSS (M±SD)[b]	41.4	10.2	35.0	10.5	45.9	7.1	<.001
PDSMS (M±SD)[c]	25.5	6.9	21.8	5.8	28.1	5.4	<.001
PMHSMS (M±SD)[d]	26.5	6.5	21.3	5.6	30.2	4.1	<.001
PTES (M±SD)[e]	76.7	16.8	69.3	20.4	82.1	11.1	<.001
Other clinically relevant variables							
BPRS (M±SD)[f]	40.0	9.3	44.4	8.7	37.1	8.8	<.001
GAF (M±SD)[g]	51.6	11.5	46.9	8.7	54.8	11.4	<.001
HbA1c (M±SD %)[h]	8.2	3.0	8.5	2.6	7.6	2.0	.011
	N	%	N	%	N	%	
Serious mental illness diagnosis							.595
Schizophrenia	49	25	18	22	31	26	
Bipolar disorder	56	28	21	26	35	30	
Major depression	95	48	42	52	53	45	

[a] Montgomery-Åsberg Depression Rating Scale. Possible scores range from 0 to 60, with higher scores indicating more severe depression.
[b] Multidimensional Scale of Perceived Social Support. Possible scores range from 1 to 84, with higher scores indicating greater perceived social support.
[c] Perceived Diabetes Self-Management Scale. Possible scores range from 8 to 40, with higher scores indicating greater perceived diabetes self-management confidence.
[d] Perceived Mental Health Self-Management Scale. Possible scores range from 8 to 40, with higher scores indicating greater perceived mental health self-management confidence.
[e] Perceived Therapeutic Efficacy Scale. Possible scores range from 0 to 100, with higher scores indicating higher confidence.
[f] Brief Psychiatric Rating Scale. Possible scores range from 18 to 126, with higher scores indicating more severity.
[g] Global Assessment of Functioning. Possible scores range from 1 to 100, with higher scores indicating better functioning.
[h] Glycosylated hemoglobin. Levels ≥6.5% indicate diabetes. Higher HbA1c levels indicate poorer control of diabetes.

interventions for every patient with comorbid serious mental illness and diabetes impractical. There has been limited research on how to best match medically complex patients who have serious mental illness with the right treatments.

This analysis, using variables that have been independently demonstrated to be related to care engagement for patients with serious mental illness, supported the presence of two conceptually distinct subgroups. In clinical terms, group A can be conceptualized as having more severe depression and lower internal and external resources in contrast to group B, which can be conceptualized as having less severe depression and more resources. Group A, with the most severe depression, had less confidence that they could manage both their psychiatric illness and diabetes, had lower expectations for treatment, and had lower perceived social support. This group scored significantly worse on measures of psychiatric symptom severity, general functioning, and diabetes control compared with the other group.

Clinical implications of these findings suggest that the higher symptom–lower resource group might require more focused and intensive effort to improve self-management. Limitations in social networks and need

for empowerment and self-confidence may make members of this group the best candidates for personalized interventions, such as peer specialists, care navigators, and home outreach. The consistency of their more severe psychiatric symptoms may also indicate a need for more aggressive use of psychiatric therapies for depression.

Between the two groups, the group with less severe depression displayed relatively high self-efficacy for both mental illness and diabetes, had a relatively optimistic outlook on outcomes of treatment, and reported stronger social support. They also had relatively better control of their diabetes. People with these characteristics might be good candidates for less intensive self-management interventions. Examples could include computer-based programs or care that is only incrementally different from standard diabetes education. Given the group's relatively strong levels of social support, involving members of the patient's support network could enhance the patient's relatively strong psychological processes.

Whereas other studies often measure depression and self-efficacy, this study was unique in including additional psychosocial variables, which have been shown in other populations and in limited studies to be relevant to outcomes in the population with serious mental illness. The relationships among the symptoms, health status, and internal and external supports among individuals with serious mental illness and diabetes underscore the importance of enhancing support with peer counselors or other individuals who can help address unique concerns and help meet ongoing challenges.

The magnitude of mean mood score differences between the groups is notable. Using reports that suggest a MADRS total score of 31 as a cutoff between severe and moderate depression (15) and MADRS scores of 20–24 indicating moderate depression, the group A mean MADRS score fell in the severe range, and the group B mean was in the mild range. Although study assessments included whether individuals were taking psychiatric medication, we did not have information on drug dosages or treatments that may have been tried in the past.

Interestingly, psychiatric diagnosis did not appear to be related to characteristics that described these two subgroups. The distribution of diagnoses between the subgroups suggests that underlying psychosocial mechanisms appeared to be independent of diagnosis. In addition, diabetes knowledge did not differ between the two groups. This finding suggests that psychiatric symptom severity and the constellation of psychosocial factors included in the group formation may offer additional opportunities to improve diabetes control and enhance the standard diabetes knowledge enhancement approaches.

This study had a number of limitations, including single-site enrollment, limited data on past and current pharmacological and behavioral treatments, and the use of research samples that may not entirely represent "real-world" populations. Strengths of the analysis include the confirmed diagnoses and enrollment in a safety-net primary care setting where many individuals with serious mental illness and high-risk medically complex conditions receive care.

CONCLUSIONS

The limited studies that have been conducted with patients with serious mental illness and comorbid chronic general medical conditions, including diabetes, suggest that psychiatric symptom severity, including depression and self-efficacy, are modifiable (2). Social support networks also can be expanded, and outcome expectancy has been shown to be changeable. Consideration of all of these factors can personalize care for specific challenges and strengths among patients with comorbid serious mental illness and diabetes and may inform treatment approaches that can advance care for this vulnerable group of individuals.

AUTHOR AND ARTICLE INFORMATION

Dr. Gunzler, Dr. McCormick, Dr. Perzynski, Mr. Thomas, Ms. Kanuch, and Dr. Dawson are with the Center for Health Care Research and Policy, Case Western Reserve University School of Medicine, Cleveland. Dr. Gunzler, Ms. Kanuch, and Dr. Dawson are also with MetroHealth Medical Center, Cleveland. Dr. Sajatovic, Ms. Cassidy, and Ms. Fuentes-Casiano are with the Department of Psychiatry, Case Western Reserve University. Send correspondence to Dr. Sajatovic (e-mail: martha.sajatovic@uhhospitals.org).

REFERENCES

1. Carney CP, Jones L, Woolson RF: Medical comorbidity in women and men with schizophrenia: a population-based controlled study. Journal of General Internal Medicine 21:1133–1137, 2006
2. Siantz E, Aranda MP: Chronic disease self-management interventions for adults with serious mental illness: a systematic review of the literature. General Hospital Psychiatry 36:233–244, 2014
3. Leas L, McCabe M: Health behaviors among individuals with schizophrenia and depression. Journal of Health Psychology 12:563–579, 2007
4. Anderson RM, Funnell MM, Fitzgerald JT, et al: The Diabetes Empowerment Scale: a measure of psychosocial self-efficacy. Diabetes Care 23:739–743, 2000
5. Perkins DO, Johnson JL, Hamer RM, et al: Predictors of antipsychotic medication adherence in patients recovering from a first psychotic episode. Schizophrenia Research 83:53–63, 2006
6. Fiore V, Marci M, Poggi A, et al: The association between diabetes and depression: a very disabling condition. Endocrine 48:14–24, 2015
7. Sheehan DV, Lecrubier Y, Sheehan KH, et al: The Mini-International Neuropsychiatric Interview (MINI): the development and validation of a structured diagnostic psychiatric interview for DSM-IV and ICD-10. Journal of Clinical Psychiatry 59(suppl 20):22–33, 1998
8. Montgomery SA, Asberg M: A new depression scale designed to be sensitive to change. British Journal of Psychiatry 134:382–389, 1979
9. Overall JE, Gorham DR: The Brief Psychiatric Rating Scale. Psychological Reports 10:799–812, 1962
10. Zimet GD, Powell SS, Farley GK, et al: Psychometric characteristics of the Multidimensional Scale of Perceived Social Support. Journal of Personality Assessment 55:610–617, 1990
11. Zheng Y, Terhorst L, Choo J, et al: Psychometric properties of the Perceived Therapeutic Efficacy Scale for adhering to a cholesterol-lowering diet. Journal of Cardiovascular Nursing 29:257–263, 2014
12. Wallston KA, Rothman RL, Cherrington A: Psychometric properties of the Perceived Diabetes Self-Management Scale (PDSMS). Journal of Behavioral Medicine 30:395–401, 2007
13. Fitzgerald JT, Funnell MM, Hess GE, et al: The reliability and validity of a brief diabetes knowledge test. Diabetes Care 21:706–710, 1998
14. Aldridge AA, Roesch SC: Developing coping typologies of minority adolescents: a latent profile analysis. Journal of Adolescence 31:499–517, 2008
15. Müller MJ, Himmerich H, Kienzle B, et al: Differentiating moderate and severe depression using the Montgomery-Asberg Depression Rating Scale (MADRS). Journal of Affective Disorders 77:255–260, 2003