Direct and Indirect Costs Among Caregivers of Patients With Major Depressive Disorder and Suicidal Ideation or Suicidal Attempt

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ABSTRACT

Objective: To compare direct and indirect costs among caregivers of patients with major depressive disorder (MDD) and suicidal ideation and/or suicide attempts (MDSI) versus caregivers of patients with MDD alone versus caregivers of patients without MDD or suicidal ideation and/or suicide attempts (controls).

Methods: Cohorts were based on caregivers of adult patients with MDSI, MDD alone, and controls. Patients were identified by Workpartners employer database *ICD-9/ICD-10* codes (January 2010 to July 2019) and were spouses or domestic partners of employees (caregivers). Twenty controls and 20 MDD-alone caregivers were matched to each MDSI caregiver on sex, age, and index year. All caregiver-patient pairs had 6 months pre/postindex information and met additional inclusion/exclusion criteria. Patient and caregiver medical and prescription claims and caregiver absenteeism (payment/time) were analyzed. Direct costs (medical, prescription) and indirect costs (absence payments by benefit type) were analyzed using separate, 2-part stepwise regression models and controlling for demographics, job-related variables, region, index year, and Charlson Comorbidity Index score.

Results: 570 MDSI caregiver-patient pairs and 11,400 matched MDD-alone and control pairs were identified. MDSI and MDD-alone caregivers had higher medical costs compared with controls ($5,131 and $4,548 versus $3,885, respectively; $P < .0001$). Prescription costs were highest among MDSI caregivers, followed by MDD-alone and control caregivers ($1,852, $1,425, and $1,005, respectively; $P < .001$). MDSI caregivers had the highest total indirect costs. MDSI patient medical and prescription costs were highest, followed by MDD-alone and control patients.

Conclusion: MDSI caregivers had significantly greater direct and indirect costs compared with MDD-alone and non-MDD caregivers.

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Major depressive disorder (MDD) is a chronic psychiatric disease that affects approximately 7.1% of US adults (17.3 million individuals), with 80% experiencing difficulties with work, home, or social activities as a result of the condition. Symptoms of MDD may include suicidal ideation (SI) and suicide attempt (SA),[1,2] and MDD is the psychiatric diagnosis most often associated with suicide.[3] Furthermore, more than 50% of those who attempt suicide have been reported to have MDD.[4,5] One prospective study[6] of patients with MDD found that the incidence rate of SA was 21-fold higher during a major depressive episode versus when patients were in remission.

The economic burden of completed suicides and SAs is substantial. The national US cost of officially reported suicides and SA alone was estimated at $58.4 billion in 2013; adjustment for the underreporting of suicide events resulted in estimates that were nearly two-thirds higher ($93.5 billion).[7] Of that $58.4 billion, 97.1% ($56.7 billion) is attributable to indirect costs related to productivity losses from premature death or injury.[7]

Research on the impact of MDD and SI/SA on patients is documented in the literature, but the impact on family members, who often serve as caregivers to patients, has not been well documented. Some studies[8,9] report caregiver stress or other conditions, including bereavement, resulting in caregivers themselves developing MDD. Self-reported data were used in several studies[9–12] to assess productivity and the quality of life of caregivers of patients with mental health conditions. Although SI/SA is prevalent—and has devastating consequences—among working-age adults, no information is available regarding the impact on caregivers of patients with MDD and SI/SA, including their health benefit costs and absenteeism. However, research has documented the impact on caregivers of spouses with late-life depression[13] and epilepsy[14] and caregivers of dependent children with pediatric asthma[15] by using objective claims data, work absence data, and human resources data. The health care burden of caregivers is a potential liability for their employers, and, therefore, analysis of health care and absenteeism costs from the employer perspective is warranted.

This study documents the impact on caregivers of patients with MDD and SI/SA (hereafter, MDSI) or MDD alone in an employed population, focusing on caregiver health benefit costs and costs associated with caregivers'

Clinical Points

- Presence of major depressive disorder (MDD) with suicidal ideation/suicide attempt (MDSI) was associated with higher medical and prescription costs compared with the MDD alone and control groups.
- Caregivers of patients with MDSI or MDD alone had higher health care costs and absenteeism than control caregivers, and caregivers of patients with MDSI had higher costs than those caregivers of patients with MDD alone in most cases.
- Clinicians should recognize that MDD and suicidal ideation/suicide attempt impact not only the patients, but also their caregivers.

work absences, using objectively measured data relevant to the payer perspective.

METHODS

Overview

This was a retrospective database study of US employees and eligible dependents with demographic and job-related information and data on employee absence payments and leaves by benefit type. Employees and their spouse-patients were identified for each cohort using adjudicated medical and prescription claims, and continuous eligibility was confirmed. A 20:1 matching procedure was used to increase sample size and lower standard errors, and 2-part statistical regression models were used for each outcome to address the non-normal distributions of the study outcomes. Because the data were de-identified and the study did not affect patient care, the study was exempt from institutional review board review and approval.

Data Source

Data for the study were extracted from the Workpartners Research Reference Database (RRDb) (formerly, Human Capital Management Systems or HCMS RRDb) during the period January 1, 2010, to July 31, 2019. The Workpartners database represents multiple geographically diverse, commercially insured US employers from all 50 states. Employers in the RRDb represent the retail, service, manufacturing, transportation, energy, technology, financial, and utility industries, and the database includes information on nearly 4 million employees, spouses, and eligible dependents. The database includes information on all individuals' sex, age, and health plan claims (medical and prescription) from multiple insurers across the United States. The associated data are transactional in nature including information on individual medical services and prescription fills. The RRDb also contains employee self-reported race, job-related information (such as full- or part-time status, tenure [years with employer], job type, exempt or nonexempt status, and salary), region (work and home location), work absence cost based on actual payments, and absence time (based on days missed) for 4 benefit types: short-term disability, long-term disability, workers' compensation, and sick leave. The database has been used in prior psychiatric[15–17] and caregiver research.[14,18]

Data were de-identified to comply with the Health Insurance Portability and Accountability Act and the contractual obligations between the RRDb and their employer contributors, thus ensuring patient care was unaffected.

Sample Selection

Patients were identified by any primary, secondary, or tertiary claims containing *International Classification of Diseases*, 9th or 10th revision, Clinical Modification (*ICD-9*/*ICD-10*) codes for MDD alone or MDSI (Supplementary Table 1). *ICD-9* codes were used for data prior to October 2014, when *ICD-10* codes were implemented. Caregiver cohorts included in the current analysis included caregivers whose spouses or domestic partners have MDSI, MDD alone, or no claims for MDD or SI/SA (controls).

Patients and married or domestic partner caregivers were included in the extraction cohorts. Patients and caregivers in the same pair had the same index date. The MDSI cohort included patients identified with claims for self-harm, SI, or SA (within the pool of MDSI patients), and their index date is the date of the initial self-harm, SI, or SA. The MDD-alone cohort included patients with at least 1 MDD diagnosis (*ICD-9* = 296.3x or *ICD-10* = F33.xx) and no SI/SA diagnostic codes, with their index dates being the dates of their first MDD claims. The control cohort included patients and caregivers with no claims for MDD or SI/SA, and their index dates were matched to the MDSI cohort (Supplementary Figure 1).

A 6-month preindex baseline period and a 6-month postindex study period starting at the index date were required, as shown in Figure 1. All caregiver participants also had to meet the following criteria: caregivers were employed at some time from January 2010 to July 31, 2019; patients and their caregivers were required to be aged > 18 years at the beginning of the 6 months prior to the index date; and all pairs had to have continuous eligibility for their combined 12-month analysis period. Caregivers with MDD or SI/SA in the baseline or study period were excluded, and patients with certain specific psychiatric conditions were excluded (Supplementary Tables 2–5).

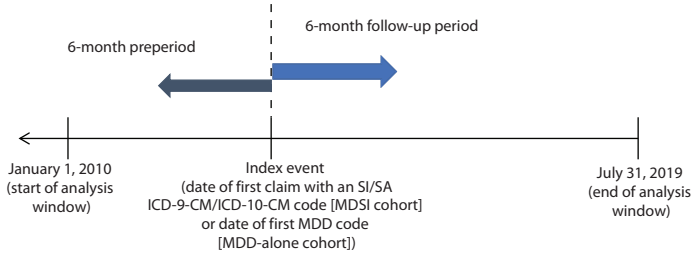
Matching

For further statistical validation, 20 pairs of patients and caregivers in the MDD-alone and control cohorts were propensity score matched to the MDSI cohort based on caregiver sex, age, region, tenure, and index year. The 3 matched cohorts were used in all comparisons throughout the study.

Descriptive Data

Descriptive information for all study participants was summarized over the baseline period and compared between cohorts. Means and standard errors of those

Figure 1. Schematic of Study Design (time frames)



Abbreviations: MDD = major depressive disorder, MDSI = patients with MDD and SI/SA, SA = suicide attempt, SI = suicidal ideation.

Table 1. Demographic and Job-Related Information

	MDSI (n = 570)	MDD Alone (n = 11,400)	Controls (n = 11,400)
Demographics			
Patients			
Age, mean (SE), y[a]	44.1 (0.4)	44.4 (0.1)	44.3 (0.1)
Female, n (%)[†]	385 (67.5)	7,959 (69.8)	7,718 (67.7)
CCI score, mean (SE)[b,*,†]	0.46 (0.05)	0.39 (0.01)	0.24 (0.01)
Caregivers			
Age, mean (SE), y[a]	44.6 (0.4)	44.7 (0.1)	44.6 (0.1)
Female, n (%)[†]	184 (32.3)	3,493 (30.6)	3,680 (32.3)
CCI score, mean (SE)[b,*,†]	0.26 (0.04)	0.33 (0.01)	0.26 (0.01)
Self-reported racial information, n (%)[c]			
White[*,†]	167 (29.3)	3,616 (31.7)	2,873 (25.2)
Black[*,†]	17 (3.0)	247 (2.2)	332 (2.9)
Hispanic[*,†]	38 (6.7)	681 (6.0)	751 (6.6)
Other[*,†]	11 (1.9)	249 (2.2)	499 (4.4)
Race missing (or not uniquely classified)[*,†]	337 (59.1)	6,607 (58.0)	6,945 (60.9)
Caregiver job-related variables[a]			
Annual salary, mean (SE), US $[d,†,‡]	75,536 (2,281)	86,548 (567)	80,006 (590)
Full-time, n (%)[*,†,‡]	511 (89.6)	9,871 (86.6)	9,899 (86.8)
Exempt, n (%)[*,†,‡]	202 (35.4)	4,899 (43.0)	5,391 (47.3)
Employee tenure, mean (SE), y[*,†,‡]	10.1 (0.4)	9.7 (0.1)	10.1 (0.1)

[a]At index date.
[b]At baseline (ie, the 6 months prior to the index date).
[c]Patients who are multiethnic or did not self-report in the optional racial information field were classified as missing (or not uniquely classified).
[d]For annual salary, MDSI: n = 513, MDD alone: n = 10,040, controls: n = 11,400.
*Significant ($P < .05$) differences: MDSI versus controls.
[†]Significant ($P < .05$) differences: MDD alone versus controls.
[‡]Significant ($P < .05$) differences: MDSI versus MDD alone.
Abbreviations: CCI = Charlson Comorbidity Index, MDD = major depressive disorder, MDSI = major depressive disorder with suicidal ideation or suicide attempt, SE = standard error.

descriptive variables were compared using *t* tests for continuous variables and χ^2 tests for discrete variables.

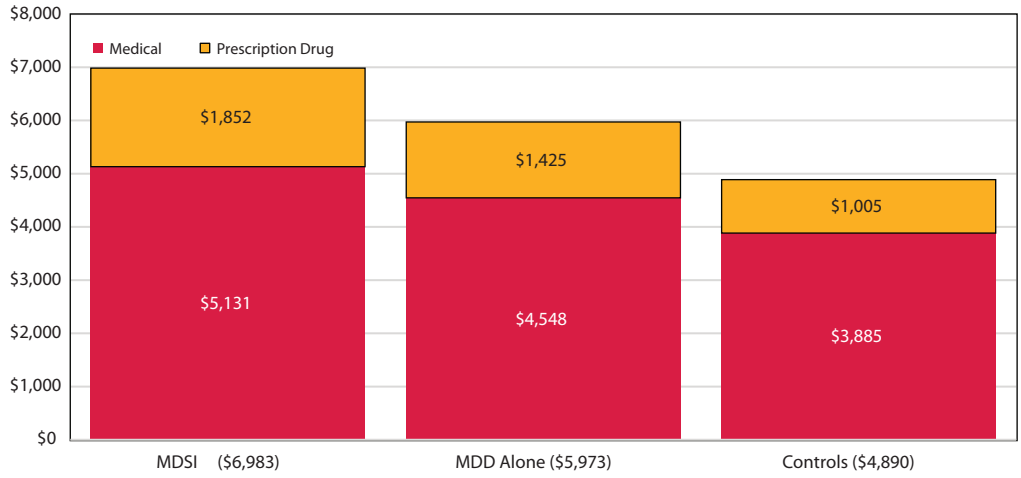
Study Outcomes

Study outcomes were evaluated for patients and caregivers. Patient outcomes included direct medical and prescription costs. Caregiver outcomes were components of health benefit costs, which included direct costs (eg, medical and prescription costs) as well as indirect costs that resulted from the caregiver's workplace absences over the 6-month study (postindex) period. Indirect costs that resulted from absences were calculated based on payments for sick leave, short-term disability, long-term disability, and workers' compensation. The workers' compensation costs also included medical claims paid under the workers' compensation benefit.

Statistical Methodology

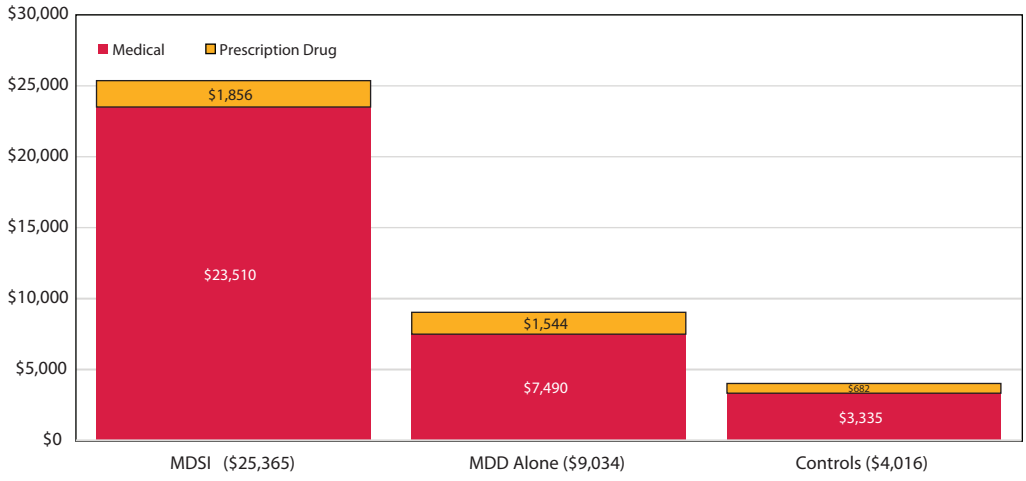
Each of the outcomes was modeled separately by using 2-stage stepwise regression models (to account for non-normally distributed data and zero value outcomes) that controlled for age, tenure, marital status, caregiver race, caregiver job-related components (ie, exempt status, full- or part-time status, and salary), location, and caregiver Charlson Comorbidity Index (CCI) score.[19] The first stage used logistic regression to model the likelihood of an outcome greater than zero—for example, those with disability claims versus those without disability claims. The second stage used generalized linear models on the portion of the population with a greater-than-zero outcome. The results of the generalized linear models were then combined with the results of the logistic models to reach an expected value of cost or days for all employees.

Figure 2. Semi-Annual Direct Medical and Prescription Costs for Caregivers of Patients With MDSI, MDD Alone, and Controls



Abbreviations: MDD = major depressive disorder, MDSI = patients with MDD and suicidal ideation/suicide attempt.

Figure 3. Semi-Annual Direct Medical and Prescription Costs for Patients With MDSI, MDD Alone, and Controls



Abbreviations: MDD = major depressive disorder, MDSI = patients with MDD and suicidal ideation/suicide attempt.

All costs were inflation adjusted to September 2019 US dollars by using various components of the Consumer Price Index (CPI).[20] Medical costs used the medical cost CPI, prescription costs used the prescription CPI, and all other components used the general CPI.

RESULTS

The identification and matching process identified 570 MDSI patient (mean age: 44.1 years, 67.5% female) and caregiver (mean age: 44.6 years, 32.3% female) pairs along with 11,400 matched MDD-alone pairs and 11,400 matched non-MDD (control) cohort pairs. Most of the differences in baseline demographics, job-related variables, index year, and region between study cohorts were not statistically significant (Table 1). However, there were some significant ($P < .05$) differences between cohorts. MDD-alone caregivers had a higher mean salary ($86,548) than both MDSI caregivers ($75,536) and control caregivers ($80,006), and more MDSI caregivers worked full-time (89.6%) than did MDD-alone caregivers (86.6%). Control caregivers were most often exempt (salaried) employees (47.3%) compared with MDD-alone caregivers (43.0%) and MDSI caregivers (35.4%), and control caregivers also had longer mean tenure (10.1 years with the employer) than MDD-alone caregivers (9.7 years). In the preindex (baseline) period (Table 1), patients in the MDSI and MDD-alone cohorts had higher mean CCI scores (0.46 and 0.39, respectively) than did patients in the control cohort (0.24). MDD-alone caregivers had a higher mean CCI score than did control caregivers (0.33 versus 0.26, respectively). Mean CCI scores for the MDSI caregivers and control caregivers were both 0.26.

Figure 4. Semi-Annual Indirect Costs for Caregivers of Patients With MDSI, MDD Alone, and Controls

Abbreviations: MDD = major depressive disorder, MDSI = patients with MDD and suicidal ideation/suicide attempt.

Direct Health Benefit Costs

Caregiver total direct costs (Figure 2) in the MDSI and the MDD-alone cohorts ($6,983 and $5,973, respectively) were significantly ($P < .0001$) higher than among control caregivers ($4,890). The MDSI total direct costs were also significantly greater than those of MDD-alone caregivers ($P < .05$). Caregiver direct medical costs in the MDSI cohort ($5,131, SE: $294) were significantly ($P < .001$) higher than among control caregivers ($3,885, SE: $50) and nearly significantly higher than among MDD-alone caregivers ($4,548, SE: $58, $P = .0513$). MDD-alone caregiver costs were significantly higher ($P < .001$) than for controls. Caregiver prescription costs were significantly ($P < .001$) different for all cohorts and highest in the MDSI cohort ($1,852, SE: $127), next highest in the MDD-alone cohort ($1,425, SE: $22), and lowest in the control cohort ($1,005, SE: $16).

Although this study focused on caregivers, patients' total direct costs (Figure 3) in the MDSI and MDD-alone cohorts ($25,365 and $9,034, respectively) were significantly ($P < .0001$) higher than those of control patients ($4,016). For patients with MDSI, total direct costs were also significantly greater than those of patients with MDD alone ($P < .01$). All of the medical costs were significantly different between cohorts ($P < .0001$), and mean costs were greatest among patients with MDSI ($23,510, SE: $1,458), next among patients with MDD alone ($7,490, SE: $104), and lowest among controls ($3,335, SE: $48). Prescription costs among patients with MDSI ($1,856, SE: $121) and those with MDD alone ($1,544, SE: $23) were significantly higher ($P < .0001$) than among controls ($682, SE $11), and significantly different from each other ($P = .0116$).

Indirect Costs

In total, the indirect costs (Figure 4) were highest for MDSI caregivers ($611), followed by those of caregivers of patients with MDD alone ($480) and controls ($427). Sick leave costs were higher among MDSI caregivers ($253, SE: $37) and MDD-alone caregivers ($218, SE: $8) than among control caregivers ($118, SE: $5). Short-term disability costs were highest among MDSI caregivers ($309, SE: $80), next highest among control caregivers ($133, SE: $11), and lowest among MDD-alone caregivers ($101, SE: $9). Long-term disability costs were higher among control caregivers ($73, SE: $34) than among MDSI caregivers ($1, SE: $1) and MDD-alone caregivers ($3, SE: $2). Workers' compensation costs were significantly higher among MDD-alone caregivers ($157, SE: $16) than among MDSI caregivers ($48, SE: $27) and control caregivers ($103, SE: $11).

DISCUSSION

This is the first attempt, to our knowledge, to analyze and quantify caregivers' economic burden of MDD in patients with and without SI/SA with regard to direct and indirect health care costs by using objectively measured data. Although the study does not establish causation, it demonstrates an association between patients' conditions—in this case, MDSI—and their caregivers' direct and indirect costs. It builds on prior work,[13] showing the relationship between MDD caregiver status and the emotional health and quality of life burden. Uniquely, this current research adopts the employer perspective and details potential employer liabilities.

Family members who provide unpaid care have been described as a hidden patient group.[21] The international literature[22] suggests that caregiving similarly affects caregivers irrespective of geographic location or of the illness the care recipient is experiencing. A UK study[21] reported that caregivers caring for family members with a

range of illnesses experience worry, frustration, anger, and guilt and need professional support for family members' conditions that include mental health problems[23] and schizophrenia.[24]

For 6 of the 8 study outcomes, costs were highest for the MDSI cohort, followed by the MDD-alone group and controls, including direct medical and prescription costs for patients and caregivers, plus caregiver indirect costs for leaves due to sick leave and short-term disability. With regard to the other indirect components (indirect costs for leaves due to long-term disability and workers' compensation), MDSI caregivers did not have the highest costs. Claims for those other components were rare in all 3 cohorts, with only 0.13% of the study population filing long-term disability claims, and 1.38% filing workers' compensation claims.

Comparison With Other Relevant Caregiver Studies

Literature searches on caregiver studies identified few comparisons. Identified studies focused on caregivers of persons with late-life depression[13] and of children with asthma,[18] who may be cared for differently than a spouse. The research on caregivers of patients with epilepsy did not include a nonepilepsy control group, and it stratified caregivers based on whether patients were managed by monotherapy or adjunctive therapy with antiepileptic drugs.[14] Other identified research used subjective data to assess the impact on caregivers.[11,24,25]

The study findings likely underestimate the impact of MDD and SI/SA on caregiver direct and indirect costs. The continuous eligibility requirement for 6 months after the index date removes the impact of completed suicides and the impact of caregivers who leave the workforce. The exclusion of caregivers with diagnoses of MDD or SI/SA likely also resulted in an underestimation of caregiver direct and indirect costs. It is recognized that there is a higher rate of MDD among caregivers of patients with mental health disorders. Because family medical leaves and bereavement benefits vary from employer to employer or are reported inconsistently, they were excluded. Despite younger age being a risk factor for SA,[6] the design excluded dependents and focused on spouses, as it was considered likely that care of a spouse differed from care of a dependent.

The strengths of this study include the breadth of the Workpartners RRDb, which contains many objectively measured components not subject to recall bias that are not available in other databases, such as salary, other job-related variables, work absences, and absence payments. The employers in the database represent various industries comprising commercial companies that provide benefits for their employees. In addition, the Workpartners RRDb differentiated the reasons for the caregiver absences. The study used matched cohorts designed to prevent the confounding of caregiver sex, age, region, tenure, and index year with the results. Plus, the 2-part regression methodology dealt with many of the challenges inherent in economic data—such as nonnormal distributions and large numbers of zeros—while controlling for many of the demographic, job-related, regional, and comorbidity factors. The regression methodology adjusted for differences between the cohorts, such as the higher mean salaries in the MDD and control cohorts compared with the MDSI cohort. The study also used baseline and study periods of the same 6-month duration, which may reduce the differences in identification of a comorbidity that manifests only rarely.

The current study has several limitations. Potential limitations of the administrative data include risk of clerical inaccuracies, recording bias secondary to financial incentives, temporal changes in billing codes, and lack of clinically relevant variables. The definition of SA was based on diagnosis codes and external cause-of-morbidity codes. Because the focus of the research was on caregivers, patient analysis was limited to overall direct medical and prescription cost components, not specific therapies used. The analysis was restricted to variables present in this database, and, therefore, other factors that were not measured may have confounded the observed relationships. The database did not contain information about the existence of other caregivers or the specific roles that employees played in the care of their spouses or domestic partners. Although the study controlled for job-related information (exempt status, full- or part-time status, and salary), it is unknown whether a caregiver's employment was structured to provide the flexibility to care for a loved one. In addition, although patients were identified based on initial claims for entry into the cohorts, it is unknown whether they were previously identified with MDD or had prior SAs.

The administrative claims data were derived from employees with commercial health insurance and may not be generalizable to patients who do not have health insurance from their employers. Although the direct and indirect health care costs are higher in the MDSI and MDD-alone cohorts, it is plausible that such factors as industry sector, job level, and employer benefit coverage may influence caregiver health care usage to varying degrees. These questions could be explored in future studies.

Future research should also explore the impact of new therapies that might offer better management of MDD and SI/SA and potentially limit the effect of those conditions on both patients and caregivers.

CONCLUSIONS

Caregivers of patients with MDSI had significantly greater direct and indirect costs compared with caregivers of the MDD-alone and non-MDD control cohorts. The present analysis found that caregivers of patients with MDSI or MDD alone had approximately 43% and 22% higher direct health care costs, respectively, and used more sick days than did caregivers of patients who served as controls.

The economic impact of MDD and SI/SA on patients was found to be substantial. Quantification of those additional components of caregiver burden clarifies the severity of the impact of the conditions and the necessity for proper care and support of both patients and their caregivers.

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Supplementary material: See accompanying pages.

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Supplementary material follows this article.

THE PRIMARY CARE COMPANION
FOR CNS DISORDERS

Supplementary Material

Article Title: Direct and Indirect Costs Among Caregivers of Patients With Major Depressive Disorder and Suicidal Ideation of Suicidal Attempt

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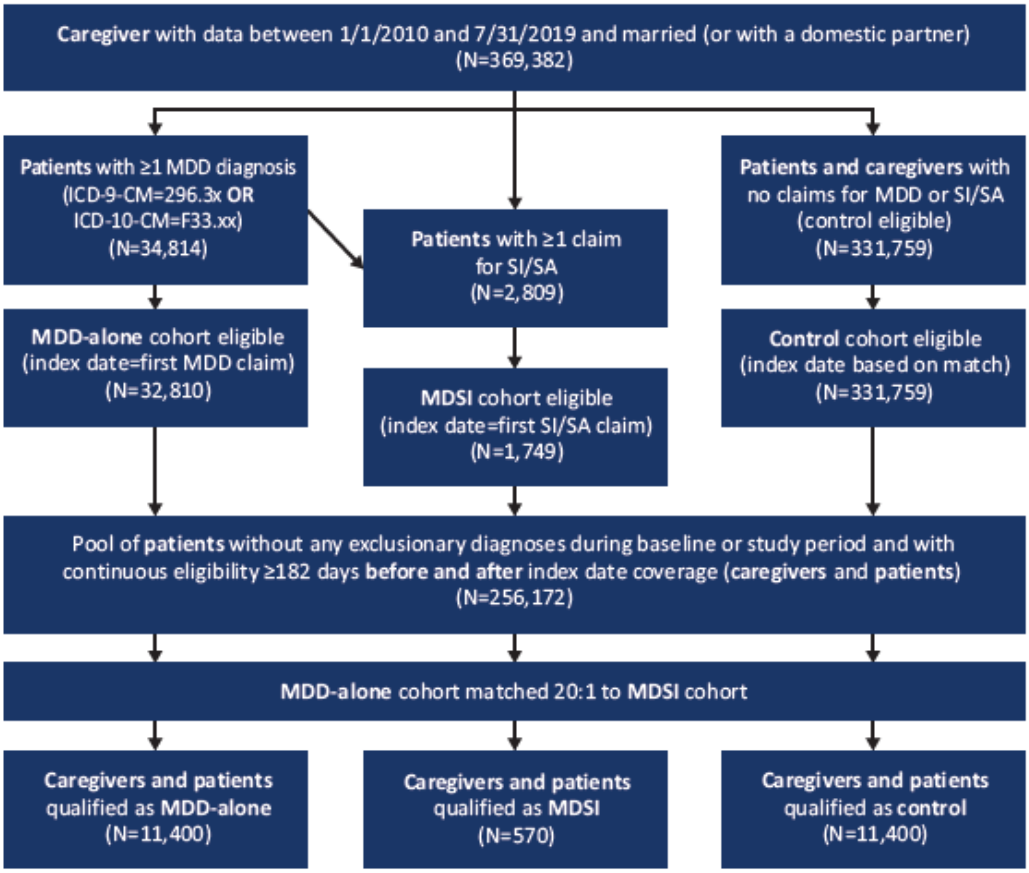
Supplemental Figure 1. Patient Identification Flowchart for the Study Period from January 1, 2010, to July 31, 2019



Supplemental Table 1. Inclusion Diagnosis Codes

Condition	ICD type	Category	Code definition	Code range
Major depressive disorder	**ICD-10s**		Major depressive disorder, recurrent	F33.xx
	ICD-9s		Major depressive disorder, recurrent episodes	296.3x
Suicide attempt or suicidal ideation	**ICD-10**	**ISH with SI DX ("probable" SA) and SA, NOS**	Possible SA/ISH by CDC definition *and* must have SI (R45.851) at any point during the study period (Note that this defaults to index or post for this study, because if SI occurs before ISH, the person would be classified as SI.)	EXTERNAL-CAUSE CODES: X71-X83 DIAGNOSIS CODES: T36-T50, with the sixth character of the code = 2 (except for T36.9, T37.9, T39.9, T41.4, T42.7, T43.9, T45.9, T47.9, and T49.9, which are included if the fifth character of the code = 2) DIAGNOSIS CODES: T51-T65, with the sixth character of the code = 2 (except for T51.9, T52.9, T53.9, T54.9, T56.9, T57.9, T58.0, T58.1, T58.9, T59.9, T60.9, T61.0, T61.1, T 61.9, T62.9, T63.9, T64.0, T64.8, and T65.9, which are included if the fifth character of the code = 2) DIAGNOSIS CODE: T71, with the sixth character of the code = 2
			SA, NOS	DIAGNOSIS CODE: T14.91
		SI only	Suicidal ideation (but not meeting ISH with SI DX and SA, NOS)	R45.851 (but not meeting ISH, with SI DX and SA NOS)

ICD-9	**Suspected suicide attempt**[(Simon 2018)]	All injury or poisoning diagnoses a cause-of-injury code indicating intentional self-harm (codes E950–E958) or undetermined intent (codes E980–E989)	800-999 Self-harm (codes E950-E958) or undetermined intent (codes E980-E989)
	Suicidal ideation	Suicidal ideation	V62.84

CDC = Centers for Disease Control and Prevention, DX = diagnosis, ISH = intentional self-harm, NOS = not otherwise specified, SA = suicide attempt, SI = suicidal ideation, SX = diagnosis

Supplemental Table 2. Bipolar Disorder/Mania Code Exclusions

Code	Code type	Description
296.0	ICD-9-CM	Bipolar I disorder, single manic episode
296.00	ICD-9-CM	Bipolar I disorder, single manic episode, unspecified
296.01	ICD-9-CM	Bipolar I disorder, single manic episode, mild
296.02	ICD-9-CM	Bipolar I disorder, single manic episode, moderate
296.03	ICD-9-CM	Bipolar I disorder, single manic episode, severe, without mention of psychotic behavior
296.04	ICD-9-CM	Bipolar I disorder, single manic episode, severe, specified as with psychotic behavior
296.05	ICD-9-CM	Bipolar I disorder, single manic episode, in partial or unspecified remission
296.06	ICD-9-CM	Bipolar I disorder, single manic episode, in full remission
296.4	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic
296.40	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic, unspecified
296.41	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic, mild
296.42	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic, moderate
296.43	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic, severe, without mention of psychotic behavior
296.44	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic, severe, specified as with psychotic behavior
296.45	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic, in partial or unspecified remission
296.46	ICD-9-CM	Bipolar I disorder, most recent episode (or current) manic, in full remission
296.5	ICD-9-CM	Bipolar i disorder, most recent episode (or current) depressed
296.50	ICD-9-CM	Bipolar I disorder, most recent episode (or current) depressed, unspecified
296.51	ICD-9-CM	Bipolar I disorder, most recent episode (or current) depressed, mild
296.52	ICD-9-CM	Bipolar I disorder, most recent episode (or current) depressed, moderate
296.53	ICD-9-CM	Bipolar I disorder, most recent episode (or current) depressed, severe, without mention of psychotic behavior
296.54	ICD-9-CM	Bipolar I disorder, most recent episode (or current) depressed, severe, specified as with psychotic behavior
296.55	ICD-9-CM	Bipolar I disorder, most recent episode (or current) depressed, in partial or unspecified remission
296.56	ICD-9-CM	Bipolar I disorder, most recent episode (or current) depressed, in full remission
296.6	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed
296.60	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed, unspecified
296.61	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed, mild

Code	Code type	Description
296.62	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed, moderate
296.63	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed, severe, without mention of psychotic behavior
296.64	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed, severe, specified as with psychotic behavior
296.65	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed, in partial or unspecified remission
296.66	ICD-9-CM	Bipolar I disorder, most recent episode (or current) mixed, in full remission
296.7	ICD-9-CM	Bipolar I disorder, most recent episode (or current) unspecified
296.8	ICD-9-CM	Other and unspecified bipolar disorders
296.80	ICD-9-CM	Bipolar disorder, unspecified
296.81	ICD-9-CM	Atypical manic disorder
296.82	ICD-9-CM	Atypical depressive disorder
296.89	ICD-9-CM	Other bipolar disorders
296.1	ICD-9-CM	Manic disorder recurrent episode
296.10	ICD-9-CM	Manic affective disorder, recurrent episode, unspecified
296.11	ICD-9-CM	Manic affective disorder, recurrent episode, mild
296.12	ICD-9-CM	Manic affective disorder, recurrent episode, moderate
296.13	ICD-9-CM	Manic affective disorder, recurrent episode, severe, without mention of psychotic behavior
296.14	ICD-9-CM	Manic affective disorder, recurrent episode, severe, specified as with psychotic behavior
296.15	ICD-9-CM	Manic affective disorder, recurrent episode, in partial or unspecified remission
296.16	ICD-9-CM	Manic affective disorder, recurrent episode, in full remission
F30	ICD-10-CM	Manic episode
F30.1	ICD-10-CM	Manic episode without psychotic symptoms
F30.10	ICD-10-CM	Manic episode without psychotic symptoms unspecified
F30.11	ICD-10-CM	Manic episode without psychotic symptoms mild
F30.12	ICD-10-CM	Manic episode without psychotic symptoms moderate
F30.13	ICD-10-CM	Manic episode, severe, without psychotic symptoms
F30.2	ICD-10-CM	Manic episode, severe with psychotic symptoms
F30.3	ICD-10-CM	Manic episode in partial remission
F30.4	ICD-10-CM	Manic episode in full remission
F30.8	ICD-10-CM	Other manic episodes
F30.9	ICD-10-CM	Manic episode, unspecified

Code	Code type	Description
F31	ICD-10-CM	Bipolar disorder
F31.0	ICD-10-CM	Bipolar disorder, current episode hypomanic
F31.1	ICD-10-CM	Bipolar disorder, current episode manic without psychotic features
F31.10	ICD-10-CM	Bipolar disorder, current episode manic without psychotic features unspecified
F31.11	ICD-10-CM	F31.11 Bipolar disorder, current episode manic without psychotic features mild
F31.12	ICD-10-CM	F31.12 Bipolar disorder, current episode manic without psychotic features moderate
F31.13	ICD-10-CM	F31.13 Bipolar disorder, current episode manic without psychotic features severe
F31.2	ICD-10-CM	F31.2 Bipolar disorder, current episode manic severe with psychotic features
F31.3	ICD-10-CM	F31.3 Bipolar disorder, current episode depressed, mild or moderate severity
F31.30	ICD-10-CM	F31.30 Bipolar disorder, current episode depressed, mild or moderate severity unspecified
F31.31	ICD-10-CM	F31.31 Bipolar disorder, current episode depressed, mild
F31.32	ICD-10-CM	F31.32 Bipolar disorder, current episode depressed, moderate
F31.4	ICD-10-CM	F31.4 Bipolar disorder, current episode depressed, severe, without psychotic features
F31.5	ICD-10-CM	F31.5 Bipolar disorder, current episode depressed, severe, with psychotic features
F31.6	ICD-10-CM	F31.6 Bipolar disorder, current episode mixed
F31.60	ICD-10-CM	F31.60 Bipolar disorder, current episode mixed unspecified
F31.61	ICD-10-CM	F31.61 Bipolar disorder, current episode mixed mild
F31.62	ICD-10-CM	F31.62 Bipolar disorder, current episode mixed moderate
F31.63	ICD-10-CM	F31.63 Bipolar disorder, current episode mixed severe, without psychotic features
F31.64	ICD-10-CM	F31.64 Bipolar disorder, current episode mixed severe, with psychotic features
F31.7	ICD-10-CM	F31.7 Bipolar disorder, currently in remission
F31.70	ICD-10-CM	F31.70 Bipolar disorder, currently in remission most recent episode unspecified
F31.71	ICD-10-CM	F31.71 Bipolar disorder, in partial remission, most recent episode hypomanic
F31.72	ICD-10-CM	F31.72 Bipolar disorder, in full remission, most recent episode hypomanic
F31.73	ICD-10-CM	F31.73 Bipolar disorder, in partial remission, most recent episode manic
F31.74	ICD-10-CM	F31.74 Bipolar disorder, in full remission, most recent episode manic
F31.75	ICD-10-CM	F31.75 Bipolar disorder, in partial remission, most recent episode depressed
F31.76	ICD-10-CM	F31.76 Bipolar disorder, in full remission, most recent episode depressed
F31.77	ICD-10-CM	Bipolar disorder, in partial remission, most recent episode mixed
F31.78	ICD-10-CM	Bipolar disorder, in full remission, most recent episode mixed
F31.8	ICD-10-CM	Other bipolar disorders
F31.81	ICD-10-CM	Bipolar II disorder

Code	Code type	Description
F31.89	ICD-10-CM	Other bipolar disorder
F31.9	ICD-10-CM	Bipolar disorder, unspecified

Supplemental Table 3. Dementia Code Exclusions

Code	Code type	Description
290	ICD-9-CM	Dementias
290.0	ICD-9-CM	Senile dementia, uncomplicated
290.1	ICD-9-CM	Presenile dementia
290.10	ICD-9-CM	Presenile dementia, uncomplicated
290.11	ICD-9-CM	Presenile dementia with delirium
290.12	ICD-9-CM	Presenile dementia with delusional features
290.13	ICD-9-CM	Presenile dementia with depressive features
290.2	ICD-9-CM	Senile dementia with delusional or depressive features
290.20	ICD-9-CM	Senile dementia with delusional features
290.21	ICD-9-CM	Senile dementia with depressive features
290.3	ICD-9-CM	Senile dementia with delirium
290.4	ICD-9-CM	Vascular dementia
290.40	ICD-9-CM	Vascular dementia, uncomplicated
290.41	ICD-9-CM	Vascular dementia, with delirium
290.42	ICD-9-CM	Vascular dementia, with delusions
290.43	ICD-9-CM	Vascular dementia, with depressed mood
290.8	ICD-9-CM	Other specified senile psychotic conditions
290.9	ICD-9-CM	Unspecified senile psychotic condition
291.2	ICD-9-CM	Alcohol-induced persisting dementia
292.82	ICD-9-CM	Drug-induced persisting dementia
294	ICD-9-CM	Persistent mental disorders due to conditions classified elsewhere
294.0	ICD-9-CM	Amnestic disorder in conditions classified elsewhere
294.1	ICD-9-CM	Dementia in conditions classified elsewhere
294.10	ICD-9-CM	Dementia in conditions classified elsewhere without behavioral disturbance
294.11	ICD-9-CM	Dementia in conditions classified elsewhere with behavioral disturbance
294.2	ICD-9-CM	Dementia, unspecified
294.20	ICD-9-CM	Dementia, unspecified, without behavioral disturbance
294.21	ICD-9-CM	Dementia, unspecified, with behavioral disturbance
331.0	ICD-9-CM	Alzheimer’s disease
331.1	ICD-9-CM	Frontotemporal dementia
331.11	ICD-9-CM	Pick’s disease

Code	Code type	Description
331.19	ICD-9-CM	Other frontotemporal dementia
331.2	ICD-9-CM	Senile degeneration of brain
F01	ICD-10-CM	Vascular dementia
F01.5	ICD-10-CM	Vascular dementia
F01.50	ICD-10-CM	Vascular dementia without behavioral disturbance
F01.51	ICD-10-CM	Vascular dementia with behavioral disturbance
F02	ICD-10-CM	Dementia in other diseases classified elsewhere
F02.8	ICD-10-CM	Dementia in other diseases classified elsewhere
F02.80	ICD-10-CM	Dementia in other diseases classified elsewhere without behavioral disturbance
F02.81	ICD-10-CM	Dementia in other diseases classified elsewhere with behavioral disturbance
F03	ICD-10-CM	Unspecified dementia
F03.9	ICD-10-CM	Unspecified dementia
F03.90	ICD-10-CM	Unspecified dementia without behavioral disturbance
F03.91	ICD-10-CM	Unspecified dementia with behavioral disturbance
G30	ICD-10-CM	Alzheimer’s disease
G30.0	ICD-10-CM	Alzheimer’s disease with early onset
G30.1	ICD-10-CM	Alzheimer’s disease with late onset
G30.8	ICD-10-CM	Other Alzheimer’s disease
G30.9	ICD-10-CM	Alzheimer’s disease, unspecified
G31.0	ICD-10-CM	Frontotemporal dementia
G31.01	ICD-10-CM	Pick’s disease
G31.09	ICD-10-CM	Other frontotemporal dementia
G31.1	ICD-10-CM	Senile degeneration of brain, not elsewhere classified

Supplemental Table 4. Intellectual Disability Code Exclusions

Code	Code type	Description
317, 318, 318.0, 318.1, 318.2, 319	ICD-9-CM	Mild intellectual disabilities; Other specified intellectual disabilities; Unspecified intellectual disabilities
F70, F71, F72, F73, F78, F79	ICD-10-CM	Intellectual disabilities: Mild, Moderate, Severe, Profound, Other, and Unspecified

Supplemental Table 5. Schizophrenia, Schizotypal, Delusional, and Other Nonmood Psychotic Disorders Code Exclusions

Code	Code Type	Description
295	ICD-9-CM	Simple type schizophrenia
295.0	ICD-9-CM	Simple type schizophrenia, unspecified
295.01	ICD-9-CM	Simple type schizophrenia, subchronic
295.02	ICD-9-CM	Simple type schizophrenia, chronic
295.03	ICD-9-CM	Simple type schizophrenia, subchronic with acute exacerbation
295.04	ICD-9-CM	Simple type schizophrenia, chronic with acute exacerbation
295.05	ICD-9-CM	Simple type schizophrenia, in remission
295.1	ICD-9-CM	Disorganized type schizophrenia
295.10	ICD-9-CM	Disorganized type schizophrenia, unspecified
295.11	ICD-9-CM	Disorganized type schizophrenia, subchronic
295.12	ICD-9-CM	Disorganized type schizophrenia, chronic
295.13	ICD-9-CM	Disorganized type schizophrenia, subchronic with acute exacerbation
295.14	ICD-9-CM	Disorganized type schizophrenia, chronic with acute exacerbation
295.15	ICD-9-CM	Disorganized type schizophrenia, in remission
295.2	ICD-9-CM	Catatonic type schizophrenia
295.20	ICD-9-CM	Catatonic type schizophrenia, unspecified
295.21	ICD-9-CM	Catatonic type schizophrenia, subchronic
295.22	ICD-9-CM	Catatonic type schizophrenia, chronic
295.23	ICD-9-CM	Catatonic type schizophrenia, subchronic with acute exacerbation
295.24	ICD-9-CM	Catatonic type schizophrenia, chronic with acute exacerbation
295.25	ICD-9-CM	Catatonic type schizophrenia, in remission
295.3	ICD-9-CM	Paranoid type schizophrenia
295.30	ICD-9-CM	Paranoid type schizophrenia, unspecified
295.31	ICD-9-CM	Paranoid type schizophrenia, subchronic
295.32	ICD-9-CM	Paranoid type schizophrenia, chronic
295.33	ICD-9-CM	Paranoid type schizophrenia, subchronic with acute exacerbation
295.34	ICD-9-CM	Paranoid type schizophrenia, chronic with acute exacerbation
295.35	ICD-9-CM	Paranoid type schizophrenia, in remission
295.4	ICD-9-CM	Schizophreniform disorder
295.40	ICD-9-CM	Schizophreniform disorder, unspecified

295.41	ICD-9-CM	Schizophreniform disorder, subchronic
295.42	ICD-9-CM	Schizophreniform disorder, chronic
295.43	ICD-9-CM	Schizophreniform disorder, subchronic with acute exacerbation
295.44	ICD-9-CM	Schizophreniform disorder, chronic with acute exacerbation
295.45	ICD-9-CM	Schizophreniform disorder, in remission
295.5	ICD-9-CM	Latent schizophrenia
295.50	ICD-9-CM	Latent schizophrenia, unspecified
295.51	ICD-9-CM	Latent schizophrenia, subchronic
295.52	ICD-9-CM	Latent schizophrenia, chronic
295.53	ICD-9-CM	Latent schizophrenia, subchronic with acute exacerbation
295.54	ICD-9-CM	Latent schizophrenia, chronic with acute exacerbation
295.55	ICD-9-CM	Latent schizophrenia, in remission
295.6	ICD-9-CM	Schizophrenic disorder, residual type
295.60	ICD-9-CM	Schizophrenic disorders, residual type, unspecified
295.61	ICD-9-CM	Schizophrenic disorders, residual type, subchronic
295.62	ICD-9-CM	Schizophrenic disorders, residual type, chronic
295.63	ICD-9-CM	Schizophrenic disorders, residual type, subchronic with acute exacerbation
295.64	ICD-9-CM	Schizophrenic disorders, residual type, chronic with acute exacerbation
295.65	ICD-9-CM	Schizophrenic disorders, residual type, in remission
295.7	ICD-9-CM	Schizoaffective disorder
295.70	ICD-9-CM	Schizoaffective disorder, unspecified
295.71	ICD-9-CM	Schizoaffective disorder, subchronic
295.72	ICD-9-CM	Schizoaffective disorder, chronic
295.73	ICD-9-CM	Schizoaffective disorder, subchronic with acute exacerbation
295.74	ICD-9-CM	Schizoaffective disorder, chronic with acute exacerbation
295.75	ICD-9-CM	Schizoaffective disorder, in remission
295.8	ICD-9-CM	Other specified types of schizophrenia
295.80	ICD-9-CM	Other specified types of schizophrenia, unspecified
295.81	ICD-9-CM	Other specified types of schizophrenia, subchronic
295.82	ICD-9-CM	Other specified types of schizophrenia, chronic
295.83	ICD-9-CM	Other specified types of schizophrenia, subchronic with acute exacerbation
295.84	ICD-9-CM	Other specified types of schizophrenia, chronic with acute exacerbation
295.85	ICD-9-CM	Other specified types of schizophrenia, in remission

295.9	ICD-9-CM	Unspecified schizophrenia
295.90	ICD-9-CM	Unspecified schizophrenia, unspecified
295.91	ICD-9-CM	Unspecified schizophrenia, subchronic
295.92	ICD-9-CM	Unspecified schizophrenia, chronic
295.93	ICD-9-CM	Unspecified schizophrenia, subchronic with acute exacerbation
295.94	ICD-9-CM	Unspecified schizophrenia, chronic with acute exacerbation
295.95	ICD-9-CM	Unspecified schizophrenia, in remission
297	ICD-9-CM	Delusional disorder
297.0	ICD-9-CM	Paranoid state, simple
297.1	ICD-9-CM	Delusional disorder
297.2	ICD-9-CM	Paraphrenia
297.3	ICD-9-CM	Shared psychotic disorder
297.8	ICD-9-CM	Other specified paranoid states
297.9	ICD-9-CM	Unspecified paranoid state
298	ICD-9-CM	Other nonorganic psychoses
2980	ICD-9-CM	Depressive type psychosis
2981	ICD-9-CM	Excitative type psychosis
2982	ICD-9-CM	Reactive confusion
2983	ICD-9-CM	Acute paranoid reaction
2984	ICD-9-CM	Psychogenic paranoid psychosis
2988	ICD-9-CM	Other and unspecified reactive psychosis
2989	ICD-9-CM	Unspecified psychosis
F20	ICD-10-CM	Schizophrenia
F20.0	ICD-10-CM	Paranoid schizophrenia
F20.1	ICD-10-CM	Disorganized schizophrenia
F20.2	ICD-10-CM	Catatonic schizophrenia
F20.3	ICD-10-CM	Undifferentiated schizophrenia
F20.5	ICD-10-CM	Residual schizophrenia
F20.8	ICD-10-CM	Other schizophrenia
F20.81	ICD-10-CM	Schizophreniform disorder
F20.89	ICD-10-CM	Other schizophrenia
F20.9	ICD-10-CM	Schizophrenia, unspecified
F21	ICD-10-CM	Schizotypal disorder

F22	ICD-10-CM	Delusional disorder
F23	ICD-10-CM	Brief psychotic disorder
F24	ICD-10-CM	Shared psychotic disorder
F25	ICD-10-CM	Schizoaffective disorders
F25.0	ICD-10-CM	Schizoaffective disorder, bipolar type
F25.1	ICD-10-CM	Schizoaffective disorder, depressive type
F25.8	ICD-10-CM	Other schizoaffective disorders
F25.9	ICD-10-CM	Schizoaffective disorder, unspecified
F28	ICD-10-CM	Other psychotic disorder not due to a substance or known physiological condition
F29	ICD-10-CM	Unspecified psychosis not due to a substance or known physiological condition
F060	ICD-10-CM	Psychotic disorder with hallucinations due to known physiological condition
F062	ICD-10-CM	Psychotic disorder with delusions due to known physiological condition