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Inpatient Stays Involving Mental and Substance Use Disorders, 2016

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Introduction

Mental and substance use disorders are common in the United States. In 2016, over 55 million people aged 18 years and over (more than one in five adults) suffered from mental and/or substance use disorders (MSUDs).¹ Of these adults, nearly 45 million had a mental disorder alone, 11 million had a substance use disorder alone, and 8 million had both a mental disorder and a substance use disorder.²

Not only do mental and substance use disorders co-occur, they also are linked to other physical conditions such as diabetes, heart disease, and asthma.^{3,4} Disorders such as depression, anxiety, and substance use disorder are associated with significant distress and impairment, including complications with multiple chronic conditions, disability, inability to function in society, and substantial economic costs.^{5,6} The treatment costs of mental disorders alone totaled \$201 billion in 2013.⁷ Taking into account additional costs associated with lost work productivity and disability payments, the total cost of mental and substance use disorders to society is estimated to be more than twice that amount.⁸

¹ Substance Abuse and Mental Health Services Administration, Center for Behavioral Health Statistics and Quality. Key Substance Use and Mental Health Indicators in the United States: Results From the 2016 National Survey on Drug Use and Health. 2017. www.samhsa.gov/data/sites/default/files/NSDUH-FFR1-2016/NSDUH-FFR1-2016.htm#adol1. Accessed November 26, 2018.

² Ibid.

³ Owens PL, Heslin KC, Fingar KR, Weiss AJ. Co-occurrence of Physical Health Conditions and Mental Health and Substance Use Conditions Among Adult Inpatient Stays, 2010 Versus 2014. HCUP Statistical Brief #240. June 2018. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb240-Co-occurring-Physical-Mental-Substance-Conditions-Hospital-Stays.pdf. Accessed December 13, 2018.

⁴ Kaiser Family Foundation. Facilitating Access to Mental Health Services: A Look at Medicaid, Private Insurance, and the Uninsured. November 27, 2017. www.kff.org/medicaid/fact-sheet/facilitating-access-to-mental-health-services-a-look-at-medicaid-private-insurance-and-the-uninsured/. Accessed November 12, 2018.

⁵ Ibid.

⁶ Kamal R, Cox C, Rousseau D, et al. Costs and Outcomes of Mental Health and Substance Use Disorders in the US. *JAMA*. 2017;318(5):415.

⁷ Roehrig C. Mental Disorders Top the List of the Most Costly Conditions in the United States: \$201 Billion. *Health Affairs*. 2016;35(6):1130–5.

⁸ Insel T. Post by Former NIMH Director Thomas Insel: Mental Health Awareness Month: By the Numbers. 2015. www.nimh.nih.gov/about/directors/thomas-insel/blog/2015/mental-health-awareness-month-by-the-numbers.shtml. Accessed November 26, 2018.

Highlights

- In 2016, nearly 10 million inpatient stays had a principal (2.2 million) or secondary (7.7 million) MSUD diagnosis, constituting 6.1 and 21.7 percent of all inpatient stays, respectively.
- In total, stays principally for MSUDs cost \$15.3 billion (3.6 percent of total hospital costs). On average, stays for MSUDs cost \$7,100 and were 6.4 days.
- The rate of stays principally for MSUDs was highest among adults aged 18–64 years.
- Nearly 60 percent of MSUD stays for patients aged less than 65 years were billed to public payers.
- One in four stays principally for MSUDs were for depressive disorders. Alcohol-related disorders and schizophrenia each constituted nearly one in five MSUD stays.
- Although uncommon, stays for eating disorders were the costliest (\$19,400 per stay) and the longest (14 days, on average) type of MSUD stay. Inpatient stays for schizophrenia were the second costliest (\$8,900 per stay) and second longest (11 days on average) MSUD stay.
- The most common reason for MSUD stays among males aged 45–64 years was alcohol-related disorders. Schizophrenia was the most common reason for MSUD stays for males aged 18–44 years.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents statistics from the 2016 National Inpatient Sample (NIS) on inpatient stays involving MSUDs at community hospitals among patients aged 5 years or older. First, MSUD-related inpatient stay characteristics, including costs, length of stay, discharge status, patient demographics, primary expected payer, and hospital location are shown. Inpatient stays for MSUDs (i.e., those with a principal MSUD diagnosis) are shown separately from those with a principal diagnosis of a physical condition and a secondary MSUD condition. Stays with no MSUD diagnosis are shown as a point of comparison. Second, the frequency, costs, and length of stay for specific MSUDs are shown. Because of the large sample size of the HCUP NIS, small differences can be statistically significant. Thus, only percentage differences between groups greater than or equal to 10 percent are noted in the text. For further information on the methodology, see the Data Source and Definitions sections at the end of this Statistical Brief.

Findings

Characteristics of inpatient stays with and without a principal or secondary MSUD diagnosis, 2016

Table 1 presents utilization and cost statistics for inpatient stays related to MSUDs in 2016. Stays with a principal MSUD diagnosis are shown separately from stays with an MSUD diagnosis that was secondary to other principal physical diagnoses. These stays are compared with those without an MSUD diagnosis.

Table 1. Characteristics of inpatient stays with and without a principal or secondary MSUD diagnosis, 2016

Inpatient stay characteristic	Principal MSUD diagnosis	Secondary MSUD diagnosis	No MSUD diagnosis
Stays, N	2,169,000	7,726,500	25,779,900
Stays, %	6.1	21.7	72.3
Stays, rate per 100,000 population	717	2,555	8,524
Aggregate costs, \$ billions	15.3	110.3	296.4
Aggregate costs, %	3.6	26.1	70.2
Mean cost per stay, \$	7,100	14,300	11,500
Mean cost per day, \$	1,400	3,400	3,200
Mean length of stay, days	6.4	5.4	4.2
Admitted from emergency department, %	60.4	66.3	46.3
Discharge status, %			
Discharged home or to home health care	82.2	72.7	83.3
Transferred to short-term hospital	2.0	2.1	1.9
Transferred to other type of facility	11.3	20.7	12.1
Died in hospital	0.5	2.1	2.0
Other	3.9	2.5	0.8

Abbreviation: MSUD, mental and/or substance use disorder

Notes: The number of stays and mean cost per stay and per day were rounded to the nearest hundred. Stays with a principal MSUD diagnosis are mutually exclusive from those with a secondary MSUD diagnosis. Population rates are based on population estimates for persons aged 5 years and older. Population data were obtained from Claritas. Other discharge status includes discharged against medical advice and discharged alive, destination unknown.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **In 2016, there were nearly 10 million stays with a principal or secondary MSUD diagnosis, constituting more than 1 in 4 inpatient stays.**

In 2016, there were 9,895,500 inpatient stays with a principal (2.2 million) or secondary (7.7 million) MSUD. Combined, stays with a principal (6.1 percent) or secondary (21.7 percent) MSUD were 27.8 percent of the 35.7 million total inpatient stays.

- **Stays with a secondary MSUD diagnosis cost more and were longer than stays without an MSUD diagnosis.**

Stays for a principal MSUD accounted for 6.1 percent of all adult stays and 3.6 percent of total hospital costs (\$15.3 billion), pointing to the relatively low resource intensity of MSUD care in community hospitals. On average, stays with a principal MSUD cost \$7,100 with an average length of stay of 6.4 days.

Care for adults with a physical condition as a principal diagnosis and a coexisting MSUD accounted for roughly 22 percent of hospital stays and 26 percent of hospital costs, whereas care for adults with only physical conditions accounted for 72 percent of all stays and 70 percent of hospital costs. Stays with a coexisting MSUD cost a total of \$110.3 billion, with an average cost of \$14,300 and an average length of stay of 5.4 days. On average, stays for a physical condition without an MSUD cost \$11,500 and were 4.2 days long. This suggests a higher resource intensity when stays for physical conditions coexist with MSUDs.

- **Inpatient stays involving MSUDs were more likely to be admitted from the emergency department than other stays.**

Compared with stays without an MSUD diagnosis, a greater percentage of stays with a principal or secondary MSUD were admitted through the emergency department (46.3 vs. 60.4 and 66.3 percent, respectively).

- **Inpatient stays with a principal MSUD were less likely to result in in-hospital death than were other stays.**

Stays with a principal MSUD were less likely to result in in-hospital death compared with other stays (0.5 vs. 2 percent). In addition, stays with a secondary MSUD were less likely to be discharged routinely to home or to home health care (72.7 vs. 82–83 percent) and more likely to be transferred to a facility other than a short-term hospital, such as a skilled nursing facility or other long-term care facility (20.7 vs. 11–12 percent), compared with stays with a principal or no MSUD diagnosis.

Table 2 presents the percentage and rates of inpatient stays with and without an MSUD diagnosis for select patient sociodemographic characteristics. Stays with a principal MSUD diagnosis are shown separately from stays with a secondary MSUD diagnosis. These stays are compared with those without an MSUD diagnosis.

Table 2. Patient characteristics and hospital location of inpatient stays with and without a principal or secondary MSUD diagnosis, 2016

Characteristic	Principal MSUD diagnosis (N=2,169,000)		Secondary MSUD diagnosis (N=7,726,500)		No MSUD Diagnosis (N=25,779,900)	
	Stays, %	Rate of stays per 100,000 population	Stays, %	Rate of stays per 100,000 population	Stays, %	Rate of stays per 100,000 population
Overall total	100.0	717	100.0	2,555	100.0	8,524
Age group, years						
5–17	7.9	317	1.2	169	20.3	9,676
18–44	49.2	923	21.2	1,417	23.3	5,195
45–64	34.6	892	38.1	3,494	19.7	6,040
65–74	5.7	440	19.6	5,373	14.9	13,596
75+	2.6	272	19.9	7,540	21.8	27,603
Sex						
Female	46.6	656	58.3	2,926	57.1	9,563
Male	53.4	780	41.7	2,167	42.9	7,439
Community-level income						
Quartile 1 (lowest)	35.1	963	32.0	3,170	29.9	9,921
Quartile 2	25.4	732	26.2	2,717	25.2	8,762
Quartile 3	22.2	604	23.7	2,324	24.1	7,943
Quartile 4 (highest)	17.3	481	18.1	1,817	20.7	6,957
Primary expected payer						
Less than 65 years						
Medicare	17.2	N/A	24.3	N/A	8.2	N/A
Medicaid	41.2	N/A	32.9	N/A	35.0	N/A
Private insurance	27.3	N/A	32.1	N/A	47.6	N/A
Self-pay/no charge	9.7	N/A	7.0	N/A	5.5	N/A
Other	4.6	N/A	3.7	N/A	3.7	N/A
65+ years						
Medicare	86.0	N/A	90.1	N/A	88.8	N/A
Non-Medicare	14.0	N/A	9.9	N/A	11.2	N/A
Patient residence						
Rural	13.9	683	16.6	2,938	16.0	9,458
Urban	86.1	709	83.4	2,474	84.0	8,334
Hospital location						
Northeast	23.0	938	18.6	2,698	18.1	8,763
New England	5.9	921	5.5	3,027	4.3	7,854
Middle Atlantic	17.1	943	13.1	2,580	13.8	9,087
Midwest	25.3	860	24.1	2,921	21.4	8,644
East North Central	16.8	826	16.9	2,963	14.7	8,626
West North Central	8.5	935	7.3	2,828	6.7	8,685
South	35.5	677	38.0	2,579	40.0	9,050
South Atlantic	21.1	765	20.8	2,687	20.5	8,856
East South Central	6.3	769	7.2	3,129	6.8	9,830
West South Central	8.2	487	10.1	2,134	12.7	8,987
West	16.1	490	19.3	2,083	20.5	7,401
Mountain	5.3	521	6.2	2,190	6.3	7,374
Pacific	10.8	476	13.0	2,035	14.2	7,413

Abbreviations: MSUD, mental and/or substance use disorder; N/A, not available.

Notes: Stays with a principal MSUD diagnosis are mutually exclusive from those with a secondary MSUD diagnosis. Population rates are based on population estimates for individuals aged 5 years and older. Population data were obtained from Claritas.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **Over 80 percent of stays principally for an MSUD were for adults aged 18–44 years or 45–64 years.**

Over four out of five stays (83.8 percent) principally for MSUDs were for 18–44 year olds and 45–64 year olds. In contrast, these age groups accounted for nearly three out of five stays (59.3 percent) with a secondary MSUD and two out of five stays (43.0 percent) without an MSUD.

The majority of stays with a coexisting MSUD were for adults aged 18–44 years (21.2 percent) or 45–64 years (38.1 percent). Nearly one in five stays with a coexisting MSUD were for older adults aged 65–74 years (19.6 percent) or 75 years and older (19.9 percent). Fewer than 2 percent of stays with a coexisting MSUD were for children aged 5–17 years (1.2 percent).

No age group accounted for a disproportionate share of stays with a physical condition without an MSUD: 5–17 years (20.3 percent), 18–44 years (23.3 percent), 45–64 years (19.7 percent), 65–74 years (14.9 percent), 75+ years (21.8 percent).

- **The rate of inpatient stays principally for MSUDs was highest among adults aged 18–44 and 45–64 years and among males.**

The rate of stays with a principal MSUD was at least twice as high among adults aged 18–44 and 45–64 years (923 and 892 per 100,000 population, respectively) compared with all other age groups: (5–17 years: 317; 65–74 years: 440; 75+ years: 272 per 100,000 population). The rate of stays with a secondary MSUD increased steadily with age. The oldest adults had the highest rate of stays with a coexisting MSUD (7,540 per 100,000 population among adults aged 75 years and older).

Among individuals aged 5–17 years, the rate of stays with a principal MSUD was higher than the rate of stays for a secondary MSUD. Among the older age groups, however, the rate of stays with a secondary MSUD was higher than the rate of stays with a principal MSUD and this difference increased with age: 923 versus 1,417 per 100,000 adults aged 18–44 years (1.5 times greater) and 272 versus 7,540 per 100,000 adults aged 75+ years (28 times greater).

The rate of stays with a principal MSUD was higher among males than among females (780 vs. 656 per 100,000 population). By contrast, the rate of stays with a secondary MSUD was higher among females than among males (2,926 vs. 2,167 per 100,000 population).

- **Nearly 60 percent of stays involving MSUDs among patients less than 65 years old were billed to public payers.**

In total, 58.4 percent of stays for patients aged less than 65 years with a principal MSUD were billed to Medicare (17.2 percent) or Medicaid (41.2 percent). Similarly, 57.2 percent of stays for patients aged less than 65 years with a secondary MSUD were billed to Medicare (24.3 percent) or Medicaid (32.9 percent). In contrast, only 43.2 percent of non-MSUD stays for patients aged less than 65 years were billed to public payers. This lower overall public share was mainly due to a much smaller percentage billed to Medicare (8.2 percent).

- **Nearly 1 in 10 stays with a principal MSUD among patients aged less than 65 years were billed as self-pay or no charge.**

Among patients aged less than 65 years, nearly 10 percent of stays with a principal diagnosis for an MSUD were billed as self-pay or no charge, compared with 7.0 percent of stays in this age group with a secondary MSUD and 5.5 percent of stays without an MSUD.

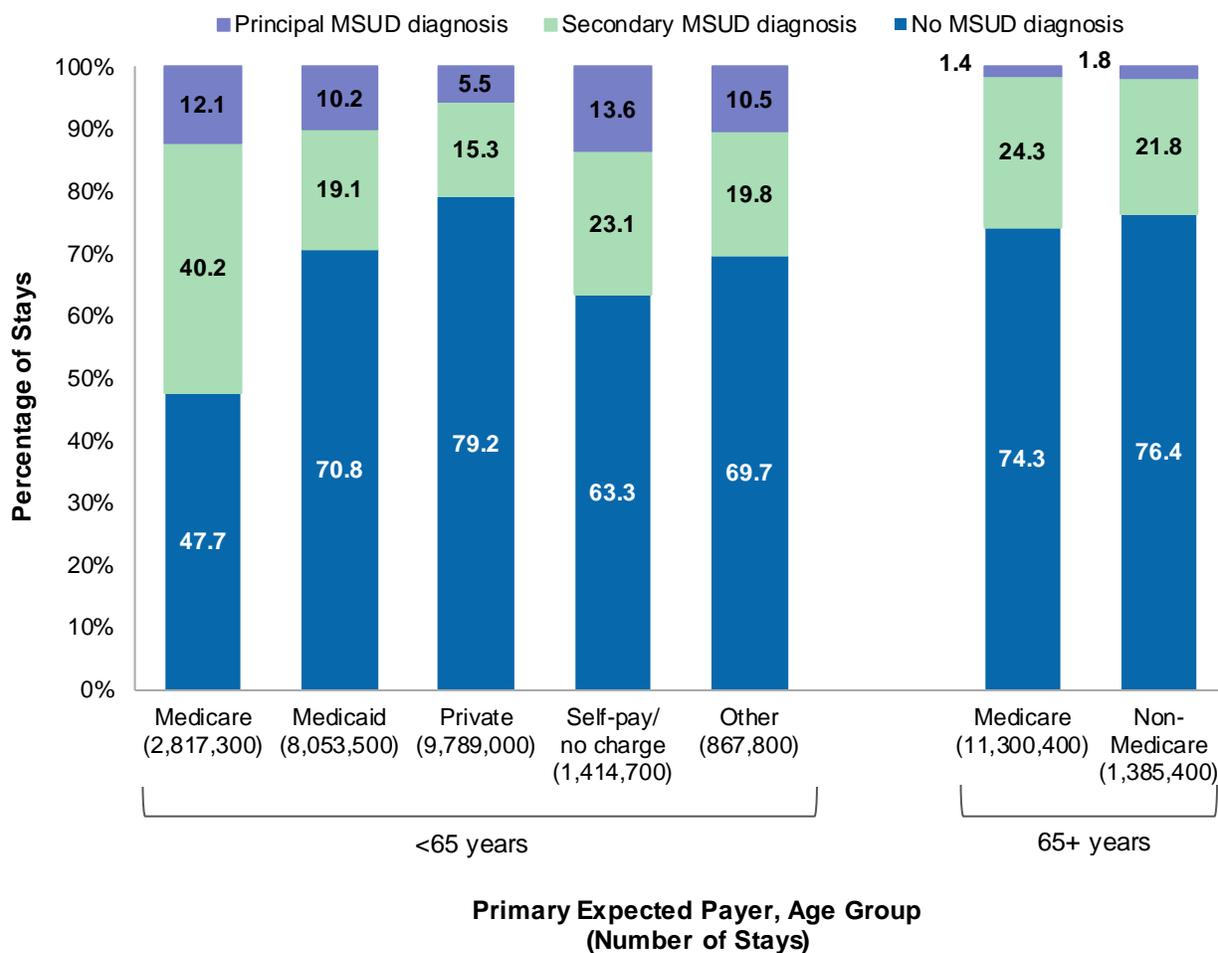
- The geographic distribution of rates of stays differed according to whether the MSUD was a principal or secondary diagnosis.

Whereas the rate of stays with a principal MSUD was similar in rural and urban areas (683 and 709 per 100,000 population, respectively), the rate of stays with a secondary MSUD was higher in rural than in urban areas (2,938 vs. 2,474 per 100,000 population).

The rate of stays with a principal MSUD was highest in the Northeast region, with rates in both the New England and the Middle Atlantic census divisions over 900 per 100,000 population. The rate of stays with a secondary MSUD diagnosis was highest in the Midwest region (2,921 per 100,000 population), although specific divisions within the South and the Northeast had higher overall rates (East South Central division: 3,129; New England division: 3,027). Both the rate of stays with a principal and the rate of stays with a secondary MSUD diagnosis were lowest in the West (490 and 2,083 per 100,000 population, respectively).

Figure 1 displays the percentage of all inpatient stays with and without an MSUD diagnosis, by primary expected payer and age group in 2016.

Figure 1. Percentage of all inpatient stays with and without a principal or secondary MSUD diagnosis, by primary expected payer and age group, 2016



Abbreviation: MSUD, mental and/or substance use disorder

Note: Stays with a principal MSUD diagnosis are mutually exclusive from those with a secondary MSUD diagnosis.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **Over half of all Medicare-billed stays for patients aged less than 65 years involved an MSUD.**

In 2016, MSUD-related stays accounted for 52.3 percent of Medicare-billed inpatient stays for patients under 65 years (principal MSUD: 12.1 percent; secondary MSUD: 40.2 percent). MSUD stays for patients under 65 years accounted for 21 to 37 percent of the stays billed to non-Medicare payers (Medicaid: 29.3 percent; private insurance: 20.8 percent; self-pay/no charge: 36.7 percent; other payers: 30.3 percent).

In contrast, only one-fourth of Medicare-billed stays for patients aged 65 years and older involved an MSUD (principal: 1.4 percent; secondary: 24.3 percent).

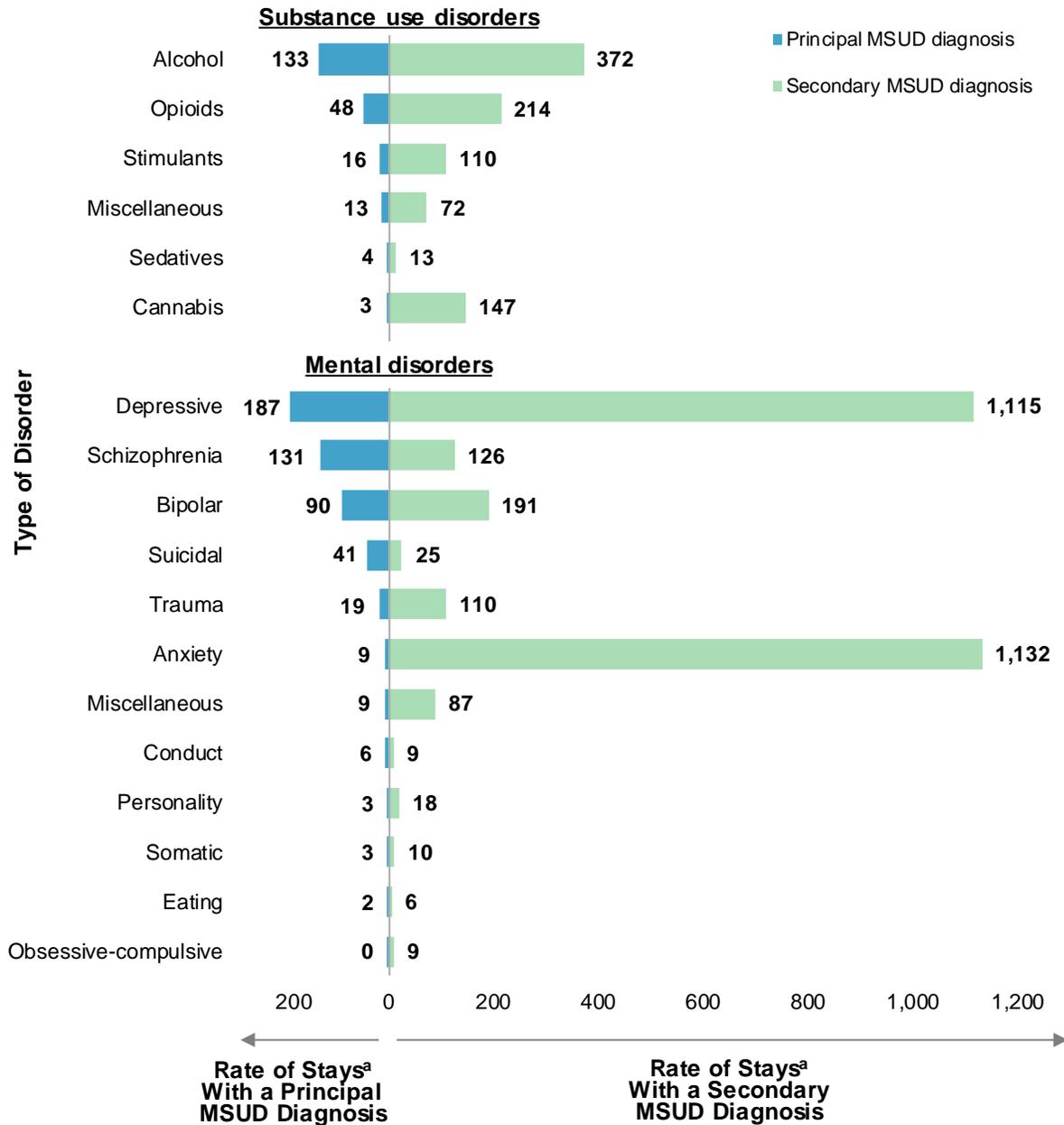
- **Among patients aged less than 65 years old, over 10 percent of stays were principally for an MSUD, except for those billed to private insurance.**

Only 5.5 percent of stays billed to private insurance were principally for an MSUD, whereas 10–14 percent of stays billed to other expected payers were principally for an MSUD (Medicare, 12.1 percent; Medicaid, 10.2 percent; self-pay/no charge, 13.6 percent; other payers, 10.5 percent).

Frequency, costs, and length of specific MSUD inpatient stays, 2016

Figure 2 displays rates of inpatient stays by specific MSUD disorders in 2016, according to whether the disorder was a principal or secondary diagnosis.

Figure 2. Rates of stays^a for specific MSUD disorders, by principal and secondary diagnosis, 2016



Abbreviation: MSUD, mental and/or substance use disorder

Notes: Suicidal includes suicidal ideation and attempts. Secondary diagnoses are counted only if the record had a non-MSUD diagnosis listed as the principal diagnosis. Population rates are based on population estimates for persons 5 years and older. Population data are obtained from Claritas.

^a Rate of stays per 100,000 population.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **In 2016, the most common type of principal and secondary substance-related diagnosis among inpatient stays was alcohol-related disorders, followed by opioid-related disorders.**

The most common type of a substance use disorder stay was alcohol-related disorders, with a rate of 133 stays per 100,000 population as a principal diagnosis and 372 stays per 100,000 population as a coexisting disorder. The second most common type of substance use disorder among stays was opioid-related disorders (principal: 48; secondary: 214 per 100,000 population).

The least common reason for a substance use disorder stay was cannabis-related disorders (3 stays per 100,000 population), but as a secondary diagnosis, cannabis-related disorders was the third most common type of substance use disorder stay (147 per 100,000 population).

- **Depressive disorders and schizophrenia were the most common reasons for a mental disorder stay, whereas anxiety disorders and depressive disorders were the most common coexisting mental disorders for inpatient stays.**

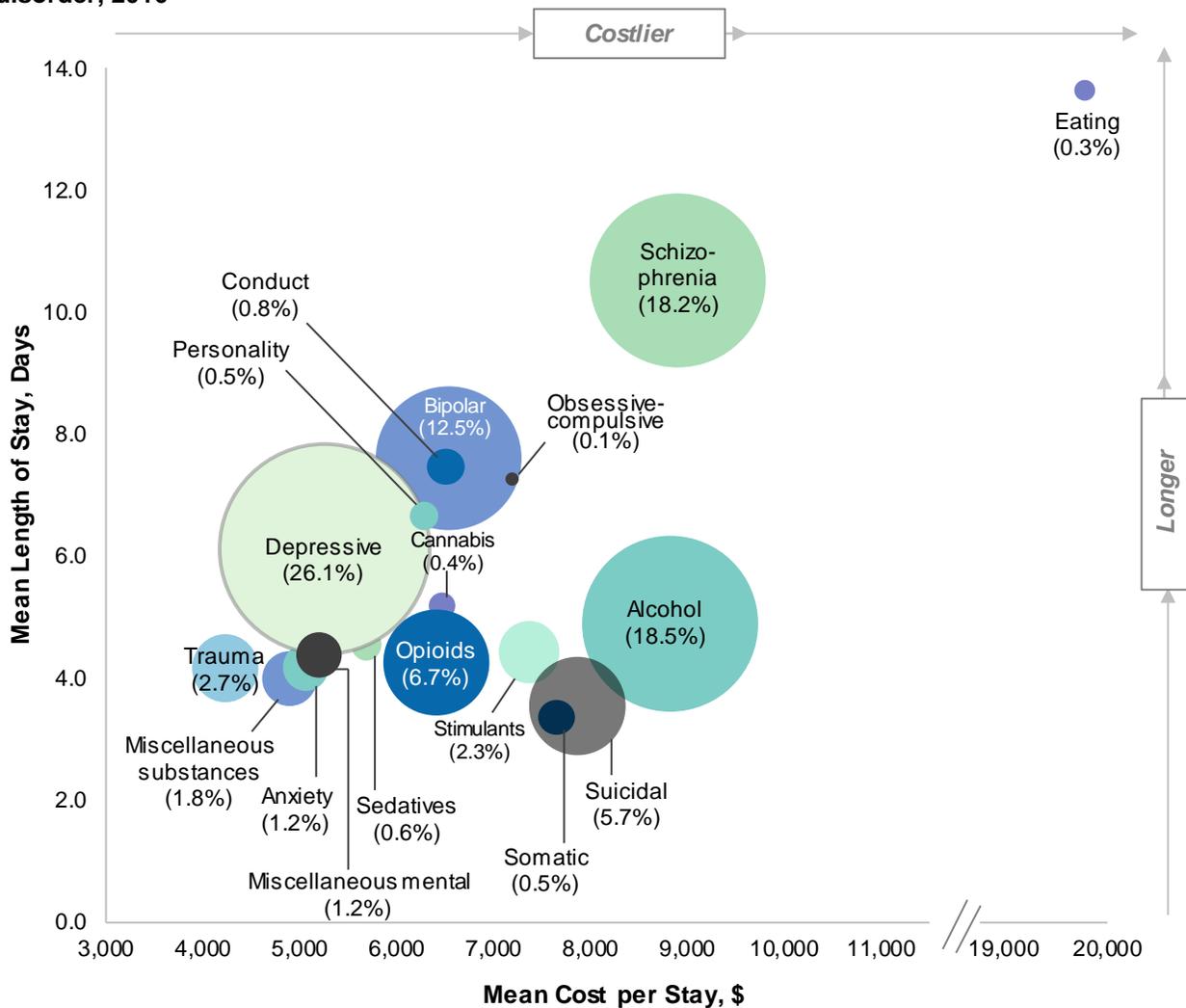
The most common reason for a mental disorder stay was depressive disorders (187 stays per 100,000 population). Along with anxiety disorders (1,132 stays per 100,000 population), depressive disorders was one of the most common secondary diagnoses for inpatient stays with a coexisting mental disorder (1,115 per 100,000 population). Although anxiety disorders was one of the most common coexisting mental disorders, stays principally for these disorders were much less common (9 per 100,000 population) than those for depressive disorders.

The second most common reason for a mental disorder stay and the fourth most common secondary diagnosis for inpatient stays with a coexisting mental disorder was schizophrenia and related disorders (131 and 126 per 100,000 population, respectively).

Suicidal ideation or attempt was more likely to be the reason for a mental disorder stay than a stay with a secondary mental disorder (41 vs. 25 stays per 100,000 population, respectively).

Figure 3 displays the percentage of inpatient stays for each MSUD diagnosis in 2016, out of all stays principally for an MSUD, as indicated by the size of each circle. The average cost and length of each type of stay are shown on the x-axis and y-axis, respectively. The exact estimates of costs and length of stay are included in Appendix A at the end of this Statistical Brief.

Figure 3. Percentage, cost, and length of inpatient stays principally for an MSUD, by specific disorder, 2016



Abbreviation: MSUD, mental and/or substance use disorder

Note: Suicidal includes suicidal ideation and attempts. Disorders shown are based on the principal diagnosis.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

■ **In 2016, more than one in four inpatient stays with a principal MSUD were for depressive disorders.**

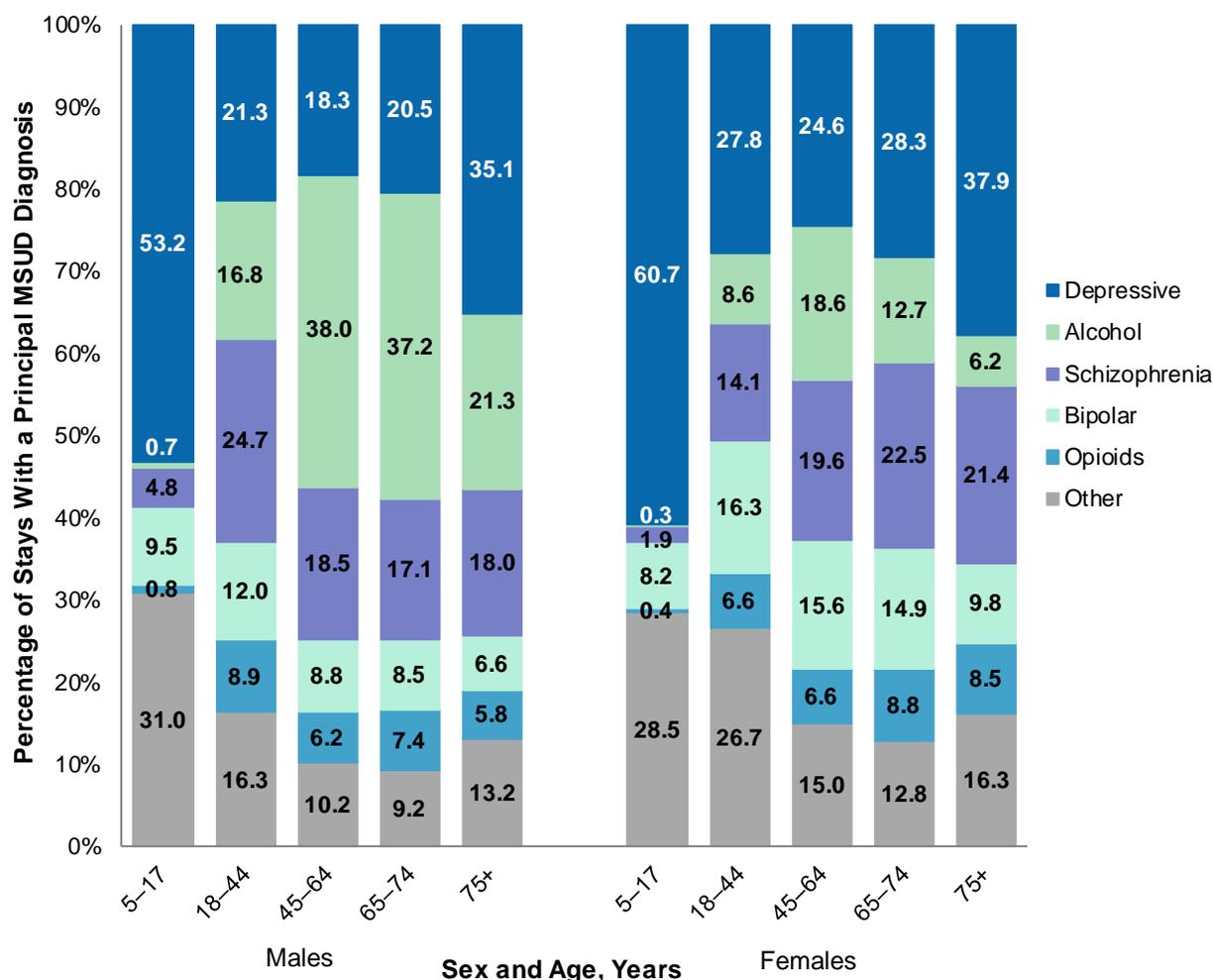
The most common type of disorder among inpatient stays with a principal MSUD in 2016 was depressive disorders, constituting 26.1 percent of these stays. Alcohol-related disorders and schizophrenia and related disorders each accounted for nearly one in five stays principally for an MSUD, followed by bipolar disorders (12.5 percent), opioid-related disorders (6.7 percent), and suicidal ideation or attempt (5.7 percent).

- Although uncommon, inpatient stays for eating disorders were the costliest and longest type of stays for MSUDs.

Although inpatient stays with a principal diagnosis of eating disorders constituted only 0.3 percent of all stays with a principal MSUD, on average they cost \$19,400 and lasted 13.6 days. Inpatient stays for schizophrenia and related disorders were the second costliest and second longest type of stay for MSUDs, with a mean cost per stay of \$8,900 and a mean length of stay of 10.5 days. Stays for alcohol-related disorders were the third costliest (\$8,800 per stay), and those for bipolar disorders were the third longest (7.6 days) type of stays with a principal MSUD.

Figure 4 displays types of disorders among inpatient stays with a principal MSUD diagnosis in 2016, by patient sex and age. The five most common principal MSUD diagnoses are shown as distinct categories. These diagnoses include depressive disorders, alcohol-related disorders, schizophrenia and related disorders, bipolar disorders, and opioid-related disorders. All other types of MSUD diagnoses are included in the Other category.

Figure 4. Distribution of stays for specific principal MSUD diagnoses, by patient sex and age, 2016



Abbreviation: MSUD, mental or substance use disorder

Note: Disorders shown are based on the frequency of stays principally for an MSUD. Other includes cannabis-related disorders; miscellaneous substances and addictive disorders; sedative-related disorders; stimulant-related disorders; anxiety disorders; disruptive, impulse-control, and conduct disorders; eating disorders; obsessive-compulsive disorders; miscellaneous mental disorders; personality disorders; somatic symptom disorders; suicidal ideation or attempt; and trauma- and stressor-related disorders.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

- **In 2016, the most common reason for MSUD stays among the youngest and oldest age groups among both males and females was depressive disorders.**

Over half of MSUD stays for males and females aged 5–17 years (53.2 and 60.7 percent, respectively), and over one-third of those for males and females aged 75 years or older (35.1 and 37.9 percent, respectively) were for depressive disorders (vs. 18.3–28.3 percent of stays for patients in the other age-sex groups). The most common reason for MSUD stays for males aged 5–17 years and 75 years or older, and for females of all ages was depressive disorders.

Among stays for every age group younger than 75 years, depressive disorders constituted a greater percentage of MSUD stays for females than for males (e.g., 28.3 vs. 20.5 percent of stays for patients aged 65–74 years).

- **Alcohol-related disorders was the most common type of principal MSUD stay for males aged 45–64 years and, at every age, was a more common reason for male hospitalization than for female hospitalization.**

Over one-third (37–38 percent) of MSUD stays for males aged 45–74 years were for alcohol-related disorders. Among MSUD stays for females, alcohol-related disorders was a more common reason for a stay among patients aged 45–74 years (12.7–18.6 percent) than for a stay for patients in the other age groups (0.3–8.6 percent).

Among MSUD stays for patients of every age group, alcohol-related disorders constituted a greater percentage of MSUD stays for males than for females (e.g., 37.2 vs. 12.7 percent among stays for patients aged 65–74 years).

- **Schizophrenia was the most common type of principal MSUD stay for males aged 18–44 years.**

The most common type of principal MSUD stay for males aged 18–44 years was schizophrenia and related disorders, constituting 24.7 percent of all stays principally for an MSUD. A principal diagnosis of schizophrenia was more common among stays for males aged 5–17 and 18–44 years than among stays for females in the same age group (5–17 years: 4.8 vs. 1.9 percent, respectively; 18–44 years: 24.7 vs. 14.1 percent, respectively). In contrast, among MSUD stays for older adults, a principal diagnosis of schizophrenia and related disorders was more common among stays for females aged 64–74 and 75+ years than among stays for males in the same age group (64–74 years: 22.5 vs. 17.1 percent, respectively; 75+ years: 21.4 vs. 18.0 percent, respectively).

- **MSUD stays for adult females were more likely than stays for males to have a principal diagnosis of bipolar disorders.**

Except for MSUD stays for patients aged 5–17 years, a principal diagnosis of bipolar disorders was more common for females than for males in each age group (e.g., 15–16 vs. 9 percent of stays for patients aged 45–74 years). The percentage of stays for bipolar disorders ranged from a low of 6.6 percent of stays among males aged 75+ years to a high of 16.3 percent of stays for females aged 18–44 years.

- **Opioid-related disorders constituted nearly 10 percent of all MSUD stays for males aged 18–44 years and females aged 65 years or older.**

Among MSUD stays for males aged 18–44 years, 8.9 percent were for opioids. Among MSUD stays for females, opioid-related disorders were highest among stays for those in the oldest age groups (9 percent of MSUD stays among females older than 64 years). Generally, a higher percentage of MSUD stays for younger than for older patients had a principal diagnosis categorized as Other disorders⁹ (i.e., disorders that were less common than the top five principal MSUD diagnoses).

⁹ Other disorders include cannabis-related disorders; miscellaneous substances and addictive disorders; sedative-related disorders; stimulant-related disorders; anxiety disorders; disruptive, impulse-control, and conduct disorders; eating disorders; obsessive-

Appendix A. Number, percentage, cost, and length of inpatient stays for a specific MSUD diagnosis, 2016

Principal MSUD	Stays, N	All MSUD stays, %	Mean cost per stay, \$	Aggregate costs, \$ billions	Mean length of stay, days
Any principal MSUD diagnosis	2,169,000	100	7,100	15.3	6.4
Any principal substance use disorder-related diagnosis					
Alcohol-related disorders	401,300	18.5	8,800	3.5	4.9
Opioid-related disorders	146,300	6.7	6,400	0.9	4.2
Stimulant-related disorders	49,400	2.3	7,400	0.4	4.4
Miscellaneous substances and addictive disorders	38,800	1.8	4,900	0.2	4.0
Sedative-related disorders	12,100	0.6	5,700	0.1	4.5
Cannabis-related disorders	9,100	0.4	6,500	0.1	5.2
Any principal mental disorder-related diagnosis					
Depressive disorders	566,700	26.1	5,300	3.0	6.1
Schizophrenia and related disorders	394,800	18.2	8,900	3.5	10.5
Bipolar disorders	270,900	12.5	6,500	1.8	7.6
Suicidal ideation or attempt	123,500	5.7	7,900	1.0	3.5
Trauma- and stressor-related disorders	57,500	2.7	4,200	0.2	4.2
Anxiety disorders	27,100	1.2	5,100	0.1	4.2
Miscellaneous mental disorders	26,600	1.2	5,200	0.1	4.4
Disruptive, impulse-control, and conduct disorders	16,900	0.8	6,500	0.1	7.5
Personality disorders	10,500	0.5	6,300	0.1	6.7
Somatic symptom disorders	10,500	0.5	7,600	0.1	3.4
Eating disorders	5,800	0.3	19,400	0.1	13.6
Obsessive-compulsive disorders	1,200	0.1	7,200	0.0 ^a	7.3

Abbreviation: MSUD, mental or substance use disorder

^a Aggregate costs of stays for obsessive-compulsive disorders totaled 0.0087 billion dollars.

Note: The estimates of costs and length of stay in this table correspond to the conditions displayed in Figure 3.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2016

compulsive disorders; miscellaneous mental disorders; personality disorders; somatic symptom disorders; suicidal ideation or attempt; and trauma- and stressor-related disorders.

About Statistical Briefs

Healthcare Cost and Utilization Project (HCUP) Statistical Briefs provide basic descriptive statistics on a variety of topics using HCUP administrative health care data. Topics include hospital inpatient, ambulatory surgery, and emergency department use and costs, quality of care, access to care, medical conditions, procedures, and patient populations, among other topics. The reports are intended to generate hypotheses that can be further explored in other research; the reports are not designed to answer in-depth research questions using multivariate methods.

Data Source

The estimates in this Statistical Brief are based upon data from the HCUP 2016 National Inpatient Sample (NIS). Supplemental sources included population denominator data for use with HCUP databases, derived from information available from Claritas, a vendor that produces population estimates and projections based on data from the U.S. Census Bureau.¹⁰

Definitions

Diagnoses and ICD-10-CM

The *principal diagnosis* is that condition established after study to be chiefly responsible for the patient's admission to the hospital. *Secondary diagnoses* are concomitant conditions that coexist at the time of admission or develop during the stay.

In this Statistical Brief, we created mutually exclusive categories for stays with a principal MSUD diagnosis (i.e., referred to as *MSUD stays* or *stays principally for an MSUD*) and those with one or more MSUD diagnoses secondary to a principal diagnosis of a physical health condition (i.e., referred to as *MSUD-related stays*, *stays with a coexisting MSUD*, or *stays with a secondary MSUD*).

ICD-10-CM is the International Classification of Diseases, Tenth Revision, Clinical Modification coding system. In October 2015, ICD-10-CM replaced the ICD-9-CM diagnosis coding system with the ICD-10-CM diagnosis coding system for most inpatient and outpatient medical encounters. There are over 70,000 ICD-10-CM diagnosis codes.

Case definition

The ICD-10-CM codes defining MSUD can be found in Appendix B, available as a separate supplemental file associated with this Statistical Brief on the HCUP-US website at www.hcup-us.ahrq.gov/reports/statbriefs/sb249-appendix.pdf. After comparing diagnoses across the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), the ICD-10-CM system, and the Clinical Classification Software (CCS),¹¹ the codes were grouped into the following categories for this Statistical Brief:

- Substance-related diagnoses
 - Alcohol-related disorders
 - Cannabis-related disorders
 - Opioid-related disorders
 - Sedative-related disorders
 - Stimulant-related disorders
 - Miscellaneous substances and addictive disorders (e.g., hallucinogen- and inhalant-related disorders, other psychoactive substance abuse, drug use complicating pregnancy)

¹⁰ Claritas. Claritas Demographic Profile by ZIP Code. <https://claritas360.claritas.com/mybestsegments/>. Accessed January 4, 2019.

¹¹ Agency for Healthcare Research and Quality. Beta HCUP Clinical Classifications Software (CCS) for ICD-10-CM/PCS. Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality. Updated October 2017. www.hcup-us.ahrq.gov/toolssoftware/ccs10/ccs10.jsp. Accessed January 4, 2019.

- Mental disorder-related diagnoses
 - Anxiety disorders
 - Bipolar disorders
 - Depressive disorders
 - Disruptive, impulse-control, and conduct disorders
 - Eating disorders
 - Obsessive-compulsive disorders
 - Personality disorders
 - Schizophrenia and related disorders (e.g., schizophrenia, catatonia, psychotic disorders)
 - Somatic symptom disorders
 - Suicidal ideation or attempt
 - Trauma- and stressor-related disorders (e.g., post-traumatic stress disorder)
 - Miscellaneous mental disorders (e.g., homicidal ideations, unspecified nonpsychotic mental disorders, unspecified childhood emotional disorders, unspecified mental disorders complicating pregnancy)

Note that the definition used in this Statistical Brief may differ from that in other Statistical Briefs and statistics published on HCUP-US and HCUPnet. As a result, rates of substance-related inpatient stays may differ somewhat from similar rates reported elsewhere. In particular, the opioid definition used here includes only codes for initial encounters and not codes for subsequent encounters or sequela. Additionally, substance-related self-harm codes were included in the category for suicidal ideation or attempt instead of the substance-related category. The codes included in this Statistical Brief also differ from those in the CCS categories related to MSUDs available for query in other parts of HCUPnet.

Types of hospitals included in the HCUP National Inpatient Sample

The National Inpatient Sample (NIS) is based on data from community hospitals, which are defined as short-term, non-Federal, general, and other hospitals, excluding hospital units of other institutions (e.g., prisons). The NIS includes obstetrics and gynecology, otolaryngology, orthopedic, cancer, pediatric, public, and academic medical hospitals. Excluded are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Beginning in 2012, long-term acute care hospitals are also excluded. However, if a patient received long-term care, rehabilitation, or treatment for a psychiatric or chemical dependency condition in a community hospital, the discharge record for that stay will be included in the NIS.

Unit of analysis

The unit of analysis is the hospital discharge (i.e., the hospital stay), not a person or patient. This means that a person who is admitted to the hospital multiple times in 1 year will be counted each time as a separate discharge from the hospital.

Population rates

Rates of stays per 100,000 population were calculated using 2016 hospital discharge totals in the numerator and Claritas¹² estimates of the 2016 U.S. population aged 5 years or older in the denominator. Individual patients hospitalized multiple times are counted more than once in the numerator.

$$\text{Population rate of MSUD stays} = \left(\frac{\text{number of MSUD stays among patients aged 5+ years}}{\text{number of U.S. residents aged 5+ years}} \right) \times 100,000$$

¹² Claritas. Claritas Demographic Profile by ZIP Code. <https://claritas360.claritas.com/mybestsegments/>. Accessed January 4, 2019.

Percentage difference

Percentage differences between groups were calculated using the following formula:

$$\text{Percentage difference} = \left(\frac{\text{Group 1 value} - \text{Group 2 value}}{\text{Group 2 value}} \right) \times 100$$

Costs and charges

Total hospital charges were converted to costs using HCUP Cost-to-Charge Ratios based on hospital accounting reports from the Centers for Medicare & Medicaid Services (CMS).¹³ *Costs* reflect the actual expenses incurred in the production of hospital services, such as wages, supplies, and utility costs; *charges* represent the amount a hospital billed for the case. For each hospital, a hospital-wide cost-to-charge ratio is used. Hospital charges reflect the amount the hospital billed for the entire hospital stay and do not include professional (physician) fees. For the purposes of this Statistical Brief, costs are reported to the nearest hundred.

Mean cost per day is calculated as the cost divided by the length of each stay, averaged across all stays.

How HCUP estimates of costs differ from National Health Expenditure Accounts

There are a number of differences between the costs cited in this Statistical Brief and spending as measured in the National Health Expenditure Accounts (NHEA), which are produced annually by CMS.¹⁴ The largest source of difference comes from the HCUP coverage of inpatient treatment only in contrast to the NHEA inclusion of outpatient costs associated with emergency departments and other hospital-based outpatient clinics and departments as well. The outpatient portion of hospitals' activities has been growing steadily and may exceed half of all hospital revenue in recent years. On the basis of the American Hospital Association Annual Survey, 2014 outpatient gross revenues (or charges) were about 46 percent of total hospital gross revenues.¹⁵

Smaller sources of differences come from the inclusion in the NHEA of hospitals that are excluded from HCUP. These include Federal hospitals (Department of Defense, Veterans Administration, Indian Health Services, and Department of Justice [prison] hospitals) as well as psychiatric, substance abuse, and long-term care hospitals. A third source of difference lies in the HCUP reliance on billed charges from hospitals to payers, adjusted to provide estimates of costs using hospital-wide cost-to-charge ratios, in contrast to the NHEA measurement of spending or revenue. HCUP costs estimate the amount of money required to produce hospital services, including expenses for wages, salaries, and benefits paid to staff as well as utilities, maintenance, and other similar expenses required to run a hospital. NHEA spending or revenue measures the amount of income received by the hospital for treatment and other services provided, including payments by insurers, patients, or government programs. The difference between revenues and costs include profit for for-profit hospitals or surpluses for nonprofit hospitals.

Location of patients' residence

Place of residence is based on the urban-rural classification scheme for U.S. counties developed by the National Center for Health Statistics (NCHS). For this Statistical Brief, we collapsed the NCHS categories into either urban or rural according to the following:

Urban:

- Large Central Metropolitan: includes metropolitan areas with 1 million or more residents
- Large Fringe Metropolitan: includes counties of metropolitan areas with 1 million or more residents
- Medium and Small Metropolitan: includes areas with 50,000 to 999,999 residents

¹³ Agency for Healthcare Research and Quality. HCUP Cost-to-Charge Ratio (CCR) Files. Healthcare Cost and Utilization Project (HCUP). 2001–2015. Agency for Healthcare Research and Quality. Updated September 2018. www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed January 4, 2019.

¹⁴ For additional information about the NHEA, see Centers for Medicare & Medicaid Services (CMS). National Health Expenditure Data. CMS Web site. Updated April 2018. www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html?redirect=/NationalHealthExpendData/. Accessed January 4, 2019.

¹⁵ American Hospital Association. TrendWatch Chartbook, 2016. Table 4.2. Distribution of Inpatient vs. Outpatient Revenues, 1994–2014. www.aha.org/system/files/2018-01/2016-chartbook.pdf. Accessed January 4, 2019.

Rural:

- Micropolitan and Noncore: includes nonmetropolitan counties (i.e., counties with no town greater than 50,000 residents).

Community-level income

Community-level income is based on the median household income of the patient's ZIP Code of residence. Quartiles are defined so that the total U.S. population is evenly distributed. Cut-offs for the quartiles are determined annually using ZIP Code demographic data obtained from Claritas, a vendor that produces population estimates and projections based on data from the U.S. Census Bureau.¹⁶ The value ranges for the income quartiles vary by year. The income quartile is missing for patients who are homeless or foreign.

Expected payer

To make coding uniform across all HCUP data sources, expected payer for the hospital stay combines detailed categories into general groups:

- Expected payer for patients aged less than 65 years:
 - Medicare: includes fee-for-service and managed care Medicare
 - Medicaid: includes fee-for-service and managed care Medicaid
 - Private Insurance: includes commercial nongovernmental payers, regardless of the type of plan (e.g., private health maintenance organizations [HMOs], preferred provider organizations [PPOs])
 - Self-pay/no charge: includes self-pay, no charge, charity, Hill Burton Free care, research (e.g., clinical trial or donor), refusal to pay, and no payment
 - Other payers: includes other Federal and local government programs (e.g., TRICARE, CHAMPVA, Indian Health Service, Black Lung, Title V) and Workers' Compensation
- Expected payer for patients aged 65 years old or older:
 - Medicare: includes fee-for-service and managed care Medicare
 - Non-Medicare: includes all other expected payer categories, as described above (i.e., Medicaid, private insurance, self-pay/no charge, other payers).

Hospital stays billed to the State Children's Health Insurance Program (SCHIP) may be classified as Medicaid, Private Insurance, or Other, depending on the structure of the State program. Because most State data do not identify SCHIP as an expected payer specifically, it is not possible to present this information separately.

Region

Region is one of the four regions defined by the U.S. Census Bureau:

- Northeast: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, and Pennsylvania
- Midwest: Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, and Kansas
- South: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida, Kentucky, Tennessee, Alabama, Mississippi, Arkansas, Louisiana, Oklahoma, and Texas
- West: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada, Washington, Oregon, California, Alaska, and Hawaii

¹⁶ Claritas. Claritas Demographic Profile by ZIP Code. <https://claritas360.claritas.com/mybestsegments/>. Accessed January 4, 2019.

Division

Division corresponds to the location of the hospital and is one of the nine divisions defined by the U.S. Census Bureau:

- New England: Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut
- Middle Atlantic: New York, New Jersey, Pennsylvania
- East North Central: Ohio, Indiana, Illinois, Michigan, Wisconsin
- West North Central: Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska, Kansas
- South Atlantic: Delaware, Maryland, District of Columbia, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida
- East South Central: Kentucky, Tennessee, Alabama, Mississippi
- West South Central: Arkansas, Louisiana, Oklahoma, Texas
- Mountain: Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah, Nevada
- Pacific: Washington, Oregon, California, Alaska, Hawaii

Admission source or point of origin

Admission source (now known as the patient's point of origin) indicates where the patient was located prior to admission to the hospital. Emergency admission indicates that the patient was admitted to the hospital through the emergency department.

Discharge status

Discharge status reflects the disposition of the patient at discharge from the hospital and includes the following five categories: routine (to home) or home health care; transfer to another short-term hospital; other transfers (including skilled nursing facility, intermediate care, and another type of facility such as a nursing home); died in the hospital; or other (including against medical advice and discharged alive, destination unknown).

About HCUP

The Healthcare Cost and Utilization Project (HCUP, pronounced "H-Cup") is a family of health care databases and related software tools and products developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and Quality (AHRQ). HCUP databases bring together the data collection efforts of State data organizations, hospital associations, and private data organizations (HCUP Partners) and the Federal government to create a national information resource of encounter-level health care data. HCUP includes the largest collection of longitudinal hospital care data in the United States, with all-payer, encounter-level information beginning in 1988. These databases enable research on a broad range of health policy issues, including cost and quality of health services, medical practice patterns, access to health care programs, and outcomes of treatments at the national, State, and local market levels.

HCUP would not be possible without the contributions of the following data collection Partners from across the United States:

Alaska Department of Health and Social Services
Alaska State Hospital and Nursing Home Association
Arizona Department of Health Services
Arkansas Department of Health
California Office of Statewide Health Planning and Development
Colorado Hospital Association
Connecticut Hospital Association
Delaware Division of Public Health
District of Columbia Hospital Association
Florida Agency for Health Care Administration
Georgia Hospital Association
Hawaii Health Information Corporation
Illinois Department of Public Health
Indiana Hospital Association

Iowa Hospital Association
Kansas Hospital Association
Kentucky Cabinet for Health and Family Services
Louisiana Department of Health
Maine Health Data Organization
Maryland Health Services Cost Review Commission
Massachusetts Center for Health Information and Analysis
Michigan Health & Hospital Association
Minnesota Hospital Association
Mississippi State Department of Health
Missouri Hospital Industry Data Institute
Montana Hospital Association
Nebraska Hospital Association
Nevada Department of Health and Human Services
New Hampshire Department of Health & Human Services
New Jersey Department of Health
New Mexico Department of Health
New York State Department of Health
North Carolina Department of Health and Human Services
North Dakota (data provided by the Minnesota Hospital Association)
Ohio Hospital Association
Oklahoma State Department of Health
Oregon Association of Hospitals and Health Systems
Oregon Office of Health Analytics
Pennsylvania Health Care Cost Containment Council
Rhode Island Department of Health
South Carolina Revenue and Fiscal Affairs Office
South Dakota Association of Healthcare Organizations
Tennessee Hospital Association
Texas Department of State Health Services
Utah Department of Health
Vermont Association of Hospitals and Health Systems
Virginia Health Information
Washington State Department of Health
West Virginia Department of Health and Human Resources, West Virginia Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

About the NIS

The HCUP National Inpatient Sample (NIS) is a nationwide database of hospital inpatient stays. The NIS is nationally representative of all community hospitals (i.e., short-term, non-Federal, nonrehabilitation hospitals). The NIS includes all payers. It is drawn from a sampling frame that contains hospitals comprising more than 95 percent of all discharges in the United States. The vast size of the NIS allows the study of topics at the national and regional levels for specific subgroups of patients. In addition, NIS data are standardized across years to facilitate ease of use. Over time, the sampling frame for the NIS has changed; thus, the number of States contributing to the NIS varies from year to year. The NIS is intended for national estimates only; no State-level estimates can be produced. The unweighted sample size for the 2016 NIS is 7,135,090 (weighted, this represents 35,675,421 inpatient stays).

For More Information

For other information on mental and substance use disorders, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_mhsa.jsp.

For additional HCUP statistics, visit:

- HCUP Fast Stats at www.hcup-us.ahrq.gov/faststats/landing.jsp for easy access to the latest HCUP-based statistics for health care information topics
- HCUPnet, HCUP's interactive query system, at www.hcupnet.ahrq.gov/

For more information about HCUP, visit www.hcup-us.ahrq.gov/.

For a detailed description of HCUP and more information on the design of the National Inpatient Sample (NIS), please refer to the following database documentation:

Agency for Healthcare Research and Quality. Overview of the National (Nationwide) Inpatient Sample (NIS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated August 2018. www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed January 4, 2019.

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AHRQ welcomes questions and comments from readers of this publication who are interested in obtaining more information about access, cost, use, financing, and quality of health care in the United States. We also invite you to tell us how you are using this Statistical Brief and other HCUP data and tools, and to share suggestions on how HCUP products might be enhanced to further meet your needs. Please e-mail us at hcup@ahrq.gov or send a letter to the address below:

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