Use of Academic Detailing With Audit and Feedback to Improve Antipsychotic Pharmacotherapy

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Objective: Second-generation antipsychotics vary in their propensity to cause serious cardiometabolic side effects. In addition, use of two or more antipsychotics (polypharmacy) may lead to additive side effects and has not been shown to be consistently more effective than monotherapy. This study examined the use of academic detailing with audit and feedback to improve antipsychotic prescribing practices, including antipsychotic polypharmacy and utilization of medication with high or low risk of cardiometabolic side effects ("high risk" or "low risk," respectively).

Methods: Four intervention sessions were provided over two years to psychiatric care providers at community mental health centers. Segmented regression within the general estimating equation model framework used Medicaid pharmacy claims to examine prescribing patterns before and after the intervention among all beneficiaries (67,721 person-months) over a five-year period.

Results: After the intervention, 10.9% of beneficiaries with antipsychotic claims were on polypharmacy, compared with 13.1% before the invention. Use of high-risk and low-risk antipsychotics did not change. The final adjusted polypharmacy model showed that antipsychotic polypharmacy decreased among young adults and adults ages 40 or older compared with beneficiaries ages 30–39 (β=−.02, p=.04, and β=−.02, p=.007, respectively). The raw proportion of beneficiaries on high- and low-risk agents did not change, although final adjusted models demonstrated changes in use of high- and low-risk agents by diagnosis and risk group.

Conclusions: Polypharmacy decreased among young and older adults after academic detailing with audit and feedback. Although further research is needed, this low-intensity intervention may help mental health systems reduce antipsychotic polypharmacy.

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Almost four million U.S. adults received a prescription for an antipsychotic medication in 2013 (1). Second-generation antipsychotics are effective and are less likely than first-generation antipsychotics to cause tardive dyskinesia, but all can cause cardiometabolic side effects, including weight gain, insulin resistance, and elevated lipids (2,3). Certain second-generation antipsychotic medications may be less likely than others to cause cardiometabolic side effects (4,5), and switching to one of these agents can partially or fully reverse weight gain and laboratory abnormalities (6).

Also of concern is antipsychotic polypharmacy, the practice of combining two or more antipsychotic medications. Guidelines recommend antipsychotic monotherapy as an initial step to treat psychotic symptoms (7–9). For individuals with schizophrenia who do not respond to monotherapy, use of clozapine is the gold standard (10,11), although its utilization in the United States is low (12). Antipsychotic polypharmacy remains a common strategy for treating chronic and debilitating symptoms (13–15), although research on its efficacy is inconsistent (16,17). Despite a consensus on the need to minimize exposure to agents with high cardiometabolic risk, either as monotherapy or polypharmacy, little is known about how to improve antipsychotic prescribing practices across large systems of providers.

To address this gap, we implemented a statewide program of academic detailing with audit and feedback for psychiatric care providers at community mental health centers (18). The intervention aimed to minimize the use of antipsychotics with high cardiometabolic risk and antipsychotic polypharmacy. Academic detailing (also known as counter-detailing or educational outreach visiting) uses visits by physicians, clinical pharmacists, or similarly respected peers to provide clinicians with evidence-based counseling on the risks, benefits, and relative efficacy of medication alternatives (19). Academic detailing is modestly effective in improving prescribing practices (20,21). Research has also shown that providing clinicians with data regarding how their own prescribing compares with that of peers or with guidelines, known as audit and feedback, results in modest improvements (22). This approach has the advantage of providing personalized information on

DESCRIPTION OF ACADEMIC DETAILING INTERVENTION AND THE TREATMENT RECOMMENDATIONS CURRICULUM

Experienced psychiatrists provided four 50-minute in-person visits to all care providers during each center's administrative meeting.

Baseline
- Provided overview of the project goals
- Presented center- or individual-level Medicaid antipsychotic claims data on prescribing
- Introduced treatment recommendations curriculum

1 month
- Reiterated treatment recommendations
- Reviewed cases where clinicians had tried to implement changes

11 months
- Reiterated treatment recommendations
- Presented center-level data on prescribing patterns, highlighting improvements

23 months
- Reinforced treatment recommendations
- Conducted final presentation of center-level data

Highlights from treatment recommendations curriculum

- Organizing theme was evidenced-based prescribing
- Addressed general medical problems among individuals with severe mental illness, especially problems caused or exacerbated by antipsychotic medications
- Provided evidence for similar efficacy among currently available antipsychotic medications, except clozapine
- Provided evidence for varying cardiometabolic, neurologic, and other side effects of antipsychotic medications (also provided on a laminated card)
- Presented equivocal evidence for antipsychotic polypharamcy
- Discussed alternatives to antipsychotic medications for nonpsychosis diagnoses
- Discussed strategies for switching from high-risk to low-risk antipsychotic medications
- Emphasized coordination of care with primary care for primary care management of co-occurring cardiometablic disorders
- Awarded continuing medical education credits

prescribing patterns that physicians otherwise are not able to ascertain (23). We hypothesized that implementing a statewide program of academic detailing combined with audit and feedback would be associated with a subsequent decrease in the proportion of individuals filling prescriptions for antipsychotics with high cardiometabolic risk and for antipsychotic polypharmacy.

METHODS

Sample and Context

In New Hampshire, the state public mental health authority contracts with 10 private, nonprofit community mental health centers to deliver rehabilitation services and comprehensive care to people with severe mental illness. During the period of study, the mental health authority implemented a quality initiative to improve health among people with severe mental illness (18). State leaders engaged community mental health center leaders and other community stakeholders, such as the National Alliance on Mental Illness, in the initiative with education and discussion. Subsequently, all psychiatric care providers at the community mental health centers (psychiatrists and advance practice nurses) were invited to participate. From 2009 to 2013, all 85 psychiatric care providers were informed of the health initiative and sent a quarterly letter describing the initiative's goals and strategies for prescribers to support health among people with severe mental illness. Each letter included articles describing optimal, evidence-based antipsychotic prescribing and cardiometabolic side-effect monitoring.

During the study period, the state's Medicaid insurance policy covered risperidone, quetiapine, ziprasidone, clozapine, and first-generation antipsychotics without requiring a copayment or prior authorization. Other second-generation antipsychotics were covered if prior authorization was obtained.

Contemporaneously, the community mental health centers expanded delivery of a health promotion intervention, In Shape, to improve fitness for people with severe mental illness (24). This intervention included a gym membership, regular meetings with a fitness coach, and regular celebrations of progress toward health goals. The education intervention described below was timed to take place as each community mental health center implemented In Shape.

Intervention

The state mental health medical director (MFB) engaged mental health center leaders to elicit support for the program. Educators, who were experienced psychiatrists, then provided a sequence of four 50-minute, in-person visits over two years to the group of psychiatric care providers at each site during the group's regular, mandatory administrative meeting. The intervention included providing data on rates of polypharmacy and prescribing of medications with high cardiometabolic risk in conjunction with a curriculum supporting recommended treatment at the initial session and three follow-up sessions (see box). Staff who did not attend one or more visits because of vacation or an emergency were provided the materials. The education intervention began as the mental health center initiated its In Shape health promotion program. The rollout was planned to occur in two

phases: three centers began in 2010, and five centers began in 2012. Two centers in the state declined to participate in the education intervention because of competing organizational quality improvement projects. The study was reviewed and approved by the Dartmouth Institutional Review Board. Because no patient-identifiable data were utilized, informed consent was not obtained from patients. Research procedures were in compliance with the Declaration of Helsinki.

Medicaid Beneficiary and Claims Data

From state Medicaid medical and pharmaceutical claims (2009–2013), we defined our study cohort as adult beneficiaries (age 18 or older as of January 1, 2009) with at least two rehabilitation service claims separated by at least six months in each year, indicating they were likely to be receiving longitudinal services for severe mental illness. Among these recipients, we utilized data for each month in which an antipsychotic prescription was filled (67,721 person-months). We categorized beneficiary age into three groups (18–29, 30–39, and ≥40) to enable us to describe prescribing patterns by age, given that younger and older individuals have different side effect susceptibilities. For example, younger patients are more likely to develop cardiometabolic side effects (25), and older patients are more likely to experience adverse drug events associated with polypharmacy (26). Psychiatric diagnoses were classified by *ICD-9* code.

Mental health centers that received the intervention beginning in 2010 were designated as the early cohort, and those that received the intervention beginning in 2012 were designated as the late cohort. This designation was used to control for a potential priming effect of the overall health initiative received by the late cohort. The two community mental health centers that did not receive the intervention contributed filled claims and were designated as preintervention only. [A description of the complete data preparation procedures is available as an online supplement to this article.]

The outcomes of interest were the monthly proportions of all beneficiaries with antipsychotic fills who had a polypharmacy fill (two or more types of antipsychotics filled for more than 60 consecutive days), a fill for an antipsychotic with high cardiometabolic risk ("high risk"), and a fill for an antipsychotic with low cardiometabolic risk ("low risk"). We defined date of service in the Medicaid pharmacy file as a prescription fill date and defined the "days' supply" field as a marker of duration of pharmacotherapy per each medication fill. On the basis of existing literature, antipsychotic medications in use over this period were divided into groups with high cardiometabolic risk (olanzapine, quetiapine, chlorpromazine, and thioridizine), medium risk, or low risk (ziprasidone, aripiprazole, asenapine, lurasidone, fluphenazine, haloperidol, molindone, and pimozide) (27–29). Because clozapine was recommended for treatment-resistant psychosis, people on clozapine were not candidates for switching; thus clozapine fills were omitted. Prescription fills for medium-risk agents were included in the denominators for the analyses, but they were not an outcome of focus for this study.

TABLE 1. Pre- and postintervention characteristics among 4,968 Medicaid recipients with a filled prescription claim for an antipsychotic[a]

Characteristic	Preintervention (N=3,779)		Postintervention (N=2,727)	
	N	%	N	%
Age (years)				
18–29	963	25	638	23
30–39	1,015	27	754	28
≥40	1,801	48	1,335	49
Male gender	1,395	37	1,018	37
Psychiatric diagnosis[b]				
Schizophrenia	1,138	30	806	30
Bipolar disorder	1,157	31	701	26
Depression	1,032	27	802	29
Anxiety	292	8	269	10
Substance abuse disorder	27	1	25	1
Personality disorder	15	0	22	1
Other	118	3	102	4
≥1 mental health–related hospital and emergency[b] department (ED) visits				
Hospital visit	1,581	42	1,168	43
ED visit	2,501	66	2,028	74
Hospital or ED visit	2,810	74	2,155	79

[a] Includes beneficiaries associated with all filled antipsychotic claims during a study of an academic detailing intervention (2009–2013) (67,721 person-months), except claims for clozapine. Not all beneficiaries overlapped before and after the intervention. Data on hospital and ED visits were from the intervention period.

[b] Significant differences were found between the pre- and postintervention groups ($p<.01$).

In keeping with a previously described approach (13), antipsychotic polypharmacy was defined as overlapping use of two or more different antipsychotic medications for longer than 60 days. Because prescriptions may overlap to allow for periods of switching from one antipsychotic to another, concurrent treatment for less than 60 days was not considered antipsychotic polypharmacy. For each beneficiary with antipsychotic fills, we labeled each month as polypharmacy or monotherapy based on these calculations.

In this filled claims–based method, all Medicaid beneficiaries receiving rehabilitation services and antipsychotic fills during the five-year study period contributed data to the analyses. The unit of analysis was a month of pharmacotherapy. A beneficiary could contribute an antipsychotic medication fill in any category in the same month (high risk, low risk, and polypharmacy); thus the categories of fills associated with an individual were not mutually exclusive. Some beneficiaries were associated with fills in the preintervention period but not in the postintervention period and vice versa. Monthly antipsychotic fills were aligned according to the time of education intervention at

TABLE 2. Use of high- and low-risk antipsychotics and antipsychotic polypharmacy before an academic detailing intervention among 4,968 Medicaid recipients with a filled prescription claim for an antipsychotic

	High-risk antipsychotic[a]				Low-risk antipsychotic[b]				Polypharmacy[c]			
	No (N=1,086)		Yes (N=1,473)		No (N=1,744)		Yes (N=785)		No (N=2,411)		Yes (N=230)	
Characteristic	N	%	N	%	N	%	N	%	N	%	N	%
Age (years)[d]												
18–29[e]	303	28	313	21	409	23	207	26	593	25	48	21
30–39	272	25	388	26	455	26	205	26	638	26	45	20
≥40	511	47	772	52	910	51	373	48	1,180	49	137	60
Male gender	421	39	528	36	678	38	271	35	887	37	102	44
Psychiatric diagnosis[d]												
Schizophrenia[f]	394	36	430	29	535	30	289	37	737	31	151	66
Bipolar disorder	314	29	440	30	495	28	259	33	728	30	40	17
Depression	244	22	422	29	505	28	161	21	647	27	22	10
Anxiety	72	7	122	8	150	8	44	6	189	8	8	3
Substance abuse disorder	2	0	14	1	14	1	2	0	14	1	0	0
Personality disorder	6	1	6	0	7	0	5	1	12	1	0	0
Other	54	5	39	3	68	4	25	3	84	3	9	4
≥1 mental health–related hospital and emergency department (ED) visits												
Hospital visit[d,g]	435	40	668	45	763	43	340	43	1,021	42	103	45
ED visit	733	68	1,030	70	1,200	68	563	72	1,657	69	147	64
Hospital or ED visit	812	75	1,135	77	1,332	75	615	78	1,829	76	165	72
Late-cohort centers[d,h]	660	61	802	54	1,022	58	440	56	1,391	58	138	60

[a] Antipsychotics with a high risk of cardiometabolic side effects
[b] Antipsychotics with a low risk of cardiometabolic side effects
[c] ≥2 types of antipsychotics filled for >60 consecutive days
[d] Patterns of antipsychotic fills varied by characteristic.
[e] Age 18 to 29 was significantly associated with less use of high-risk antipsychotics ($p<.001$) and polypharmacy ($p<.01$).
[f] Schizophrenia was significantly associated with less use of high-risk antipsychotics ($p<.001$), more use of low-risk antipsychotics, and more use of polypharmacy ($p<.01$).
[g] Hospital visits were associated with more use of high-risk antipsychotics ($p<.01$).
[h] Treatment at late-cohort centers (centers that received academic detailing in 2012) was associated with less use of high-risk antipsychotics ($p<.01$).

each mental health center and were assigned a status of preintervention or postintervention. They were also assigned a time designation based on the point in time during the five-year study window. Because prescribing patterns change over time (30), we included time in our modeling.

Statistical Analyses

Using chi-square or t test, as appropriate, we assessed whether beneficiary characteristics (e.g., gender, age group, diagnosis group, and hospitalization during the five-year study period) (31) were associated with pharmacotherapy category (antipsychotic polypharmacy, high-risk antipsychotic, and low-risk antipsychotic) for beneficiaries contributing filled claims before the intervention.

To examine the effect of the intervention on monthly prescribing, we calculated raw rates of filled claims for each antipsychotic category before and after the intervention. We then ran three models, one each for antipsychotic polypharmacy, high-risk antipsychotic pharmacotherapy, and low-risk antipsychotic pharmacotherapy. We used a segmented regression approach within generalized estimating equation (GEE) models (32,33), which accounts for autocorrelation between monthly pharmacotherapy within beneficiaries. We first conducted a series of exploratory analyses. Based on research questions of interest and model fit, our final models included the time trend prior to intervention, time trend change after intervention during the five-year study period, beneficiary diagnosis and demographic characteristics, late-intervention cohort status, and actual time (e.g., December 2012) during the five-year period to enable measurement of secular trends. We expected that antipsychotic fills for participants with markers of potentially lower acuity of antipsychotic need (diagnosis other than schizophrenia or bipolar disorder and no hospital use) and those with potentially higher risk of metabolic adverse effects (youngest and oldest age groups) would be more likely to change. The intervention effect was assessed by whether there was a significant trend change after the intervention compared with before the intervention. If the intervention effect was significant, the interaction between beneficiary characteristics and intervention was added into the model, and significant interaction effects became the focal point of interpretation for that model. Thus the three models included different variables. The results were interpreted as a relative increase or decrease in the outcomes compared with the relevant reference group. Data management and analyses were performed by using SAS, version 9.3.

RESULTS

Beneficiary Characteristics

The analysis group included 4,986 adult Medicaid beneficiaries with severe mental illness who had received rehabilitation services over at least six months and who had also filled at least one antipsychotic prescription paid for by Medicaid during the study period (67,721 person-months) (Table 1). Compared with beneficiaries who filled antipsychotic prescriptions before the intervention, those who filled antipsychotic prescriptions after the intervention were less likely to have diagnoses of bipolar disorders and were more likely to have had a psychiatric hospitalization or an emergency department (ED) visit during the five-year study period, although the actual magnitude of differences was small.

Table 2 shows antipsychotic fills by beneficiary characteristic before the intervention, showing that patterns of prescription fills varied depending upon beneficiary characteristic. High-risk antipsychotic pharmacotherapy was associated with a diagnosis of depression, older age, and treatment at early-cohort centers. Low-risk antipsychotic pharmacotherapy was associated with schizophrenia and bipolar disorder diagnoses, and antipsychotic polypharmacy was associated with schizophrenia diagnoses and older age.

In aggregate, the raw proportions of people with Medicaid-filled claims for antipsychotic polypharmacy decreased after the intervention. Before the intervention, 13.1% of beneficiaries who had filled an antipsychotic prescription were users of polypharmacy, compared with 10.9% in the second year after the intervention, an absolute reduction of 2.2% and a relative reduction of 16.8%. The proportion of beneficiaries who filled prescriptions for high-risk antipsychotics and low-risk antipsychotics did not change between the year before the intervention and the years after the intervention (Table 3).

TABLE 3. Use of high- and low-risk antipsychotics and antipsychotic polypharmacy before and after an academic detailing intervention[a]

Time period	Total N	High-risk Antipsychotic[b] N	%	Low-risk Antipsychotic[c] N	%	Polypharmacy[d] N	%
1 year before intervention	3,779	2,006	53	1,201	32	495	13
1 year after intervention	2,727	1,423	52	848	31	321	12
2 years after intervention	865	495	53	278	32	94	11

[a] Includes all beneficiaries with antipsychotic claims except clozapine (67,721 person-months) over the five-year study period
[b] Antipsychotics with a high risk of cardiometabolic side effects
[c] Antipsychotics with a low risk of cardiometabolic side effects
[d] ≥2 types of antipsychotics filled for >60 consecutive days

Antipsychotic Utilization Trends

Segmented GEE models were specified to evaluate trends in prescribing over time before and after the intervention. The models adjusted for participant age group, gender, diagnosis, hospital and ED utilization, and intervention cohort.

Antipsychotic polypharmacy. The final adjusted antipsychotic polypharmacy model showed that after the intervention, the trend for fills decreased among young adults and adults over 40 compared with 30- to 39-year-olds, indicating that the education intervention affected polypharmacy prescribing differently depending on the age group (Table 4). The models also showed that, overall, polypharmacy was more common among people with diagnoses of schizophrenia and bipolar disorders.

Antipsychotics with high cardiometabolic risk. The final adjusted regression model showed that after the intervention, the trend for high-risk antipsychotic fills decreased among people with schizophrenia and bipolar disorder compared with fills for beneficiaries with other diagnoses (β=–.01, p=.034), indicating that the effects of the education intervention on high-risk antipsychotic prescribing differed significantly depending on patients' diagnosis (Table 4). The model results also showed that high-risk antipsychotic fills decreased among beneficiaries at centers in the late cohort, indicating that the intervention's effect on fills was greater at these centers compared with the early cohort. Also, high-risk agents were used less often among young adults compared with adults over age 30 and among beneficiaries who had not recently been hospitalized compared with those with a recent psychiatric hospitalization.

Antipsychotics with low cardiometabolic risk. As shown in Table 4, the final adjusted model for low-risk antipsychotics showed that the trend for fills for low-risk agents decreased among beneficiaries with at least one psychiatric hospitalization compared with beneficiaries without a hospital admission (β=–.02, p=.009). The model indicates that the education intervention affected low-risk antipsychotic prescribing significantly depending on patients' utilization of hospitals or EDs. The model also showed that, overall, low-risk agents were used more among women, young adults, and people with diagnoses of schizophrenia and bipolar disorder.

DISCUSSION

Antipsychotic polypharmacy was reduced after implementation of a statewide program involving four sessions of academic detailing with audit and feedback. Adjusted models that controlled for other beneficiary characteristics and time trends showed a significant reduction in polypharmacy among young adults and adults over 40. The 2.2% absolute reduction and 16.8% relative reduction in polypharmacy are similar to the median changes reported in previous studies of academic detailing (21) and audit and feedback (22). As expected, polypharmacy in this group—people with

TABLE 4. Adjusted trends in antipsychotic polypharmacy and prescribing of high- and low-risk antipsychotics over a five-year study of an academic detailing intervention

Prescribing characteristic	Estimate	SE	Z	p
Antipsychotic polypharmacy[a]				
Preintervention level (intercept)	−2.68	.24	−11.3	≤.001
Preintervention monthly trend	−.00	.00	−.37	.711
Level of change after intervention	−.13	.09	−1.47	.140
Trend change after the intervention	.02	.01	2.34	.019
Schizophrenia and bipolar disorder diagnoses (reference: all other)	.68	.21	3.32	.001
Age (reference: 30–39)				
18–29	.15	.19	.82	.414
≥40	−.22	.29	−.77	.442
Male (reference: female)	.21	.12	1.78	.074
Late cohort (reference: early cohort)	−.18	.12	−1.47	.142
Trend change after intervention				
Age 18–29	−.02	.01	−2.05	.041
Age ≥40	−.02	.02	−2.71	.007
High-risk antipsychotics[b]				
Preintervention level (intercept)	.42	.11	3.74	≤.001
Preintervention monthly trend	−.00	.00	−.69	.488
Level of change after intervention	−.00	.05	−.07	.942
Trend change after intervention	.01	.00	1.65	.099
Schizophrenia and bipolar disorder diagnoses (reference: all other)	−.23	.09	−2.62	.009
Age (reference: 30–39)				
18–29	−.36	.11	−3.27	.001
≥40	.05	.10	.55	.580
Psychiatric hospital visit (reference: no psychiatric hospital visit)	.16	.08	2.01	.045
Late cohort (reference: early cohort)	−.30	.09	−3.41	.001
Trend change after intervention for late cohort	−.01	.01	−1.97	.049
Trend change after intervention for schizophrenia and bipolar disorder diagnoses	−.01	.01	−2.12	.034
Low-risk antipsychotics[c]				
Preintervention level (intercept)	−1.24	.15	−8.19	≤.001
Preintervention monthly trend	−.00	.00	−1.05	.295
Level of change after intervention	−.03	.06	−.48	.629
Trend change after intervention	.02	.01	2.51	.012
Schizophrenia and bipolar disorder diagnoses (reference: all other)	.58	.09	6.61	≤.001
Male (reference: female)	−.25	.09	−2.94	.003
Age (reference: 30–39)				
18–29	.27	.12	2.3	.021
≥40	−.09	.10	−.94	.347
Psychiatric hospital or emergency department visit (reference: no visit)	.21	.11	1.9	.058
Late cohort (reference: early cohort)	.01	.10	.15	.880
Trend change after intervention for late cohort	.01	.01	1.91	.056
Trend change after intervention for those with psychiatric hospital or emergency department visit	−.02	.01	−2.62	.009

[a] Antipsychotics with a high risk of cardiometabolic side effects. Goodness of fit (quasilikelihood under the independence model criterion=58,679)
[b] Antipsychotics with a high risk of cardiometabolic side effects. Goodness of fit (quasilikelihood under the independence model criterion=91,725)
[c] ≥2 types of antipsychotics filled for >60 consecutive days. Goodness of fit (quasilikelihood under the independence model criterion=82,893)

severe mental illness who were receiving rehabilitation services—was higher than the rate (6.4%) found among people in general Medicaid populations in the first year after starting an antipsychotic, including people who did not have a mental illness (13).

There was no change in the proportion of beneficiaries who used antipsychotics with high and low cardiometabolic risk. However, we found reduced use of high-risk antipsychotics among beneficiaries with psychotic and bipolar disorders and increased use of low-risk antipsychotics among individuals without hospital or ED visits, who likely represent a group of recipients with greater psychiatric stability. These patterns suggest that prescribers considered beneficiary characteristics and needs, as well as antipsychotic efficacy, in addition to cardiometabolic risk in making decisions about specific antipsychotics (34). In a previous U.S. Department of Veterans Affairs study, the presence of existing cardiometabolic comorbidities minimally influenced selection of low- versus high-risk cardiometabolic antipsychotic medications (35).

The use of academic detailing with audit and feedback in four visits over two years is a low-intensity approach compared with other approaches that have been studied to address polypharmacy (36). A more intensive approach may have had a larger effect (37). Our intervention incorporated features to enhance behavior change, including use of a respected educator, an interactive approach, and feedback on prescriber behavior. It did not include other effective approaches, including specific behavioral targets and supervisor tracking (20,22). We did not measure cost or cost-effectiveness. Because antipsychotic polypharmacy is expensive and has an unclear benefit, future evaluations of intervention cost-effectiveness would be worthwhile.

Additionally, physician behavior change may be more likely when the change involves the addition of a new behavior rather than the elimination of an existing practice. For example, starting a new, low-risk antipsychotic may be easier than helping a patient switch from a high-risk agent. Similarly, in a previous study of academic detailing with audit and feedback for smoking cessation pharmacotherapy, we found an increase in prescriptions of nicotine replacement therapy (38). Likewise, adding metformin

to antipsychotic treatment may be easier to influence than other strategies for mitigating the risk of cardiometabolic side effects (39).

Several limitations warrant caution in interpreting the results. First, in the absence of random assignment and a control condition, it is not possible to prove that the observed pre-post intervention changes in prescribing were due to the intervention. Other factors (e.g., pharmaceutical marketing, new guidelines, and insurance formulary management) could have affected prescribing practices. However, the varying intervention schedule over the study period, our data preparation methods, and our use of GEE with time as a covariate were effective strategies to minimize the likelihood that temporal or environmental factors were responsible for the observed changes.

Second, we chose to focus on changes in proportions of types of antipsychotic fills among all antipsychotic fills, assuming that the need for antipsychotics among those using mental health rehabilitation services would remain steady. In fact, the results showed that a greater proportion of beneficiaries with more unstable and complex conditions filled antipsychotic prescriptions after the intervention compared with before, suggesting a reduction among beneficiaries with stable symptoms. Finally, the state population was largely Caucasian and rural. Therefore, inferences may not generalize to more ethnically diverse and urban populations or to other systems of care.

CONCLUSIONS

Academic detailing with audit and feedback was associated with a 2% absolute reduction in antipsychotic polypharmacy but was not associated with absolute reduction in prescribing of antipsychotics with high or low cardiometabolic risk. Polypharmacy and use of antipsychotics with high cardiometabolic risk was reduced in some groups of beneficiaries. Academic detailing with audit and feedback is a low-intensity intervention that may be useful for state mental health systems wishing to reduce antipsychotic polypharmacy. Further research is needed to better understand why clinicians continue to prescribe high-risk antipsychotics and polypharmacy when lower-risk alternatives are effective and available and to test different and more intensive strategies to reduce the cardiometabolic burden related to antipsychotic side effects.

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