Access to Psychotropic Medication via Prescription Is Associated With Choice of Psychotropic Medication as Suicide Method:

A Retrospective Study of 27,876 Suicide Attempts

Talia L. Brown, MS, PhD[a,b,*]; Peter M. Gutierrez, PhD[c]; Gary K. Grunwald, PhD[a]; Carolyn DiGuiseppi, MD, PhD[a]; Robert J. Valuck, PhD[d]; and Heather D. Anderson, PhD[a,d]

ABSTRACT

Objective: Whether physical access to psychotropic medication via prescription (ie, prescribed access) is associated with use of psychotropic medication as a means of subsequent suicide attempt remains unclear. In a population of suicide attempters, we investigated whether prescribed access to any psychotropic medication increased the likelihood of using any psychotropic drug in a suicide attempt and whether prescribed access to a specific psychotropic drug type increased the likelihood of using that specific psychotropic drug type in an attempt.

Methods: Case-control study design was used. We identified individuals receiving care for a suicide attempt (fatal or nonfatal) in emergency department and inpatient settings from a US insurance claims dataset (2006–2013) using relevant *ICD-9-CM* codes. Cases used a psychotropic drug in their suicide attempt, while controls used another method. Exposed individuals filled a psychotropic drug prescription within 90 days prior to the attempt. Multivariable logistic regression estimated odds ratios.

Results: A population of 27,876 (cases = 10,158, controls = 17,718) was included. Anxiolytics were used most in attempts (n = 6,037, 59.4%), followed by antidepressants (n = 3,573, 35.2%), antipsychotics or mood stabilizers (n = 1,168, 11.5%), and stimulants (n = 368, 3.6%). Thirteen percent (n = 1,316) used more than 1 type of psychotropic drug in the attempt. Across all psychotropic drug groups evaluated, individuals using psychotropic medication in a suicide attempt were significantly more likely to have had prescribed access (adjusted odds ratio [aOR] = 1.7; 95% CI, 1.6–1.9), with the highest drug type–specific odds ratios for antipsychotics or mood stabilizers (aOR = 6.5; 95% CI, 5.4–7.7) and stimulants (aOR = 7.6; 95% CI, 5.5–10.5).

Conclusions: Individuals at high risk for suicide with prescribed access to any psychotropic medication should be targeted for means safety interventions.

J Clin Psychiatry 2018;79(6):17m11982

To cite: Brown TL, Gutierrez PM, Grunwald GK, et al. Access to psychotropic medication via prescription is associated with choice of psychotropic medication as suicide method: a retrospective study of 27,876 suicide attempts. *J Clin Psychiatry*. 2018;79(6):17m11982.

To share: https://doi.org/10.4088/JCP.17m11982

[a]Colorado School of Public Health, University of Colorado Anschutz Medical Campus, Aurora, Colorado

[b]Boulder County Public Health, Boulder, Colorado

[c]Rocky Mountain Regional VA Medical Center, Aurora, Colorado

[d]Skaggs School of Pharmacy and Pharmaceutical Science, Aurora, Colorado

**Corresponding author:* Talia L. Brown, MS, PhD, Boulder County Public Health, 3540 Broadway, Boulder, CO 80304 (talia.brown@ucdenver.edu).

Suicide is the 10th leading cause of death in the United States, responsible for nearly 45,000 deaths in 2016, with more than 200,000 hospitalizations and 500,000 emergency department visits for suicide attempts annually.[1,2] Despite national efforts to curb suicide,[3] rates continue to increase.[4,5] The method used during a suicide attempt (ie, method choice) is the most important factor influencing survival.[6,7] Having physical access to a method impacts method choice.[8] Preventing access to an individual's preferred method (ie, "means safety") could prevent or delay an individual from attempting suicide.[9,10]

Intentional poisoning occurs in 15% of fatal suicides and between 54%–68% of nonfatal suicide attempts treated in the emergency department.[1,11,12] Drugs are used in the vast majority of intentional poisoning events—over 94% in a national study of 2006–2013 emergency department data.[11] Clinical interventions that limit access to medications by high-risk individuals could prevent their use in a suicide attempt.[13] However, more research is needed to understand factors influencing medication as the preferred method.

Prescriptions for medications, especially psychotropic drugs, have increased significantly in recent decades.[14] Ecological studies indicate that increases in psychotropic prescriptions correlate with increases in suicidal acts using psychotropic drugs.[15–17] However, few studies[18–24] have investigated how an individual's access to a psychotropic drug might influence his or her use of the drug in a suicide attempt. Those with more access to medication through their employment (eg, nurses, doctors, and pharmacists) appear 3–5 times more likely to use medication in an attempt than other employed people.[19,20] Research also indicates that more than 75% of individuals using a psychotropic drug to overdose were prescribed the drug.[18,21,23,24] However, no studies have investigated the influence of prescribed access to (or having a filled prescription for) a psychotropic drug on the likelihood of using that drug versus a different method in a suicide attempt, nor how this relationship might differ for specific types of psychotropic drugs.

The objective of this study was to examine the influence of prescribed access to psychotropic drugs on the likelihood of using a psychotropic drug in a suicide attempt. Using a large, nationally representative insurance claims dataset from the United States, we investigated whether access to any psychotropic medication increased the likelihood of using any psychotropic drug in a suicide attempt and whether access to

Clinical Points

- If someone is suicidal, it is not known if having access to a prescription psychotropic medication influences use of that medication versus a different method in a suicide attempt.
- Clinicians prescribing psychotropic medication should consider how much access potentially suicidal individuals have to past medications.
- Concerned clinicians can take several means safety approaches to limit the amount of medication patients have access to, such as writing shorter prescriptions, recommending medications be kept in a locked cabinet, and recommending patient and family members discard old medication.

a specific psychotropic drug type increased the likelihood of using that specific psychotropic drug type in an attempt.

METHODS

A case-control study design was used in a population of presumed first-time suicide attempters identified from an administrative medical and pharmacy claims dataset. Case status was assigned based on the method used in the suicide attempt, with those using a psychotropic drug defined as cases and those using any other method defined as controls.

Setting

At the time of this study, the PharMetrics Legacy Health Plan Claims Dataset (IMS Health, Alexandria, Virginia) was the largest deidentified, patient-centric database of longitudinal and fully adjudicated medical, facility, and pharmacy claims in the United States. It represents over 65 million patients on over 80 health plans, including Medicare and Medicaid, health maintenance organizations, and other major commercial plans.[25] Patients included in the dataset have the same age and sex distribution as the US population[25] but are not necessarily representative of those without health insurance. The dataset provides health plan enrollment information; details of medical encounters in outpatient, emergency department, or inpatient facilities; and medication information for each filled prescription. Each medical encounter includes up to 4 *International Classification of Diseases, Ninth Revision, Clinical Modification* (*ICD-9-CM*) diagnosis codes. The PharMetrics Health Plan Claims Dataset is managed with intensive quality control measures to promote completeness and comparability of data from the different data sources.

Study Population

All adults 18 years and older in the PharMetrics dataset who attempted suicide from 2006 to 2013 were considered for this study. External cause of injury codes (E-codes) for suicide and self-inflicted injury, ie, E950–E958, which specify the specific method used in a suicide attempt (eg, poisoning by solid, liquid, or gas substance; hanging or strangulation; firearm), were used to define the sample of patients who attempted suicide. This population could represent both fatal and nonfatal suicides since this dataset can capture individuals who died while receiving treatment. The first occurrence of a suicide attempt for each eligible patient during the study period was considered the index attempt, restricted to individuals seen in the emergency department or an inpatient stay. Individuals with an E959 code for their index attempt were excluded since this code indicates treatment for late effects or sequelae from a previous suicide attempt. To increase the likelihood that the event was the individual's first suicide attempt, only those continuously enrolled in their insurance program for at least 1 year prior to the index attempt were included, as reattempt risk is highest within the first year post attempt.[26] Individuals missing the fourth digit of an E950 code, which specifies the type of substance used in intentional poisoning, were excluded.

Measures

Outcomes. All participants had at least 1 E950–E958 code indicating a suicide attempt. Cases (ie, those who used any psychotropic drug in their attempt, regardless of other methods also used in the attempt) were defined by the presence of either E950.3 or a 969.0–969.9 poisoning code, while controls were identified as those using any other method in their attempt (ie, those without any of these codes). Cases were further classified by specific type of psychotropic drug used in the attempt using poisoning codes: anxiolytic (969.4, 969.5), antidepressant (969.0), antipsychotic/mood stabilizer (969.1–969.3), and stimulant (969.7), with controls defined as above. Since poisoning codes do not clearly distinguish between mood stabilizer and antipsychotic medication, these 2 categories were combined. Additionally, cases might not include all possible psychotropic drugs because changes in prescribing and off-label use of medication have led to certain classically nonpsychotropic medications (eg, anticonvulsant drugs) being used to treat mental illness.[27]

An individual was considered a case for multiple specific psychotropic drug types if more than 1 psychotropic poisoning code was present. This decision created nonmutually exclusive categories so that the relationship between prescribed access to psychotropic drug and use of psychotropic drug in suicide attempt could be explored for each specific drug type used. Cases with an E950.3 and either 969.8 or 969.9 code, or no psychotropic poisoning code, were classified as unspecified. Table 1 provides a summary of each case definition.

Exposures. The main exposure, prescribed access to a medication, was defined as a filled prescription of interest during or overlapping the 90 days prior to the attempt. This exposure window was selected to assess the influence of acute exposure on method choice. For each outcome (ie, any psychotropic, anxiolytic, antidepressant, antipsychotic/mood stabilizer, and stimulant used in an attempt), the exposure was defined as prescribed access to that specific drug type. Drug codes, days supplied, and date filled were available for all filled prescriptions. Generic

Table 1. Codes Used to Define Outcome and Exposure for Each Specific Psychotropic Drug Group

	Defining Outcome		Defining Exposure
Drug Group	E-Code[b]	969 Poisoning[a]	GPI Code
Any psychotropic	E950.3	969.0–969.9	57*–59* or 61*
Anxiolytic	E950.3	969.4 Benzodiazepine-based tranquilizer 969.5 Other tranquilizers	57* Anxiolytic agents
Antidepressant	E950.3	969.0 Antidepressants	58* Antidepressants
Antipsychotic/ mood stabilizer	E950.3	969.1 Phenothiazine-based tranquilizers 969.2 Butyrophenone-based tranquilizers 969.3 Antipsychotics, neuroleptics, and major tranquilizers	59* Antipsychotics/ antimanic agents
Stimulant	E950.3	969.7 Psychostimulants	61* Stimulants
Unspecified	E950.3	969.8 Other specified psychotropic agent 969.9 Unspecified psychotropic agent Missing	Not applicable

[a]Code 969.6 indicates poisoning by psychodysleptics; thus, it was not included in the case definition.
[b]Code E-950.3 indicates tranquilizers and other psychotropic agents.
Abbreviations: E-Code = external cause of injury code, GPI = general product identifier.

product identifier (GPI) codes indicated drug group: 57* (anxiolytic), 58* (antidepressant), 59* (antipsychotic/mood stabilizer), or 61* (stimulant) (Table 1). Exposure variables were dichotomous, indicating whether the individual had exposure to the medication type during the 90 days prior to the suicide attempt.

Other variables. Several confounders were considered in analyses. Demographic variables included sex, age at suicide attempt, type of insurance (Medicaid vs other), and region of residence (4-category US Census Bureau definition).

Clinical variables included psychiatric diagnoses in the year prior to a suicide attempt, captured using *ICD-9-CM* codes and categorized as anxiety (300), depression (296.2, 296.3, 300.4, 311), bipolar disorder (296.0, 296.1, 296.4–296.8), schizophrenia (295), substance use disorder (303–305), and other mental illness (297–299, 301, 202). Two proxies were used to capture severity of mental illness during the year prior to the attempt: (1) comorbid mental illnesses, calculated as a count of unique psychiatric diagnoses, and (2) any inpatient hospitalizations with a mental illness *ICD-9-CM* code present.[28] The use of multiple methods in the suicide attempt, captured as the presence of 2 or more unique E950–E958 codes, was also considered.

Analysis

Chi-square tests were used to test univariate relationships between each covariate and the outcome (ie, cases vs controls) and between each covariate and the exposures (ie, prescribed access to psychotropics). Variables significantly associated with the outcome were considered for multivariable analysis.

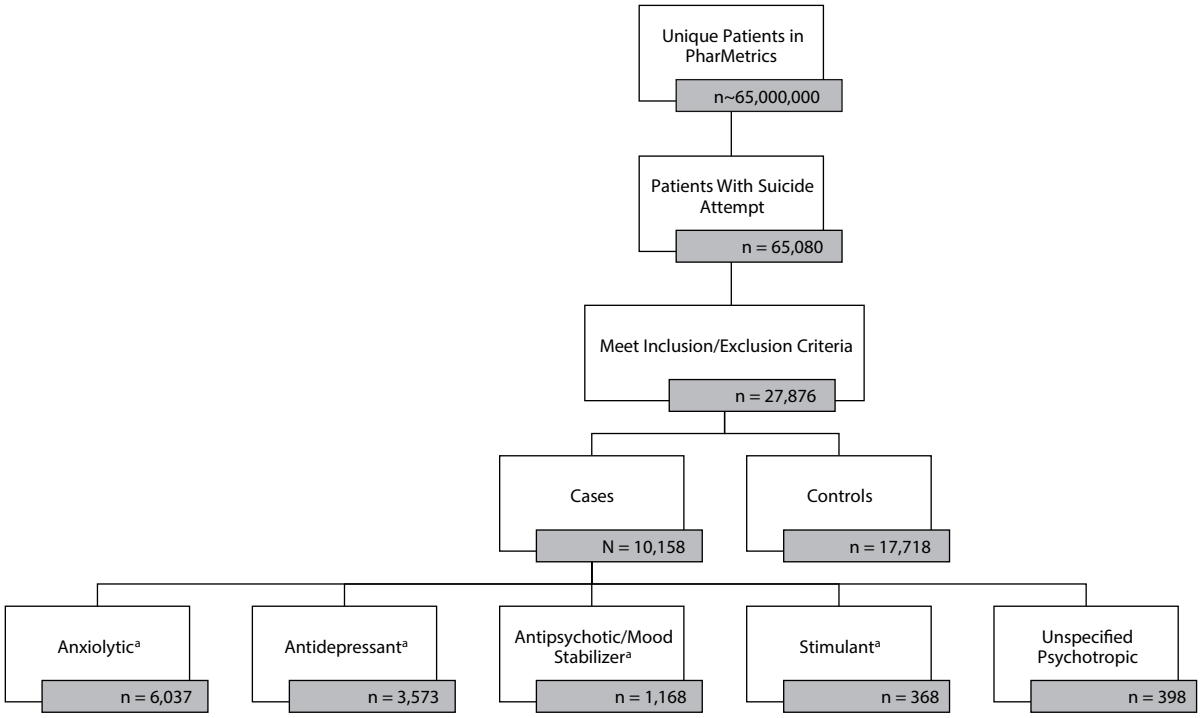
Unadjusted odds ratios were calculated using logistic regression to estimate the association between prescribed access to a psychotropic and using a psychotropic in an attempt. Multivariable logistic regression estimated adjusted odds ratios, controlling for covariates. Five models were tested: (1) all cases (ie, used any psychotropic drug in their attempt) compared to controls, with access to any psychotropic drug as the exposure; (2) anxiolytic cases (ie, used anxiolytic drug in an attempt) compared to controls, with access to anxiolytic medication as the exposure; (3) antidepressant cases compared to controls, with access to antidepressant medication as the exposure; (4) antipsychotic/mood stabilizer cases compared to controls, with access to antipsychotic/mood stabilizer medication as the exposure; and (5) stimulant cases compared to controls, with access to stimulant medication as the exposure. A manual forward selection approach was used to build a model with a predetermined hierarchy of variables (ie, demographic variables, severity of mental illness, and multiple methods). A variable was considered if it was significantly associated with outcome and exposure variables and if it decreased the Akaike Information Criterion on any of the 5 models unless other factors indicated the variable should be removed (eg, if the variable was highly correlated with another variable already in the model). The same final covariates were included in all models.

For each model, the cases included only individuals using that specific psychotropic drug in the attempt, even if they also used other psychotropic drugs as well, while all controls were included in each model. Since the case definitions were not mutually exclusive, some subjects were included in multiple models, making the models not independent; therefore, odds ratios estimated from the models could not be directly compared. Thus, the results from this analysis determined the relationship between prescribed access and method choice for that drug but did not directly assess whether the relationship is stronger for 1 specific psychotropic drug compared to another.

To test the impact of having a longer exposure window, analyses were repeated using 180 and 365 day windows for all outcome exposure pairs, with the same covariates. The results did not change, so we report the 90-day acute exposure window results.

An α level of .05 was used to indicate statistical significance. However, this study was most likely overpowered due to the large sample size, so clinical significance of effect sizes was

Figure 1. Flow Diagram of Study Population Selection



[a]Not mutually exclusive categories.

also considered. SAS software version 9.3 (SAS Institute, Cary, North Carolina) was used to carry out all analyses.

Since the PharMetrics dataset provides deidentified data, this study was determined to be nonhuman subject research and approved by the Colorado Multiple Institutional Review Board.

RESULTS

There were 65,080 individuals in the PharMetrics dataset (Figure 1) with at least 1 E950–E598 code indicating a suicide attempt, and 27,876 were included after applying exclusion criteria (9,628 not seen in the emergency department or inpatient setting or had an E959 code; 12,872 younger than 18 years; 14,696 with less than 12 months of continuous enrollment prior to attempt; and 8 missing the fourth digit in the E950 code).

Use of Psychotropic Medication in an Attempt

Of the 27,876 attempters included in the study, 10,158 (36%) individuals used a psychotropic medication in their attempt compared to 17,718 who used other methods (Figure 1). Anxiolytic medications were the most commonly used psychotropic medication in a suicide attempt, followed by antidepressant medications, antipsychotics or mood stabilizers, and then stimulant medications. Of the 9,760 identified as using a specified psychotropic drug (ie, anxiolytic, antidepressant, antipsychotic/mood stabilizer, or stimulant medication) in a suicide attempt, 1,316 (13%) used more than 1 type of psychotropic drug. Those using an antipsychotic/mood stabilizer medication (41%) were most likely to use more than 1 psychotropic medication in the attempt followed by stimulant (38%), antidepressant (29%), and finally anxiolytic medication (18%).

Cases (ie, individuals who used any psychotropic drug in a suicide attempt) were more likely to be female, moderately older (mean age 39 years versus 35 years), and more likely to have at least 1 mental illness diagnosis compared to controls (Table 2). Cases were also more than twice as likely to use more than 1 method in the suicide attempt. These differences were consistent for all the specific psychotropic drugs compared to controls (data not shown). Region of residence did not differ significantly between cases and controls overall, but did differ between cases and controls for 3 of the 4 drug groups.

Prescribed Access to Psychotropic Medication

Overall, 18% of the study sample had prescribed access to any psychotropic drug in the 90 days prior to a suicide attempt. Women, older individuals, those living in the South or West US Census Bureau regions, those who had at least 1 psychiatric diagnosis, and those using more than 1 method in the suicide attempt were more likely to have prescribed access (data not shown). Antidepressant medication was the most commonly filled psychotropic prescription, with 15% of the sample having prescribed access, followed by anxiolytics (8%), antipsychotics/mood stabilizers (5%), and stimulants (2%).

Table 2. Population Demographics for Those Using a Psychotropic Drug (Cases) and Those Using Another Method (Controls) in a Suicide Attempt[a]

Variable	Cases (n = 10,158)	Controls (n = 17,718)	*P* Value[b]
Sex			
Male	2,938 (29)	7,158 (40)	< .0001
Female	7,220 (71)	10,560 (60)	
Age at suicide attempt			
18–25 y	2,491 (25)	6,696 (38)	< .0001
26–44 y	3,989 (39)	5,968 (34)	
45–64 y	3,410 (34)	4,395 (25)	
65+ y	268 (3)	659 (4)	
Region of US residence			
East	1,707 (17)	3,039 (17)	.11
Midwest	3,381 (33)	5,976 (34)	
South	2,995 (29)	4,981 (28)	
West	2,075 (20)	3,722 (21)	
Medicaid	996 (10)	1,624 (9)	.08
Psychiatric diagnoses in year prior to attempt			
Anxiety	1,765 (17)	2,054 (12)	< .0001
Depression	2,031 (20)	2,573 (15)	< .0001
Bipolar disorder	644 (6)	730 (4)	< .0001
Schizophrenia	82 (0.8)	96 (0.5)	.007
Substance abuse disorder	1,053 (10)	1,492 (8)	< .0001
Other mental illness	427 (4)	542 (3)	< .0001
No. of unique mental illness diagnoses in year prior to attempt			
0	7,477 (74)	14,139 (80)	< .0001
1	816 (8)	1,315 (7)	
2	895 (9)	1,152 (7)	
3 or more	970 (10)	1,112 (6)	
Inpatient stay with psychiatric diagnosis code year prior to attempt	809 (8)	1,024 (6)	< .0001
2 or more methods used	1,432 (14)	1,052 (6)	< .0001
Prescribed access to psychotropic drug	2,385 (23)	2,592 (15)	< .0001

[a]Values expressed as n (%).
[b]Significant *P* value indicates distribution of variable is different between cases and controls.

Association of Use and Access to Psychotropic Medication

Individuals using any psychotropic drug in a suicide attempt were 1.8 (95% CI, 1.7–1.9) times more likely to have prescribed access to at least 1 psychotropic drug in the 90 days prior to the attempt compared to controls (23% vs 15%; Figure 2). For each specific psychotropic drug, there was a significant positive relationship with prescribed access to that drug class. For example, individuals using anxiolytics in an attempt were 3.2 (95% CI, 2.9–3.5) times more likely to have prescribed access to anxiolytics compared to controls. The strongest relationships were seen for antipsychotics/mood stabilizers (OR = 6.1; 95% CI, 5.2–7.2) and stimulants (OR = 8.4; 95% CI, 6.1–11.5).

Multivariable logistic regression produced adjusted odds ratios for outcome-exposure pairs (Figure 3). All models were adjusted for sex, age, region of residence, and use of multiple methods in attempt. The resulting adjusted odds ratios were similar in magnitude to the unadjusted odds ratios and indicate significant relationships between prescribed access and use of a psychotropic drug in an attempt for each outcome-exposure pair.

DISCUSSION

In this large, administrative claims sample, subjects using a psychotropic drug in a suicide attempt were more likely to have had recent prescribed access to any psychotropic drug and to the drug type used prior to the attempt compared with those not using any psychotropic drug in an attempt. The magnitude of the relationship was larger in models in which case status and exposure accounted for specific psychotropic drug types versus the model in which cases and exposure accounted for any psychotropic drug, indicating that it is important to consider each specific drug group separately. Results from this study support other research identifying prescribed access as an important factor in suicide method choice.[18–21,23,24]

This population does not represent all individuals prescribed psychotropic medication since only those with a suicide attempt were included. However, this study supports other research on the importance of means safety for prescribed medication.[8,13] Several ecologic studies[18–24] have identified a correlation between prescriptions filled for psychotropic medications and use of psychotropic medication in an attempt. Other studies conducted in hospitalized samples of individuals found that those using psychotropic drugs in a suicide attempt more often used medication they were prescribed.[18,23,24,29] The current study demonstrates that prescribed access, and thus direct access to psychotropic medication, could influence method choice in a suicide attempt and could be a point of intervention to prevent suicide attempts.

The percentage of individuals meeting our definition of prescribed access (25% or less) was lower than expected when compared with other studies (ie, about 66%).[18,24] This begs the question: how else were individuals accessing the drugs used in attempts? The most likely options were from family or friends, previous prescriptions filled prior to our exposure period, medications purchased outside of insurance plans, or the black market. The first 3 possibilities, in addition to recently filled medication, are prime targets for means safety interventions—specifically, safe storage of medication. People should consider safely storing all over-the-counter and prescription medications, not just the most toxic, especially when there is a family member or friend at risk of suicide. Additionally, providing medication in blister packs has been a successful intervention in other countries since it requires time and effort to remove enough medication for an overdose, thereby creating time for the individual to change his or her mind or for someone else to intervene.[30]

Although our methods did not allow for direct statistical comparisons across psychotropic drug models, a novel finding from this study was possible differences in risk for specific types of psychotropic medicine. We found larger associations with prescribed access for antipsychotic/mood stabilizer and stimulant medication than for antidepressants and anxiolytic medication. One possible explanation is that antipsychotic/mood stabilizer medications are specialized

Figure 2. Percent of Prescribed Access to Psychotropic Drugs for Cases (ie, individuals using psychotropic drugs in suicide attempt) vs Controls (ie, individuals using any other method) Stratified by Each Specific Psychotropic Drug Type

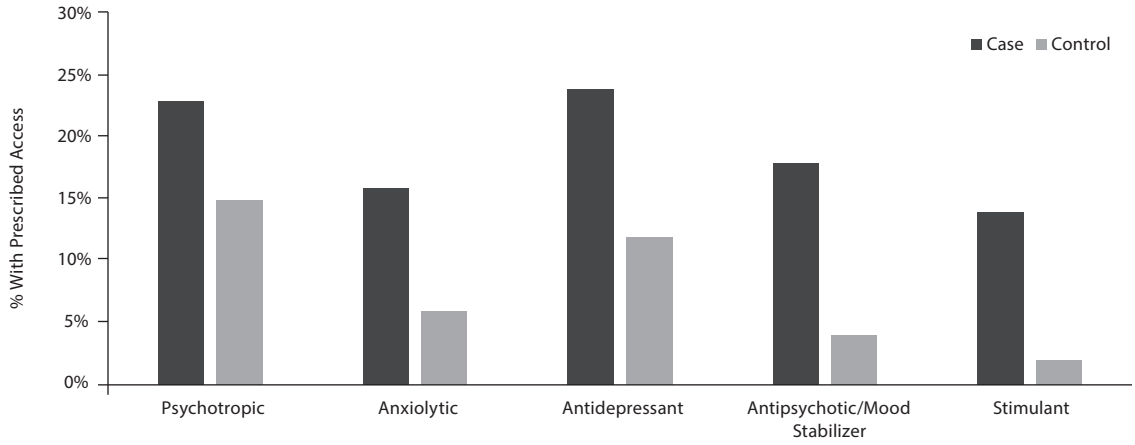
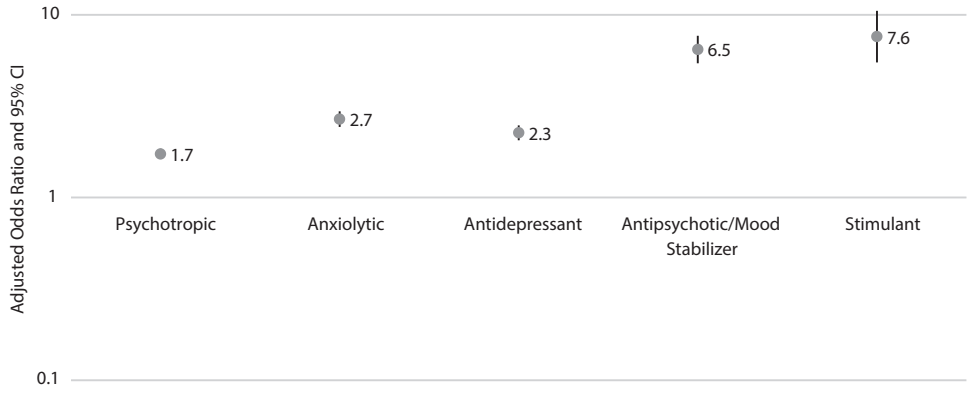


Figure 3. Adjusted Association (Odds Ratios With 95% CI) Between Prescribed Access to Psychotropic Medication in Cases (Individuals Using Any Psychotropic Drugs in Suicide Attempt) Compared to Controls (Individuals Using Any Other Method) for Each Specific Drug Type[a]



[a]All models adjusted for sex, age, region, and use of multiple methods of attempt.

medications that are prescribed less often than anxiolytic and antidepressant medications,[31] thus it is less likely that those without a prescription would have other access to these classes of medications. Several international studies indicate that the relationship between prescribed access and use of psychotropic drugs in a suicide attempt could be stronger in individuals with more comorbid mental illness or with prescribed access to multiple types of psychotropic drugs.[32–34] This question, while outside the scope of this study, merits further research in the context of our findings. Additionally, the study findings could indicate a relationship between prescribed access and use of medication in an attempt for drug types other than psychotropics since use of medication in suicide attempts is common.[1]

There are several important limitations to consider. First, this study very likely includes both fatal and nonfatal suicide attempts since we included any patient who received billable care in an emergency department or inpatient unit, not just those who survived. While this means that we included a larger population of individuals attempting suicide, results might not be directly comparable to other studies that only included either fatal or nonfatal suicide attempt.[18,23,24,29] However, given that method choice during suicide attempt is the most important factor contributing to survival of the attempt,[7,8] pursuing questions related to method choice in only fatal or nonfatal suicide attempt populations introduces a selection bias that impacts measures of association. While we believe our study design addressed some of this bias present in other research, suicide attempts that resulted in immediate death or that were treated in another location (eg, outpatient or urgent care) were not included. Second, the PharMetrics dataset provides up to 4 diagnosis codes for each medical claim. Individuals treated for a suicide attempt could have been excluded or misclassified as a control or unspecified psychotropic attempt if relevant codes were not included in the medical claim. This is a common limitation

of secondary analyses, and it is impossible to quantify the impact on study findings. Third, PharMetrics captures only medications filled through insurance. This may explain why our exposure was lower compared to other studies including all filled medications.[18,23] Finally, there could be some discrepancy between type of psychotropic used in the attempt and type of psychotropic filled because *ICD-9-CM* and GPI codes do not perfectly align for each drug category, and information allowing these discrepancies to be corrected is not available in the dataset. For example, a suicide attempt using lithium, which is a mood stabilizer, is coded using *ICD-9-CM* as 969.8 (other psychotropic), while filled lithium prescriptions captured as 59* (antipsychotics/antimanic agents) in GPI coding. In this case, the relationship would most likely be underestimated because the exposure group was higher and the outcome lower.

This study also has several important strengths. The PharMetrics dataset provides the largest nationally representative sample that includes both medical and pharmacy data for insured patients in the United States. Findings from this study can be generalized to the larger insured US population. Also, IMS Health performs intensive quality control, so its PharMetrics dataset has minimal missing data. Answering novel research questions with available datasets provides justification for more resource intensive studies; therefore, while there are limitations in this study, the benefit of being able to answer new questions related to factors affecting method choice in a suicide attempt demonstrates the value of this study's approach.

This study showed that prescribed access to psychotropic medication can be an important factor in suicide method choice. More research is needed to identify groups at highest risk of using medication prescribed to them in an attempt, and to identify effective means safety interventions to prevent the use of prescribed medication in a suicide attempt.

Submitted: October 22, 2017; accepted April 5, 2018.

Published online: November 6, 2018.

Author contributions: Dr Brown was responsible for conceptual development of study, analysis, interpretation, and drafting the manuscript. Dr Anderson contributed greatly to study design, analysis, and revision of the manuscript. Drs Grunwald, Gutierrez, Valuck, and DiGuiseppi supported conception, study design, analysis, and revision of manuscript for important intellectual content. All parties approved the final manuscript and agree to be accountable for all aspects of the work and the ability to identify contributions of each coauthor and ensure the integrity of these contributions.

Potential conflicts of interest: None.

Funding/support: None.

Acknowledgments: The authors acknowledge Richard Read Allen, MS, from Peak Statistical Services for assistance with data management. Mr Allen has no conflicts of interest to report.

Additional information: The PharMetrics Legacy Health Plan Claims Dataset is owned by IMS Health. Access to this dataset was made available by a license purchased by the University of Colorado Skaggs School of Pharmacy and Pharmaceutical Sciences. For more information, visit https://www.iqvia.com/institute/research-support.

REFERENCES

1. Web-based Injury Statistics Query and Reporting System (WISQARS).CDC website. www.cdc.gov/injury/wisqars. 2005. Accessed January 4, 2018.
2. Crosby AE, Han B, Ortega LAG, et al; Centers for Disease Control and Prevention (CDC). Suicidal thoughts and behaviors among adults aged ≥18 years—United States, 2008–2009. *MMWR Surveill Summ*. 2011;60(13):1–22.
3. US Department of Health and Human Services (HHS) Office of the Surgeon General and National Action Alliance for Suicide Prevention. *2012 National Strategy for Suicide Prevention: Goals and Objectives for Action*. Washington, DC: HHS; 2012.
4. Vyrostek SB, Annest JL, Ryan GW. Surveillance for fatal and nonfatal injuries—United States, 2001. *MMWR Surveill Summ*. 2004;53(7):1–57.
5. Bertolote JM, Fleischmann A. A global perspective in the epidemiology of suicide. *Suicidologi*. 2015;7(2).
6. Parra Uribe I, Blasco-Fontecilla H, García-Parés G, et al. Attempted and completed suicide: not what we expected? *J Affect Disord*. 2013;150(3):840–846.
7. Miller M, Azrael D, Barber C. Suicide mortality in the United States: the importance of attending to method in understanding population-level disparities in the burden of suicide. *Annu Rev Public Health*. 2012;33(1):393–408.
8. Florentine JB, Crane C. Suicide prevention by limiting access to methods: a review of theory and practice. *Soc Sci Med*. 2010;70(10):1626–1632.
9. McPhedran S, Baker J. Suicide prevention and method restriction: evaluating the impact of limiting access to lethal means among young Australians. *Arch Suicide Res*. 2012;16(2):135–146.
10. Kreitman N. The coal gas story. United Kingdom suicide rates, 1960–71. *Br J Prev Soc Med*. 1976;30(2):86–93.
11. Canner JK, Giuliano K, Selvarajah S, et al. Emergency department visits for attempted suicide and self harm in the USA: 2006–2013. *Epidemiol Psychiatr Sci*. 2018;27(1):94–102.
12. Doshi A, Boudreaux ED, Wang N, et al. National study of US emergency department visits for attempted suicide and self-inflicted injury, 1997–2001. *Ann Emerg Med*. 2005;46(4):369–375.
13. Jin HM, Khazem LR, Anestis MD. Recent advances in means safety as a suicide prevention strategy. *Curr Psychiatry Rep*. 2016;18(10):96.
14. Pincus HA, Tanielian TL, Marcus SC, et al. Prescribing trends in psychotropic medications: primary care, psychiatry, and other medical specialties. *JAMA*. 1998;279(7):526–531.
15. Gunnell D, Middleton N, Frankel S. Method availability and the prevention of suicide—a re-analysis of secular trends in England and Wales 1950–1975. *Soc Psychiatry Psychiatr Epidemiol*. 2000;35(10):437–443.
16. Kelly CB, Weir J, Rafferty T, et al. Deliberate self-poisoning presenting at a rural hospital in Northern Ireland 1976–1996: relationship to prescribing. *Eur Psychiatry*. 2000;15(6):348–353.
17. Isacsson G, Wasserman D, Bergman U. Self-poisonings with antidepressants and other psychotropics in an urban area of Sweden. *Ann Clin Psychiatry*. 1995;7(3):113–118.
18. Tournier M, Grolleau A, Cougnard A, et al. Factors associated with choice of psychotropic drugs used for intentional drug overdose. *Eur Arch Psychiatry Clin Neurosci*. 2009;259(2):86–91.
19. Skegg K, Firth H, Gray A, et al. Suicide by occupation: does access to means increase the risk? *Aust N Z J Psychiatry*. 2010;44(5):429–434.
20. Baca-García E, Diaz-Sastre C, Saiz-Ruiz J, et al. How safe are psychiatric medications after a voluntary overdose? *Eur Psychiatry*. 2002;17(8):466–470.
21. Buykx P, Loxley W, Dietze P, et al. Medications used in overdose and how they are acquired—an investigation of cases attending an inner Melbourne emergency department. *Aust N Z J Public Health*. 2010;34(4):401–404.
22. Youssef HA. Psychotropic drugs in suicidal patients: a comparison of psychotropic medications in attempters and completed suicides. *Int Clin Psychopharmacol*. 1990;5(4):291–294.
23. Corcoran P, Heavey B, Griffin E, et al. Psychotropic medication involved in intentional drug overdose : implications for treatment. *Neuropsychiatry (London)*. 2013;3(3):285–293.
24. Okumura Y, Tachimori H, Matsumoto T, et al. Exposure to psychotropic medications prior to overdose: a case-control study. *Psychopharmacology (Berl)*. 2015;232(16):3101–3109.
25. IMS Health Incorporated. *PharMetrics Health Plan Claims Data User Guide & Data Dictionary*. Alexandria, VA: 2014.
26. Owens D, Horrocks J, House A. Fatal and non-fatal repetition of self-harm: systematic review. *Br J Psychiatry*. 2002;181:193–199.
27. Post RM, Denicoff KD, Frye MA, et al. A history of the use of anticonvulsants as mood stabilizers in the last two decades of the 20th century. *Neuropsychobiology*. 1998;38(3):152–166.
28. Valuck RJ, Orton HD, Libby AM. Antidepressant discontinuation and risk of suicide attempt: a retrospective, nested case-control study. *J Clin Psychiatry*. 2009;70(8):1069–1077.
29. Gjelsvik B, Heyerdahl F, Lunn D, et al. Change

in access to prescribed medication following an episode of deliberate self-poisoning: a multilevel approach. *PLoS One*. 2014;9(5):e98086.
30. Hawton K, Townsend E, Deeks J, et al. Effects of legislation restricting pack sizes of paracetamol and salicylate on self poisoning in the United Kingdom: before and after study. *BMJ*. 2001;322(7296):1203–1207.
31. Mojtabai R, Olfson M. Proportion of antidepressants prescribed without a psychiatric diagnosis is growing. *Health Aff (Millwood)*. 2011;30(8):1434–1442.
32. Bellivier F, Belzeaux R, Scott J, et al. Anticonvulsants and suicide attempts in bipolar I disorders. *Acta Psychiatr Scand*. 2017;135(5):470–478.
33. Windfuhr K, While D, Kapur N, et al. Suicide risk linked with clinical consultation frequency, psychiatric diagnoses and psychotropic medication prescribing in a national study of primary-care patients. *Psychol Med*. 2016;46(16):3407–3417.
34. Takeuchi T, Takenoshita S, Taka F, et al. The relationship between psychotropic drug use and suicidal behavior in Japan: Japanese adverse drug event report. *Pharmacopsychiatry*. 2017;50(2):69–73.

Editor's Note: We encourage authors to submit papers for consideration as a part of our Focus on Suicide section. Please contact Philippe Courtet, MD, PhD, at pcourtet@psychiatrist.com.