Monitoring for Metabolic Side Effects Among Outpatients With Dementia Receiving Antipsychotics

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Objective: **This study examined monitoring for metabolic side effects among older outpatients with dementia starting a new antipsychotic.** ***Methods:*** **In a retrospective cohort analysis of U.S. Department of Veterans Affairs data, monitoring, as recommended by the American Diabetes Association and the American Psychiatric Association, was examined between October 1, 2005, and September 30, 2011. The sample included outpatients aged ≥60 years with dementia but without a psychotic disorder (N=3,903) and outpatients with a psychotic disorder but without dementia (N=5,779) who were prescribed a new antipsychotic. Because dementia patients differed from psychosis patients in all observed patient characteristics, especially age, metabolic monitoring of dementia patients was compared with a propensity score–matched sample of outpatients with psychosis (1,576 matched pairs).** ***Results:*** **At baseline (±30 days from the index prescription), 68% of the matched dementia patients were weighed, compared with 63.7% of the matched psychosis patients (odds ratio [OR]=1.28, 95% confidence interval [CI] =1.03–1.48). Monitoring for glucose or glycosylated hemoglobin (HBA1c) and low-density lipoprotein (LDL) was not significantly different between the groups: glucose or HBA1c, 41% versus 44%; LDL, 24% versus 27%. At three months (±30 days), metabolic monitoring for all three parameters was significantly lower for the dementia group: weight, OR=.86, CI=.75–.99; glucose or HBA1c, OR=.83, CI=.71–.97; and LDL, OR=.69, CI=.57–.85.** ***Conclusions:*** **Monitoring rates for metabolic side effects were low for both dementia and psychosis groups, with lower rates for dementia patients at follow-up compared with matched psychosis patients. Quality improvement efforts are needed to improve monitoring, especially for patients with dementia. (*Psychiatric Services* 65:1147–1153, 2014; doi: 10.1176/appi.ps.201300317)**

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The most common use of second-generation antipsychotics for older adults is to ameliorate behavioral disturbances associated with dementia (1). In 2004, the Expert Consensus Panel for Using Antipsychotic Drugs in Older Patients recommended second-generation antipsychotics as an option for patients with dementia (1,2). However, the efficacy and effectiveness of second-generation antipsychotics in treating neurobehavioral symptoms of dementia are at best modest and not well established (3–6).

Nearly all research and guidelines regarding antipsychotics and neuropsychiatric symptoms of dementia (7) recommend caution when using these agents because of significantly greater risks of cerebrovascular events (CVEs) and mortality compared with a placebo (8–10). Because of these concerns, the U.S. Food and Drug Administration (FDA) issued a black-box warning in 2005 identifying the association between second-generation antipsychotic use among elderly patients with dementia and increased mortality (8); a similar warning was issued for first-generation antipsychotics in 2008 (9).

Antipsychotics, especially second-generation antipsychotics, are associated with increased risk of metabolic side effects, such as weight gain, diabetes, and hyperlipidemia (11). In 2003, the FDA required that antipsychotic product labeling include a warning about hyperglycemia and diabetes and

recommended monitoring of fasting blood glucose among patients with diabetes, diabetes risk factors, or symptoms of hyperglycemia. In 2004, the American Diabetes Association (ADA) and American Psychiatric Association (APA) published expert consensus recommendations that providers should consider the relative risk of various antipsychotic agents; monitor weight, glucose or glycosylated hemoglobin (HBA1c), and lipids when a patient begins a new antipsychotic medication; and should continue to monitor these metabolic parameters, periodically assessing and treating any abnormalities identified (12). Despite the expert recommendations and the FDA warning, the rates of metabolic monitoring for patients with schizophrenia and related diagnoses who are prescribed antipsychotics remained low among Medicaid enrollees (13), veterans (14), and commercially insured patients (15).

Although some authors have suggested that metabolic side effects of antipsychotics in the elderly population may be somewhat attenuated compared with younger populations (16), patients with dementia are still at risk of developing metabolic side effects. In a small study (N=59) using data from the U.S. Department of Veterans Affairs (VA), Mathys and colleagues (17) investigated incidence of metabolic abnormalities among patients with dementia after they began taking antipsychotics and reported that 10% developed impaired glucose tolerance, 8.9% gained weight, and 14.5% developed lipid abnormalities during the one-year follow-up. In the Clinical Antipsychotic Trials of Intervention Effectiveness (CATIE study), second-generation antipsychotics did not appear to affect glucose or triglyceride levels, but clinically significant weight gain (>7%) was observed in the treatment groups compared with the placebo groups (18).

In addition, Mathys and colleagues (17) found that 51.8% of patients treated with antipsychotics for dementia-related behavioral disturbances were not monitored for glucose at baseline or follow-up. Other studies have suggested that the presence of dementia is associated with lower monitoring for diabetes mellitus (19). However, we are not aware of any studies that have systematically examined monitoring for metabolic side effects among patients with dementia for whom antipsychotics are prescribed.

This study helped fill the gaps in the existing literature by examining recent practices for guideline-concordant (20) monitoring of metabolic side effects (weight gain, hyperglycemia, and hyperlipidemia) among older VA outpatients with dementia at the time a new antipsychotic medication is prescribed for any reason (baseline) and at a three-month follow-up. We compared the frequency of metabolic monitoring among patients with dementia and no psychotic disorder diagnosis (not an FDA-approved indication for antipsychotic use) and patients with psychotic disorders and no dementia (for whom antipsychotics are FDA approved). We expected that the frequency of monitoring for antipsychotic side effects for patients with dementia without psychosis would be higher because of a lack of FDA indication for the use of antipsychotics in this group compared with patients with psychotic disorders.

Methods

Study design and data source

This study was a retrospective cohort analysis that included patients prescribed antipsychotics in 32 VA medical centers within the Veterans Integrated Service Networks 18–22. Data on service utilization, diagnosis, prescribed medications, and laboratory tests were extracted from Veterans Health Administration medical SAS data sets, and vital signs were extracted from the Region 1 Corporate Data Warehouse.

This project was approved by the Central Arkansas Veterans Healthcare System Institutional Review Board and Research and Development Committee.

Patient selection

The dementia group (N=3,903) included patients with a diagnosis of dementia but no psychotic disorder (schizophrenia, bipolar disorder, or other psychotic disorders) who were prescribed a new antipsychotic prescription (the "index medication") between October 1, 2005, and September 30, 2011, with at least a 60-day supply in the subsequent 90 days. The psychosis group (N=5,779) included patients with a psychotic disorder but without dementia who met the same inclusion criteria regarding a new antipsychotic prescription. *ICD-9-CM* codes were used for selecting the groups: schizophrenia (295.0X–295.4X and 295.6X–295.9X), bipolar disorder (296.0X, 296.1X and 296.4X–296.8X), other psychotic disorders (293.81, 293.82, 297.0X–297.3X, 297.8X, 297.9X, 298.0X–298.4X, 298.8X, and 298.9X), and dementia (290.0, 290.1X–290.4X, 291.2, 294.10, 294.11, 294.20, 294.21, 331.0, 331.1X, and 331.82).

We identified patients clearly in need of monitoring for a new episode of treatment by including patients who had a new antipsychotic medication (that is, one that had not been prescribed in the previous 180 days) and who also had a stable medication regimen (that is, no other new antipsychotic medications had been prescribed in the prior six months). Patients were included whether the index prescription was a new antipsychotic start (that is, for a patient not prescribed any antipsychotic agent in the previous 180 days), a switch to a different antipsychotic agent, or the addition of a different antipsychotic medication to ongoing antipsychotic treatment. If more than one new prescription was identified within the study period, we selected the most recent occurrence. We excluded patients who had hospital or extended-care stays (for example, a nursing home or residential program) from 30 days before through 120 days after the index prescription date to focus on outpatient monitoring practices. In analyses not reported here, hospital or extended-care stays were strongly associated with completion of metabolic monitoring. Because dementia diagnoses are rare for persons younger than 60, only patients aged ≥60 years were included for both groups. In addition, given that elderly patients (≥65 years) may use Medicare-covered services, which may not be detected in VA databases, only ongoing VA service users with at least two VA outpatient visits on two different days in the previous 360 days (including the index date), were included. [A flow diagram

of patient selection is available in an online data supplement to this article.]

Assessment of monitoring

Observed metabolic monitoring rates vary depending on the definition of monitoring periods (21). On the basis of published recommendations (12), we examined baseline monitoring of weight, plasma glucose or hemoglobin A1c (HBA1c), and serum low-density lipoprotein cholesterol (LDL) within the 30 days before or after the index medication date. Similarly, three-month follow-up monitoring was operationalized as monitoring these parameters between 60 and 120 days after the index date (14). Because VA data often do not indicate whether the patient was fasting, any glucose or LDL test was included. Although the consensus statements specifically recommend fasting laboratory tests, most studies of routine monitoring practices have examined whether any glucose or lipid tests were obtained (22).

Antipsychotic side-effect risk classification

The risk of the index medication to cause metabolic side effects was classified as high (clozapine and olanzapine), medium (quetiapine, risperidone, chlorpromazine, thioridazine, loxapine, perphenazine, paliperidone, thiothixene, and trifluoperazine), or low (aripiprazole, ziprasidone, haloperidol, fluphenazine, molindone, pimozide, and mesoridazine) on the basis of the consensus ADA-APA statement (12), comprehensive review articles (23,24), and CATIE study results (25).

Statistical analysis

For each metabolic parameter (weight, glucose or HBA1c, and LDL), we compared monitoring frequency between the dementia and psychosis groups with a chi square test for equal proportions. We did this for baseline and follow-up monitoring separately. Changes in the monitoring rate from baseline to follow-up within each diagnostic group were compared using McNemar's tests.

We compared patient characteristics on the day of the index antipsychotic prescription or in the 180 days before (age; gender; race-ethnicity; marital status; and preexisting medical comorbidities, such as diabetes, dyslipidemia, obesity, hypertension, and heart disease) and the metabolic side-effect risk of the index medication (high, medium, or low) between the two diagnostic groups using a t test for the continuous variable (age) and chi square tests of independence for categorical variables. Because dementia patients differed from psychosis patients in all observed patient characteristics listed above, especially age, a propensity score analysis was conducted. Propensity score analysis facilitates the comparison of two groups of patients with different characteristics (26,27). Propensity scores were estimated by using logistic regression to predict the diagnostic group (dementia versus psychosis) based on the aforementioned patient characteristics. In addition to the variables for patient characteristics listed above, the model included all statistically significant interaction terms and quadratic and cubic terms of age identified following the model development process described in Austin and Mamdani (28). Psychosis patients were matched to dementia patients by using a greedy matching algorithm (29) with a caliper of .1 standard deviation of the logit of the estimated propensity score to enhance comparability of the matched patients. Because age was the most significant difference between the two groups, we further required age differences between the matched pairs to be no more than one year. After matching, differences in observed patient characteristics were tested by using a paired t test for the continuous variable and McNemar's test for binary variables to account for the matched nature of the sample. Standardized differences were also calculated as recommended, and any differences of 10 percentage points or larger were marked as "large" (28). The matching used an iterative process until there were no statistically significant differences in patient characteristics between diagnostic groups and all standardized differences were less than 10 percentage points. After matching, monitoring rates between diagnostic groups were compared at each time point and across time points with McNemar's tests. Conditional logistic regressions for matched data were also conducted for each metabolic parameter at baseline and at follow-up with the diagnostic group as the only predictor to generate the odds ratios.

All analyses were conducted with SAS, version 9.1, and p values less than .05 were considered statistically significant.

Results

The final sample included 1,576 matched pairs. Table 1 summarizes data on patient characteristics before and after matching. Before matching, the differences between the two diagnostic groups were statistically significant for all characteristics, and all but six standardized differences were >10 percentage points. The most significant difference, clinically and statistically, was age, with dementia patients being much older than psychosis patients (79.1±8.4 versus 65.9±6.7, $p<.001$). After matching, the two groups did not differ significantly on any of the patient characteristics, and the largest standardized differences were <4 percentage points.

Table 2 presents data for the two groups on each of the three metabolic parameters at baseline and at follow-up. The results determined after matching were our primary results; we include before-matching results for completeness. After matching, all between-group differences in monitoring rates (except weight at baseline) were reduced from the comparisons made before matching. However, differences between the two groups in follow-up monitoring for all parameters remained statistically significant, even after matching patient baseline characteristics between diagnostic groups For both diagnostic groups, monitoring was greater at baseline than at follow-up for each metabolic parameter: weight, 68% at baseline and 46% at follow-up in the dementia group and 64% versus 51% in the psychosis group; glucose or HBA1c, 41% versus 26% in the dementia group and 44% versus 31% in the psychosis group; LDL, 24% versus 13% in the dementia group and 27% versus 18% in the psychosis group ($p<.001$ for each comparison).

Discussion

This work represents a systematic examination of metabolic monitoring of

Table 1

Characteristics of VA patients, by diagnostic group and before and after propensity score matching

Characteristic	Before matching						After matching					
	Dementia (N=3,903)		Psychosis (N=5,779)				Dementia (N=1,576)		Psychosis (N=1,576)			
	N	%	N	%	p[a]	Standardized difference (%)[b]	N	%	N	%	p[a]	Standardized difference (%)[b]
Age (M±SD)	79.1±8.4		65.9±6.7		<.001	175.0	72.7±8.4		72.7±8.4		.186	.1
Gender												
Male	3,781	97	5,530	96	.003	6.3	1,524	97	1,527	97	.739	1.1
Female	122	3	249	4	.003	6.3	52	3	49	3	.739	1.1
Race												
Missing	644	17	569	10	<.001	19.8	205	13	196	12	.589	1.7
White	2,877	74	4,240	73	.707	.8	1,177	75	1,203	76	.216	3.8
Black	189	5	633	11	<.001	22.8	114	7	102	6	.317	3.0
Other	193	5	337	6	.060	3.9	80	5	75	5	.649	1.5
Married												
No	1,398	36	3,715	64	<.001	59.4	711	45	721	46	.391	1.3
Yes	2,505	64	2,064	36	<.001	59.4	865	55	855	54	.391	1.3
Preexisting comorbidity												
Diabetes	921	24	1,624	28	<.001	10.3	409	26	393	25	.421	2.3
Dyslipidemia	2,109	54	3,082	53	.495	1.4	873	55	870	55	.890	.4
Obesity	1,117	29	1,962	34	<.001	11.5	509	32	491	31	.395	2.5
Hypertension	2,017	52	2,637	46	<.001	12.1	783	50	769	49	.514	1.8
Heart disease	743	19	625	11	<.001	23.2	244	15	236	15	.641	1.4
Metabolic risk of the index medication												
High	347	9	602	10	.013	5.2	172	11	168	11	.773	.8
Medium	3,004	77	3,317	57	<.001	42.6	1,109	70	1,114	71	.731	.7
Low	552	14	1,860	32	<.001	43.8	295	19	294	19	.944	.2

[a] The p values for unmatched samples were tested using t tests for continuous variables and chi square tests for categorical variables; p values for matched samples were generated using paired t tests for continuous variables and McNemar's test for categorical variables.

[b] Standardized differences are the percentage standardized difference between diagnosis groups by using the formula of Austin and Mamdani (28). A standardized difference of >10 percentage points is considered significant.

older outpatients with dementia who were prescribed off-label antipsychotics in a large VA sample. At baseline, metabolic monitoring of glucose or HBA1c and LDL for the dementia group was comparable to the propensity score–matched psychosis group, but weight was monitored significantly more often in the dementia group. At follow-up, monitoring of all three metabolic parameters was significantly lower in the dementia group compared with the matched psychosis group, although the absolute differences were small (<5%). Overall, monitoring rates for all metabolic parameters were low in both groups, both at baseline and follow-up, indicating suboptimal metabolic monitoring for patients in both dementia and psychosis groups on the basis of the consensus ADA-APA recommendations (20). Although suboptimal, the monitoring in our VA sample was higher than that reported previously in non-VA samples (15,30).

Suboptimal monitoring after prescription of antipsychotics, especially for psychotic disorders, has been documented in various settings (13), including the VA (14). However, because of the potential for serious side effects, including mortality and CVEs, we had expected that our sample of outpatients with dementia who were receiving off-label prescriptions for antipsychotics would be monitored for metabolic side effects with greater frequency compared with psychosis patients, for whom antipsychotics are FDA approved.

Why do patients with dementia not receive recommended monitoring? Although the answer is unclear, one possible reason is that we used the ADA-APA monitoring recommendations, which were developed to apply to any patient treated with a second-generation antipsychotic but which did not specifically consider recommended monitoring for patients with dementia. Other possible reasons include patient and provider factors that could not be measured in a medical records database. These factors may affect patients with dementia more than patients with psychosis. A variety of factors that affect metabolic monitoring have been addressed in the literature (31,32). Patient-related factors may include reluctance to travel to the clinic for frequent lab tests, transportation difficulties, and limited understanding about the need for frequent monitoring. In an exploratory analysis, we found that 95% of patients with dementia had at least one outpatient visit during the baseline period and 75% had one during the three-month follow-up period. This suggests that lack of outpatient contact did not explain lack of monitoring for most patients. Provider-related factors may include reliance on other providers to order lab tests and monitor results, an assumption

Table 2

Baseline and follow-up monitoring of metabolic risk parameters among VA patients, by diagnostic group and before and after propensity score matching

Time point and parameter[a]	Before matching							After matching						
	Dementia (N=3,903)		Psychosis (N=5,779)		Dementia versus psychosis			Dementia (N=1,576)		Psychosis (N=1,576)		Dementia versus psychosis		
	N	%	N	%	OR	95% CI	p	N	%	N	%	OR[b]	95% CI	p
Baseline														
Weight	2,613	67	3,760	65	1.09	.99–1.19	.055	1,080	68	993	64	1.28	1.03–1.48	.001
Glucose or HBA1c	1,574	40	2,613	45	.82	.75–.89	<.001	664	41	685	44	.95	.82–1.09	.449
Low-density lipoprotein	839	21	1,713	30	.65	.59–.72	<.001	383	24	425	27	.87	.74–1.02	.084
3 months														
Weight	1,626	42	3,012	52	.66	.60–.71	<.001	738	46	796	51	.86	.75–.99	.036
Glucose or HBA1c	910	23	1,789	31	.68	.62–.74	<.001	424	26	483	31	.83	.71–.97	.020
Low-density lipoprotein	434	11	1,099	19	.53	.47–.60	<.001	206	13	278	18	.69	.57–.85	<.001

[a] Monitoring was associated with the time point if performed within 30 days before or after the baseline and 3-month follow-up time-point.
[b] Odds ratios (ORs) for matched samples were estimated by using conditional logistic regression with dementia diagnosis as the only predictor.

that patients with dementia may not understand instructions to manage metabolic side effects if they are detected, and less emphasis on strictly managing side effects and focusing on providing comfort care. For example, weight gain from antipsychotics might be considered helpful because unexplained and untreatable weight loss is common among individuals with dementia (33). However, our sample included only patients with dementia who were being managed in the outpatient setting and were thus likely to have less advanced dementia than those in nursing homes. Conflicting findings in the literature about the association between hyperglycemia and use of antipsychotics may lead to decreased vigilance for hyperglycemia risk among patients with dementia (16,34). In addition, the ADA and the American Geriatrics Society guidelines recommend less stringent control for HBA1c (8% rather than 7%) for older adults with dementia and diabetes mellitus (35,36). The allowance in treatment guidelines for less stringent diabetes mellitus control may influence providers to monitor less for hyperglycemia (19) among older persons with dementia who receive antipsychotics, despite the fact that monitoring may be particularly important in this context (19), and hyperglycemia and ketoacidosis can develop rapidly (37) and cause other imbalances in blood chemistries in already frail elders. However, in the absence of specific guidelines for monitoring outpatients with dementia who receive antipsychotics, adopting the ADA-APA approved monitoring recommendations seems reasonable.

Although practice guidelines recommend that nonpharmacological treatment and psychosocial interventions should be the first line of treatment for neurobehavioral symptoms of dementia (38), antipsychotics are frequently prescribed despite their limited efficacy and substantial risks, particularly in circumstances in which the patient exhibits identifiable risk of harm to self or others or has significant distress and when nonpharmacological interventions have been unsuccessful (39). There is a paucity of evidence-based treatment alternatives to antipsychotics for this population, and currently no such alternative treatment has been approved by the FDA for these symptoms (40,41). Similarly, the data on efficacy of specific psychosocial treatments for patients with dementia are limited and inconclusive (42). Clinicians, patients, and caregivers are left with unclear choices of treatment for dementia patients with severe behavioral disturbance. It is important to note that although there is a risk of increased mortality with the use of antipsychotics among patients with dementia, the absolute increased risk, at least in the short term, is relatively small (approximately 1%−2%) (1,43).

The study had some limitations. The results are applicable only to patients with dementia who receive care as an outpatient in the VA and cannot be generalized to patients with dementia receiving antipsychotics in inpatient, residential care, or nursing home settings. Because of the large age differences between patients with dementia without psychosis and psychotic patients without dementia, a significant number of older patients with dementia, particularly those aged 75 or older, were not matched. Therefore, the monitoring rates estimated by using the matched sample may not generalize well to dementia patients over 75 years of age.

Although propensity score matching was able to balance all observed differences between the dementia and psychosis groups, there may have been unmeasured differences between the two groups that may have explained some differences in monitoring. For example, travel distance to the medical center or clinic or differences in living situations may account

for some of the between-group differences in monitoring. Finally, in the administrative data available to us, we were not able to identify the provider type or the clinic that ordered the laboratory tests for monitoring. This information will be useful to appropriately target efforts to improve monitoring.

Conclusions

The most significant finding of our study is that similar to rates for patients with psychosis, the rates of monitoring for metabolic side-effects were low for outpatients with dementia who were prescribed antipsychotics. In the absence of alternative, safe, and efficacious treatments, the use of antipsychotics for managing neurobehavioral symptoms of dementia is likely to continue in some clinical situations where the risks of unmanaged neurobehavioral symptoms outweigh the risks of not using antipsychotics. However, it is concerning to find that such prescribing was not accompanied by greater monitoring for metabolic side effects, especially considering that our sample included only outpatients whose dementia was likely to be less severe than that of patients in residential programs and nursing homes. Although there are ongoing efforts in the VA to improve monitoring for metabolic side effects associated with antipsychotic prescribing, our findings suggest that more targeted efforts are needed to improve monitoring among patients with dementia for whom the off-label use of antipsychotics lacks efficacy and poses substantial risks.

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References

1. Jeste DV, Blazer D, Casey D, et al: ACNP White Paper: update on use of antipsychotic drugs in elderly persons with dementia. Neuropsychopharmacology 33:957–970, 2008
2. Alexopoulos GS, Streim J, Carpenter D, et al: Introduction: methods, commentary, and summary. Journal of Clinical Psychiatry 65(suppl 2):5–19, 2004
3. Maher AR, Maglione M, Bagley S, et al: Efficacy and comparative effectiveness of atypical antipsychotic medications for off-label uses in adults: a systematic review and meta-analysis. JAMA 306:1359–1369, 2011
4. Gentile S: Second-generation antipsychotics in dementia: beyond safety concerns. A clinical, systematic review of efficacy data from randomised controlled trials. Psychopharmacology 212:119–129, 2010
5. Schneider LS, Tariot PN, Dagerman KS, et al: Effectiveness of atypical antipsychotic drugs in patients with Alzheimer's disease. New England Journal of Medicine 355: 1525–1538, 2006
6. Kalapatapu RK, Schimming C: Update on neuropsychiatric symptoms of dementia: antipsychotic use. Geriatrics 64:10–18, 2009
7. Azermai M, Petrovic M, Elseviers MM, et al: Systematic appraisal of dementia guidelines for the management of behavioural and psychological symptoms. Ageing Research Reviews 11:78–86, 2012
8. Public Health Advisory: Deaths With Antipsychotics in Elderly Patients With Behavioral Disturbances. Silver Spring. Md, US Food and Drug Administration, 2005. Available at www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/DrugSafetyInformationforHeathcareProfessionals/PublicHealthAdvisories/ucm053171.htm
9. Transcript for FDA Media Briefing on Safety Labeling Changes for Antipsychotic Drugs. Silver Spring, Md, US Food and Drug Administration, 2008. Available at www.fda.gov/downloads//newsevents/newsroom/mediatranscripts/ucm169331.pdf
10. Mittal V, Kurup L, Williamson D, et al: Risk of cerebrovascular adverse events and death in elderly patients with dementia when treated with antipsychotic medications: a literature review of evidence. American Journal of Alzheimer's Disease and Other Dementias 26:10–28, 2011
11. Rummel-Kluge C, Komossa K, Schwarz S, et al: Head-to-head comparisons of metabolic side effects of second generation antipsychotics in the treatment of schizophrenia: a systematic review and meta-analysis. Schizophrenia Research 123:225–233, 2010
12. American Diabetes Association; American Psychiatric Association; American Association of Clinical Endocrinologists, et al: Consensus development conference on antipsychotic drugs and obesity and diabetes. Diabetes Care 27:596–601, 2004
13. Morrato EH, Druss BG, Hartung DM, et al: Small area variation and geographic and patient-specific determinants of metabolic testing in antipsychotic users. Pharmacoepidemiology and Drug Safety 20:66–75, 2011
14. Mittal D, Li C, Williams JS, et al: Monitoring veterans for metabolic side effects when prescribing antipsychotics. Psychiatric Services 64:28–35, 2013
15. Haupt DW, Rosenblatt LC, Kim E, et al: Prevalence and predictors of lipid and glucose monitoring in commercially insured patients treated with second-generation antipsychotic agents. American Journal of Psychiatry 166:345–353, 2009
16. Micca JL, Hoffmann VP, Lipkovich I, et al: Retrospective analysis of diabetes risk in elderly patients with dementia in olanzapine clinical trials. American Journal of Geriatric Psychiatry 14:62–70, 2006
17. Mathys M, Blaszczyk A, Busti A: Incidence of abnormal metabolic parameters and weight gain induced by atypical antipsychotics in elderly patients with dementia. Consultant Pharmacist 24:201–209, 2009
18. Zheng L, Mack WJ, Dagerman KS, et al: Metabolic changes associated with second-generation antipsychotic use in Alzheimer's disease patients: the CATIE-AD study. American Journal of Psychiatry 166:583–590, 2009
19. Thorpe CT, Thorpe JM, Kind AJ, et al: Receipt of monitoring of diabetes mellitus in older adults with comorbid dementia. Journal of the American Geriatrics Society 60:644–651, 2012
20. American Diabetes Association; American Psychiatric Association; American Association of Clinical Endocrinologists, et al: Consensus development conference on antipsychotic drugs and obesity and diabetes. Journal of Clinical Psychiatry 65: 267–272, 2004
21. Morrato EH, Druss B, Hartung DM, et al: Metabolic testing rates in 3 state Medicaid programs after FDA warnings and ADA/APA recommendations for second-generation antipsychotic drugs. Archives of General Psychiatry 67:17–24, 2010
22. Mitchell AJ, Delaffon V, Vancampfort D, et al: Guideline concordant monitoring of metabolic risk in people treated with antipsychotic medication: systematic review and meta-analysis of screening practices. Psychological Medicine 42:125–147, 2012
23. Allison DB, Mentore JL, Heo M, et al: Antipsychotic-induced weight gain: a comprehensive research synthesis. American Journal of Psychiatry 156:1686–1696, 1999
24. Nussbaum AM, Stroup TS: Paliperidone for treatment of schizophrenia. Schizophrenia Bulletin 34:419–422, 2008
25. Lieberman JA, Stroup TS, McEvoy JP, et al: Effectiveness of antipsychotic drugs in patients with chronic schizophrenia. New England Journal of Medicine 353:1209–1223, 2005
26. Rosenbaum PR, Rubin DB: The central role of the propensity score in observational studies for causal effects. Biometrika 70:41–55, 1983
27. Rubin DB: Estimating causal effects from large data sets using propensity scores. Annals of Internal Medicine 127:757–763, 1997
28. Austin PC, Mamdani MM: A comparison of propensity score methods: a case-study estimating the effectiveness of post-AMI statin use. Statistics in Medicine 25:2084–2106, 2006

29. Kosanke J, Bergstralh E: gmatch (match 1 or more controls to cases using the GREEDY algorithm). Rochester, Minn, Mayo Clinic College of Medicine, 2004. Available at www.mayo.edu/research/documents/gmatchsas/DOC-10027248

30. Morrato EH, Newcomer JW, Allen RR, et al: Prevalence of baseline serum glucose and lipid testing in users of second-generation antipsychotic drugs: a retrospective, population-based study of Medicaid claims data. Journal of Clinical Psychiatry 69: 316–322, 2008

31. Morrato EH: An update on lipid profile screening in second-generation antipsychotic users in the USA. Clinical Lipidology 7:509–523, 2012

32. Druss BG: Improving medical care for persons with serious mental illness: challenges and solutions. Journal of Clinical Psychiatry 68(suppl 4):40–44, 2007

33. Gillette-Guyonnet S, Nourhashemi F, Andrieu S, et al: Weight loss in Alzheimer disease. American Journal of Clinical Nutrition 71: 637S–642S, 2000

34. Feldman PD, Hay LK, Deberdt W, et al: Retrospective cohort study of diabetes mellitus and antipsychotic treatment in a geriatric population in the United States. Journal of the American Medical Directors Association 5:38–46, 2004

35. American Diabetes Association: Standards of medical care in diabetes, 2011. Diabetes Care 34(suppl 1):S11–S61, 2011

36. Brown AF, Mangione CM, Saliba D, et al: Guidelines for improving the care of the older person with diabetes mellitus. Journal of the American Geriatrics Society 51 (suppl guidelines):S265–S280, 2003

37. Guenette MD, Hahn M, Cohn TA, et al: Atypical antipsychotics and diabetic ketoacidosis: a review. Psychopharmacology 226: 1–12, 2013

38. Lyketsos CG, Colenda CC, Beck C, et al: Position statement of the American Association for Geriatric Psychiatry regarding principles of care for patients with dementia resulting from Alzheimer disease. American Journal of Geriatric Psychiatry 14:561–572, 2006

39. Rabins PV, Lyketsos CG: Antipsychotic drugs in dementia: what should be made of the risks? JAMA 294:1963–1965, 2005

40. Jeste DV, Dolder CR, Nayak GV, et al: Atypical antipsychotics in elderly patients with dementia or schizophrenia: review of recent literature. Harvard Review of Psychiatry 13:340–351, 2005

41. Sink KM, Holden KF, Yaffe K: Pharmacological treatment of neuropsychiatric symptoms of dementia: a review of the evidence. JAMA 293:596–608, 2005

42. Ayalon L, Gum AM, Feliciano L, et al: Effectiveness of nonpharmacological interventions for the management of neuropsychiatric symptoms in patients with dementia: a systematic review. Archives of Internal Medicine 166:2182–2188, 2006

43. Steinberg M, Lyketsos CG: Atypical antipsychotic use in patients with dementia: managing safety concerns. American Journal of Psychiatry 169:900–906, 2012

Psychiatric Services Invites Short Descriptions of Novel Programs

Psychiatric Services invites contributions for Frontline Reports, a column featuring short descriptions of novel approaches to mental health problems or creative applications of established concepts in different settings.

Text should be 350 to 750 words. A maximum of three authors, including the contact person, can be listed; one author is preferred. References, tables, and figures are not used. Any statements about program effectiveness must be accompanied by supporting data within the text.

Material to be considered for Frontline Reports should be sent to one of the column editors: Francine Cournos, M.D., New York State Psychiatric Institute, 1051 Riverside Dr., Unit 112, New York, NY 10032 (e-mail: fc15@columbia.edu), or Stephen M. Goldfinger, M.D., Department of Psychiatry, SUNY Downstate Medical Center, Box 1203, 450 Clarkson Ave., Brooklyn, NY 11203 (e-mail: smgoldfingermd@aol.com).