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Inpatient Hospital Stays and Emergency Department Visits Involving Influenza, 2006–2016

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Introduction

Influenza, also known as the flu, is a contagious respiratory viral infection that may cause mild to severe symptoms and at times lead to death. The flu season generally peaks between December and February, but the timing and severity of the flu and its distribution across regions and populations may vary from year to year.[1] Nevertheless, each year influenza contributes to tens of thousands of inpatient stays and emergency department (ED) visits in the United States,[2,3] some of which may be prevented through better access to primary care and vaccination.[4]

The Centers for Disease Control and Prevention (CDC) recommend that everyone 6 months of age or older receive a yearly flu vaccine, which ideally should be administered by the end of October, before most flu seasons start.[5] Between the 2010–2011 and 2016–2017 flu seasons, vaccination rates increased from 51.0 to 59.0 percent among children aged 6 months to 17 years and from 40.5 to 43.3 percent among adults aged 18 years and older.[6]

Despite these increases, disparities in vaccination rates persist for certain populations. In 2015, the percentage of individuals who received the flu vaccine in the past year was lower for younger adults aged 18–44 years (30.9 percent) than for those aged 45–64 years (45.1 percent) and 65 years and older (69.1 percent); was lower for males than for females (39.2 vs. 46.8 percent,

[1] Centers for Disease Control and Prevention. The Flu Season. Page last reviewed July 12, 2018. www.cdc.gov/flu/about/season/flu-season.htm. Accessed July 1, 2019.
[2] Milenkovic M, Russo CA, Elixhauser A. Hospital Stays for Influenza, 2004. HCUP Statistical Brief #16. November 2006. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb16.pdf. Accessed July 1, 2019.
[3] Uscher-Pines L, Elixhauser A. Emergency Department Visits and Hospital Inpatient Stays for Seasonal and 2009 H1N1 Influenza, 2008–2009. HCUP Statistical Brief #147. January 2013. Agency for Healthcare Research and Quality, Rockville, MD. www.hcup-us.ahrq.gov/reports/statbriefs/sb147.pdf. Accessed July 1, 2019.
[4] Centers for Disease Control and Prevention. Preventive Steps. Page last reviewed November 13, 2018. www.cdc.gov/flu/prevent/prevention.htm. Accessed July 1, 2019.
[5] Ibid.
[6] Centers for Disease Control and Prevention. Flu Vaccination Coverage, United States, 2016–17 Influenza Season. Page last reviewed September 28, 2017. www.cdc.gov/flu/fluvaxview/coverage-1617estimates.htm##key-findings. Accessed July 1, 2019.

Highlights

- Over a 10-year period, the 2014–2015 flu season appeared to be more severe than other flu seasons, resulting in the most inpatient stays (223,300) and deaths (3.4 percent of stays).
- The 2009–2010 and 2014–2015 flu seasons resulted in more treat-and-release emergency department (ED) visits than did other seasons (over 800,000).
- During four high-volume flu seasons examined in more detail, over 40 percent of influenza-related ED visits had Medicaid as the expected payer.
- Rates of influenza-related stays and ED visits were highest for patients from low-income areas. This disparity was greatest for young children: for children aged 0–4 years, the rate of influenza-related ED visits in 2015–2016 was 220 percent higher in the lowest than in the highest income areas.
- Females had higher rates of influenza-related stays and ED visits than did males. Yet, hospital stays for males were costlier and more likely to result in in-hospital death (2015–2016: mean cost, $17,300 vs. $14,900; in-hospital mortality, 3.9 vs. 3.2 percent).
- In 2015–2016, the in-hospital mortality rate for stays involving influenza was as high as 8.7 percent among patients with cancer and 6.4 percent among patients with heart or cerebrovascular disease. Patients with these conditions without influenza had in-hospital mortality rates of 5.3 percent and 4.0 percent, respectively.

respectively); was lower for Hispanics and Blacks than for Whites (31.2 and 36.0 vs. 46.9 percent, respectively); and was lower for individuals in poverty than for those with incomes at 400 percent of the federal poverty level or higher (33.6 vs. 50.4 percent respectively).[7] Vaccination rates were highest in the Northeast (46.6 percent) and lowest in the West (41.8 percent).[8]

Vaccination is particularly important for populations who are at greater risk of influenza and flu-related complications.[9] These populations include adults aged 65 years and older, children younger than 5 years of age, pregnant women, and individuals with chronic conditions, such as asthma and other lung conditions, diabetes, cancer, human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS), obesity, sickle cell disease,[10] and potentially opioid-related disorders.[11]

This HCUP Statistical Brief presents statistics on inpatient stays and treat-and-release ED visits (i.e., those that do not result in admission to the same hospital) with an influenza diagnosis from the 2006–2007 flu season through the 2015–2016 flu season using the 2006–2016 National (Nationwide) Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS). *Flu seasons* were defined as the 12-month period from August through July of the next year, except for 2015–2016. The *2015–2016 flu season* was defined as the 12-month period from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October 2015. Because the 2015–2016 flu season started later than most years,[12] this definition captured most cases.

First, trends in the number of inpatient stays and treat-and-release ED visits are presented over time. Second, characteristics of inpatient stays and ED visits involving influenza are presented for four high-volume flu seasons: 2009–2010, during which the H1N1 or "swine flu" virus predominated infections[13]; 2012–2013; 2014–2015; and 2015–2016. Finally, inpatient costs, length of stay, and in-hospital mortality are shown for the most recent flu season for which data were available (2015–2016), overall and by patient characteristics, including select co-occurring conditions that place individuals at greater risk for flu-related complications. All differences between estimates noted in the text are 10 percent or greater.

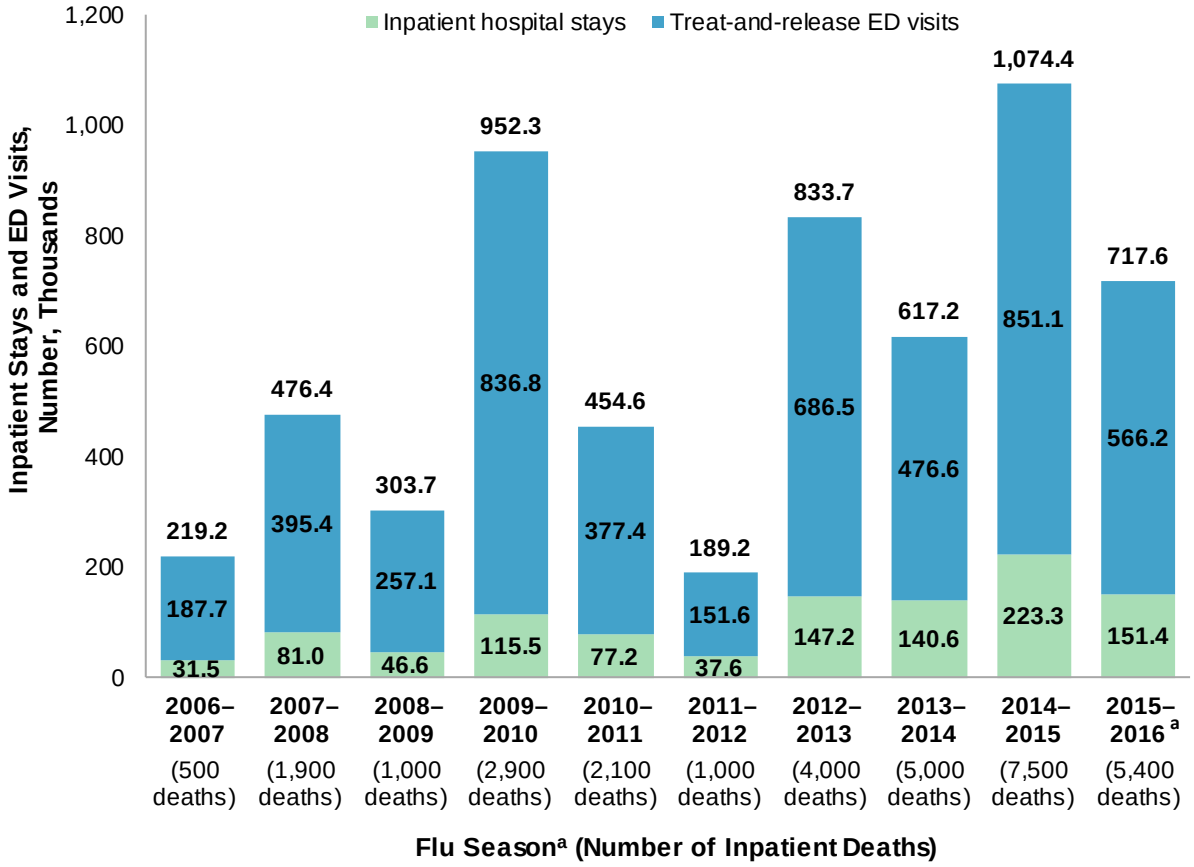
[7] National Center for Health Statistics. Health, United States, 2016: With Chartbook on Long-term Trends in Health. Table 68: Influenza vaccination among adults aged 18 and over, by selected characteristics: United States, selected years 1989–2015. Centers for Disease Control and Prevention, National Center for Health Statistics; 2017. www.cdc.gov/nchs/data/hus/hus16.pdf#068. Accessed July 1, 2019.
[8] Ibid.
[9] Centers for Disease Control and Prevention. People at High Risk for Flu Complications. Page last reviewed August 27, 2018. www.cdc.gov/flu/highrisk/index.htm. Accessed July 1, 2019.
[10] Ibid.
[11] Tahamtan A, Tavakoli-Yaraki M, Mokhtari-Azad T, Teymoori-Rad M, Bont L, Shokri F, et al. Opioids and viral infections: a double-edged sword. Frontiers in Microbiology. 2016;7:970.
[12] Centers for Disease Control and Prevention. Summary of the 2015–2016 Influenza Season. Page last reviewed September 29, 2016. www.cdc.gov/flu/about/season/flu-season-2015-2016.htm. Accessed July 1, 2019.
[13] Centers for Disease Control and Prevention. Summary of the 2009–2010 Influenza Season. Page last reviewed September 8, 2010. www.cdc.gov/flu/pastseasons/0910season.htm. Accessed July 1, 2019.

Findings

Trends in inpatient stays and ED visits involving influenza, 2006–2016

Figure 1 displays the number, in thousands, of inpatient stays, treat-and-release ED visits, and stays and visits combined, with any-listed diagnosis of influenza from 10 flu seasons between 2006 and 2016.

Figure 1. Number (in thousands) of influenza-related inpatient stays and treat-and-release ED visits from 10 flu seasons,[a] 2006–2016



Abbreviation: ED, emergency department

Note: Numbers are based on all-listed diagnoses of influenza. Numbers of inpatient deaths are rounded to the nearest hundred.

[a] Flu seasons were defined from August through July of the next year, except for 2015–2016, which was defined from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October 2015.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS), 2006–2016

- **Use of acute hospital care varied by flu season. The greatest number of inpatient stays, inpatient deaths, and treat-and-release ED visits involving influenza occurred during the 2014–2015 season.**

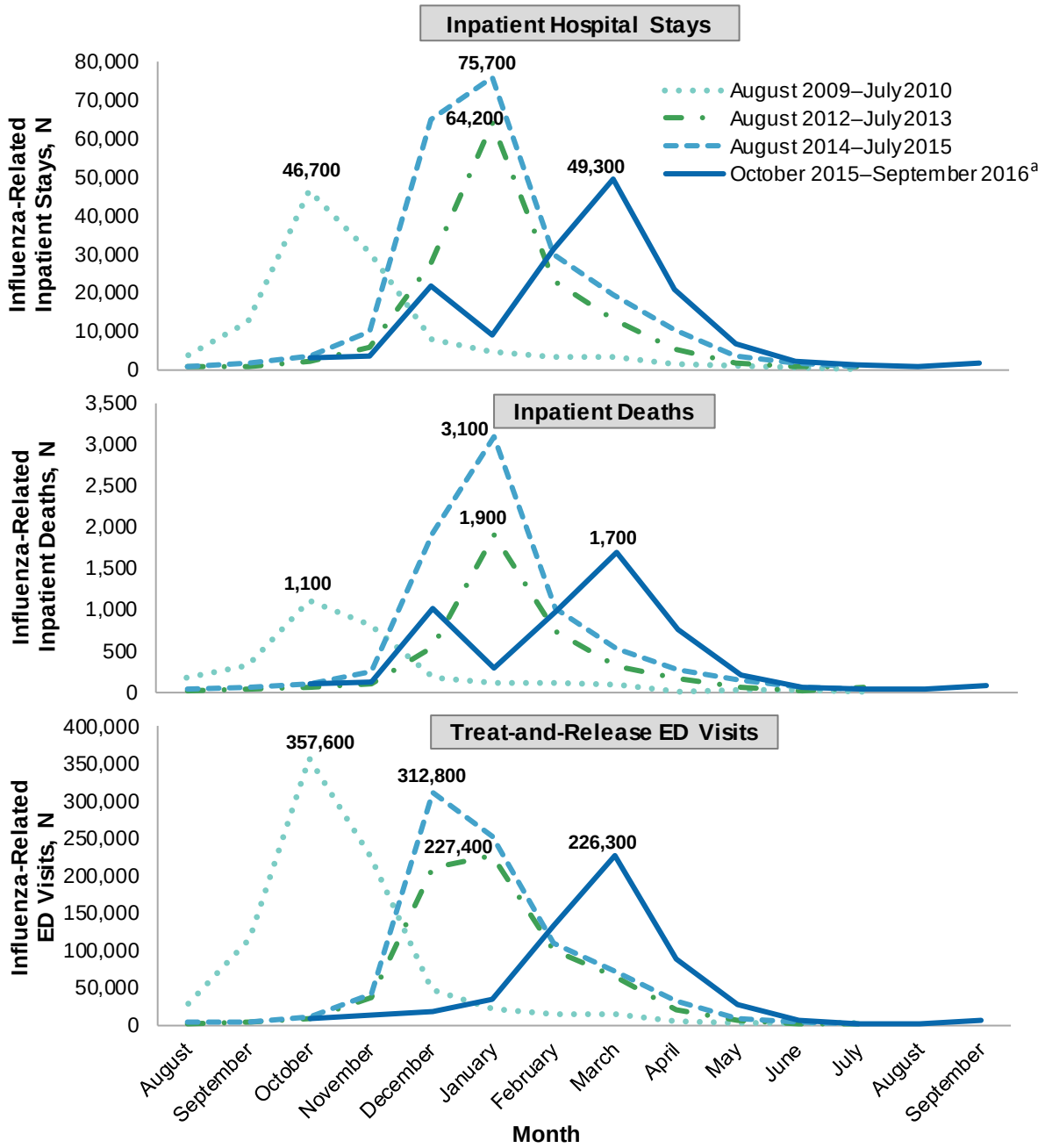
  Between 2006 and 2016, the combined number of inpatient stays plus ED visits involving influenza ranged from 189,200 (rounded to the nearest hundred) in the 2011–2012 flu season to 1,074,400 in 2014–2015. During this flu season, 7,500 out of 223,300 inpatient stays resulted in in-hospital death (3.4 percent).

- **Across all flu seasons, treat-and-release ED visits involving the flu were more common than hospital inpatient stays involving the flu.**

The percentage of all influenza-related acute hospital care encounters that were ED visits ranged from 88 percent (836,800 ED visits out of 952,300 inpatient stays and ED visits combined) during the 2009–2010 flu season to 77 percent (476,600 ED visits out of 617,200 inpatient stays and ED visits combined) during the 2013–2014 flu season.

Figure 2 presents monthly variation in the number of influenza-related inpatient stays, inpatient deaths, and treat-and-release ED visits for four select flu seasons between 2009 and 2016. These four flu seasons were selected because they resulted in the highest numbers of inpatient stays plus treat-and-release ED visits, as shown in Figure 1.

Figure 2. Number of inpatient stays, inpatient deaths, and treat-and-release ED visits from four high-volume flu seasons,[a] by month of admission, 2009–2016



Abbreviation: ED, emergency department; N, number

Note: Numbers are based on all-listed diagnoses of influenza and are rounded to the nearest hundred.

[a] Flu seasons were defined from August through July of the next year, except for 2015–2016, which was defined from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October 2015.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS), 2009–2016

- **With respect to inpatient stays, inpatient deaths, and treat-and-release ED visits, the 2009–2010 flu season peaked earlier than most flu seasons and the 2015–2016 flu season peaked later.**

  Most flu seasons peak between December and February.[14] Consistent with this peak period, the highest numbers of inpatient stays during the 2012–2013 and 2014–2015 flu seasons were in January (64,200 in 2013 and 75,700 in 2015).

  In contrast, the highest number of inpatient stays during the 2009–2010 flu season was in October 2009 (46,700) and the highest number of stays during the 2015–2016 flu season was in March 2016 (49,300).

- **The 2014–2015 flu season appeared to be the most severe when compared with the three other seasons, with the highest number of inpatient stays and in-hospital deaths.**

  The 2014–2015 flu season resulted in more inpatient stays involving influenza than the other three seasons, peaking at 75,700 in January 2015 and totaling 223,300 stays overall (as shown in Figure 1). The most influenza-related inpatient deaths occurred in the 2014–2015 flu season also, peaking at 3,100 in January 2015 and totaling 7,500 deaths overall (as shown in Figure 1).

- **Although the 2009–2010 flu season was associated with the highest peak in number of treat-and-release ED visits, it appears to have been less severe than other flu seasons in terms of number of inpatient stays and deaths.**

  The 2009–2010 flu season resulted in fewer influenza-related inpatient stays than the other three high-volume flu seasons, peaking at 46,700 in October 2009 and totaling 115,500 stays overall (as shown in Figure 1). It also resulted in fewer influenza-related inpatient deaths, peaking at 1,100 in October 2010 and totaling 2,900 deaths overall (as shown in Figure 1).

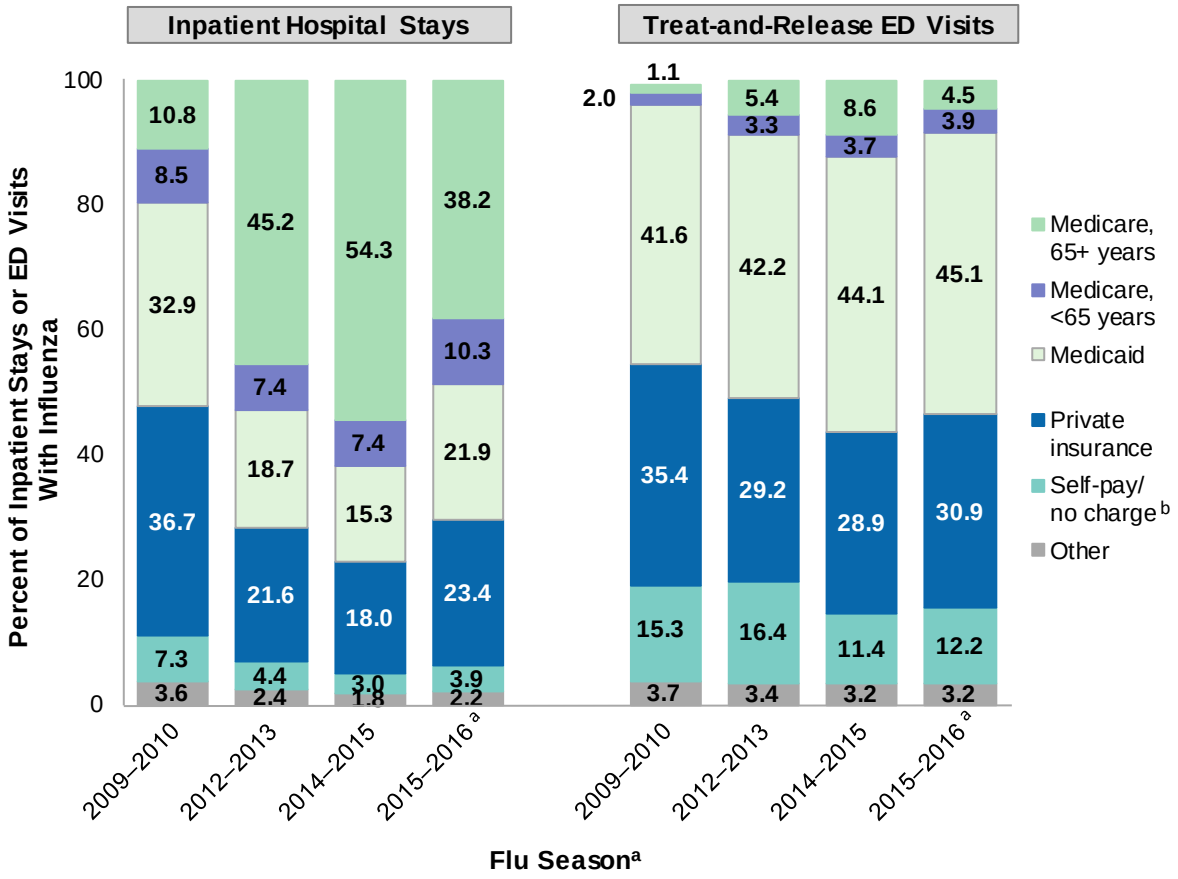
  However, second to the 2014–2015 flu season, the 2009–2010 flu season resulted in the highest number of ED visits, peaking at 357,600 in October 2009 and totaling 836,800 influenza-related ED visits overall (as shown in Figure 1).

[14] Centers for Disease Control and Prevention. The Flu Season. Page last reviewed July 12, 2018. www.cdc.gov/flu/about/season/flu-season.htm. Accessed July 1, 2019.

Characteristics of inpatient stays and ED visits with influenza during four high-volume flu seasons, 2009–2016

Figure 3 displays the percentage of inpatient stays and treat-and-release ED visits involving influenza by expected payer during four high-volume flu seasons between 2009 and 2016.

Figure 3. Percentage of influenza-related inpatient stays and treat-and-release ED visits for four high-volume flu seasons,[a] by expected payer, 2009–2016



Abbreviation: ED, emergency department

Notes: Numbers are based on all-listed diagnoses of influenza. Percentages may not add to 100 because of missing data on payer.

[a] Flu seasons were defined from August through July of the next year, except for 2015–2016, which was defined from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October 2015.

[b] Self-pay/no charge includes self-pay, no charge, charity, and no expected payment.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS), 2009–2016

- **Influenza-related inpatient stays were more likely than influenza-related treat-and-release ED visits to have Medicare as the expected payer.**

  In each of the four flu seasons examined, Medicare was more often the expected payer of influenza-related stays than of influenza-related ED visits. Medicare constituted a greater percentage of inpatient stays involving influenza (aged 65+ years: 10.8–54.3 percent; aged <65 years: 7.4–10.3 percent) than of influenza-related ED visits (aged 65+ years: 1.1–8.6 percent; aged <65 years: 2.0–3.9 percent). In contrast, compared with influenza-related inpatient stays, a greater percentage of ED visits involving influenza had an expected payer of Medicaid (41.6–45.1 vs. 15.3–32.9 percent),

private insurance (28.9–35.4 vs. 18.0–36.7 percent), and self-pay/no charge[15] (11.4–16.4 vs. 3.0–7.3 percent).

Across all flu seasons examined, Medicaid was the most frequent payer of influenza-related ED visits, constituting over 40 percent of all visits.

- **Compared with the other flu seasons, during the 2009–2010 season, a smaller percentage of influenza-related stays and treat-and-release ED visits were for patients aged 65 years and older and had an expected payer of Medicare.**

  During the 2009–2010 flu season, only 10.8 percent of inpatient stays and 1.1 percent of ED visits were for patients aged 65 years and older and had an expected payer of Medicare, compared with 38.2–54.3 percent of stays and 4.5–8.6 percent of ED visits during the three other flu seasons.

  Compared with the other flu seasons, the 2009–2010 flu season resulted in a greater percentage of influenza-related hospital inpatient stays with Medicaid as the expected payer (32.9 vs.15.3–21.9 percent). The 2009–2010 flu season also resulted in a greater percentage of inpatient stays and ED visits with private insurance as the expected payer (36.7 vs.18.0–23.4 percent of stays and 35.4 vs. 28.9–30.9 percent of ED visits). The 2009–2010 flu season also was different from other flu seasons in that it resulted in a greater percentage of inpatient stays that were self-pay/no charge (7.3 vs. 3.0–4.4 percent).

[15] Self-pay/no charge includes self-pay, no charge, charity, and no expected payment.

Table 1 presents rates (per 100,000 population) of influenza-related inpatient stays and treat-and-release ED visits for four high-volume flu seasons between 2009 and 2016, by patient characteristics.

Table 1. Rates of influenza-related inpatient stays and treat-and-release ED visits for four high-volume flu seasons,[a] by patient characteristics, 2009–2016

Patient characteristic	Rate of influenza-related stays per 100,000 population				Rate of influenza-related treat-and-release ED visits per 100,000 population			
	2009–2010	2012–2013	2014–2015	2015–2016[a]	2009–2010	2012–2013	2014–2015	2015–2016[a]
Total	37.5	46.9	70.1	47.1	271.7	218.6	267.2	176.0
Age, years								
0–4	111.3	83.8	76.6	67.3	779.8	710.8	877.4	593.3
5–17	33.2	17.7	16.9	14.1	536.7	316.6	393.3	244.4
18–49	27.5	16.0	20.8	21.3	243.1	192.9	220.5	166.3
50–64	38.1	41.8	59.5	58.6	72.7	97.2	126.8	92.4
65–84	36.4	132.4	213.9	114.6	30.6	96.7	169.4	64.0
85+	37.6	426.6	785.1	260.1	16.0	125.4	269.5	56.2
Sex								
Male	34.9	43.5	63.8	45.1	252.6	203.3	243.8	165.7
Female	39.7	50.1	76.2	48.9	289.1	233.4	289.8	186.0
Community income								
Quartile 1 (lowest)	48.5	56.4	80.7	58.3	377.0	326.8	406.9	258.9
Quartile 2	37.6	47.8	71.5	48.1	309.1	241.7	290.1	191.9
Quartile 3	32.1	41.9	66.0	42.5	231.4	172.5	216.3	138.6
Quartile 4 (highest)	27.4	37.8	57.3	35.9	147.6	120.1	137.8	103.8
Patient location								
Metro area	35.4	44.4	67.8	46.6	242.3	185.2	230.8	164.7
Rural, adjacent to metro area	44.5	57.8	79.2	48.8	418.1	396.2	490.9	230.7
Rural, remote area	53.2	61.3	89.0	47.7	405.4	367.5	453.9	259.1
Region of patient's residence								
Northeast	32.3	56.6	78.8	53.2	224.0	177.0	163.4	157.5
Midwest	39.9	53.9	87.5	51.9	358.2	260.8	339.7	170.4
South	35.1	46.3	69.6	44.5	255.2	261.5	339.3	195.7
West	42.6	33.6	48.1	41.7	249.0	140.7	162.6	161.6

Abbreviation: ED, emergency department

Note: Numbers are based on all-listed diagnoses of influenza.

[a] Flu seasons were defined from August through July of the next year, except for 2015–2016, which was defined from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October 2015.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National (Nationwide) Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS), 2009–2016

- **The rate of influenza-related inpatient stays among children younger than 5 years old was higher during the 2009–2010 flu season than during the other flu seasons.**

  Overall, the total rate of influenza-related inpatient stays was lower during the 2009–2010 flu season than during the other flu seasons (37.5 vs. 46.9–70.1 per 100,000 population). However, the rate of influenza-related inpatient stays among children aged 0–4 years was 111.3 during the 2009–2010 flu season, compared with 67.3–83.8 during the other flu seasons. In 2009–2010, the rate among children aged 0–4 years was more than double the rate in any other age group.

  In contrast, the rate of influenza-related inpatient stays was highest for adults aged 85 years and older in each of the other flu seasons: 260.1–785.1 per 100,000 population, compared with 37.6 in the 2009–2010 flu season.

- **Generally, the rate of influenza-related treat-and-release ED visits decreased as age increased.**

  Except for the 2009–2010 flu season, rates of influenza-related inpatient stays were highest in the oldest age group. In contrast, during each of the four flu seasons examined, the rate of influenza-related ED visits was highest for children aged 0–4 years: 593.3–877.4 per 100,000 population. Generally, the influenza-related ED visit rate decreased as age increased (e.g., from 779.8 per 100,000 population aged 0–4 years to 16.0 per 100,000 population aged 85+ years in 2009–2010 and from 593.3 per 100,000 population aged 0–4 years to 56.2 per 100,000 population aged 85+ years in 2015–2016). However, in 2012–2013 and 2014–2015, around age 65 years, the rate began to increase as age increased.

- **Females had higher rates of influenza-related inpatient stays and treat-and-release ED visits than males.**

  During each flu season examined, females had higher rates of inpatient stays and ED visits involving influenza. For instance, in 2014–2015, rates of influenza-related inpatient stays (76.2 vs. 63.8 per 100,000 population) and ED visits (289.8 vs. 243.8 per 100,000 population) were 19 percent higher among females than among males.

- **Individuals from lower income communities had higher rates of influenza-related inpatient stays and treat-and-release ED visits than those from higher income communities.**

  During each flu season examined, rates of influenza-related inpatient stays and ED visits decreased as community-level income increased. The disparity was greatest for ED visits in 2014–2015. During this flu season, the rate of influenza-related ED visits among individuals from the lowest income communities (quartile 1) was nearly 3 times higher than the rate among individuals from the highest income communities (quartile 4) (406.9 vs. 137.8 per 100,000 population).

- **Generally, rates of influenza-related inpatient stays and treat-and-release ED visits were higher for patients from rural areas than for those from metropolitan areas.**

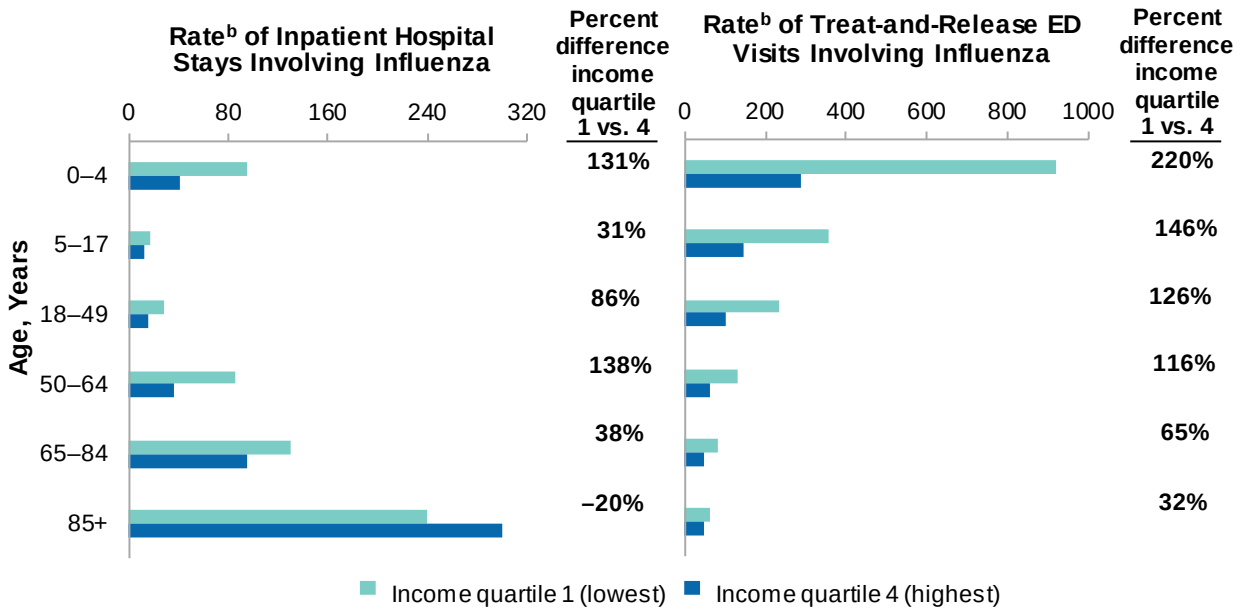
  Except for inpatient stays in 2015–2016, during each flu season, rates of influenza-related inpatient stays and ED visits were higher for patients who resided in rural rather than metro areas. For instance, in 2014–2015, rates of influenza-related ED visits were around 2 times higher for patients from rural areas adjacent to a metro area and from rural, remote areas than for patients from metro areas (490.9 and 453.9 vs. 230.8 per 100,000 population, respectively).

- **Rates of influenza-related inpatient stays and treat-and-release ED visits varied across regions by flu season.**

  Depending on the flu season, rates (per 100,000 population) of inpatient stays and ED visits were higher in certain regions of the United States than in other regions. In each flu season except 2009–2010, rates of inpatient stays involving influenza were highest for patients who resided in the Northeast (53.2–78.8) and Midwest (51.9–87.5); rates were lowest for hospitals in the West (33.6–48.1). In each flu season except 2009–2010, rates of ED visits involving influenza were highest for patients who resided in the South (195.7–339.3) and Midwest (170.4–339.7) and lowest for those who resided in the West (140.7–162.6).

Figure 4 presents differences in rates of influenza-related inpatient stays and treat-and-release ED visits between the lowest and highest levels of community income, by age group, for the 2015–2016 flu season (most recent available data). The percentage difference in the rate between patients from the lowest income communities (quartile 1) and those from the highest income communities (quartile 4) is listed on the right.

Figure 4. Differences in rates of inpatient stays and treat-and-release ED visits involving influenza, by community income and age, 2015–2016 flu season[a]



Abbreviation: ED, emergency department

Note: Numbers are based on all-listed diagnoses of influenza.

[a] The 2015–2016 flu season was defined from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October of 2015.

[b] Rate per 100,000 population

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS), 2015–2016

- **Generally, the disparity in rates of influenza-related inpatient stays and treat-and-release ED visits between patients in the lowest and highest income quartiles was greatest for children aged 0–4 years.**

  Except for inpatient stays among adults aged 85 years and older, rates of influenza-related inpatient stays and ED visits were higher for patients who resided in the lowest income communities (quartile 1) than for patients who resided in the highest income communities (quartile 4). However, this differential varied by age group. For instance, the rate of inpatient stays involving influenza for residents of the lowest versus highest income communities was 131 and 138 percent higher for patients aged 0–4 and 50–64 years, respectively, but only 31 and 38 percent higher for patients aged 5–17 and 65–84 years, respectively.

  The difference in the rate of ED visits involving influenza across community income levels also was highest for children aged 0–4 years (a 220 percent difference between quartile 1 and quartile 4) and decreased as age increased (to a 32 percent difference between quartile 1 and quartile 4 among adults aged 85 years and older).

  There was one exception, in which the rate was lower for individuals from lower income areas than for those from higher income areas. For adults aged 85 years or older, the rate of influenza-related inpatient stays was 20 percent lower for individuals from the lowest income communities (quartile 1) than for those from the highest income communities (quartile 4).

Utilization characteristics and outcomes of inpatient stays with influenza, 2015–2016

Table 2 presents the mean cost and length, admission source, and in-hospital mortality rate of influenza-related inpatient stays during the 2015–2016 flu season.

Table 2. Utilization characteristics of influenza-related inpatient hospital stays by patient characteristics, 2015–2016 flu season[a]

Patient characteristic	Influenza-related inpatient hospital stays				
	Inpatient Stays, N	Mean cost per stay, $	Mean length of stay, days	Admitted from the ED, %	In-hospital death, %
Total	151,400	16,000	6.3	78.4	3.6
Age, years					
0–4	13,500	12,500	4.7	63.0	0.3
5–17	7,600	17,500	4.8	63.1	1.1
18–49	29,000	18,100	6.2	77.1	2.5
50–64	36,900	18,500	6.8	81.1	3.9
65–84	48,100	14,900	6.6	82.1	4.3
85+	16,100	12,300	6.5	83.8	6.3
Sex					
Male	71,400	17,300	6.4	78.6	3.9
Female	79,900	14,900	6.2	78.3	3.2
Community income					
Quartile 1 (lowest)	48,000	15,100	6.3	77.2	3.6
Quartile 2	37,100	15,000	6.2	76.6	3.4
Quartile 3	34,800	17,000	6.3	79.5	3.5
Quartile 4 (highest)	28,800	17,800	6.4	81.6	3.6
Expected payer[b]					
Medicare, 65+ years	57,800	14,100	6.5	82.6	4.8
Medicare, <65 years	15,500	17,500	7.0	79.8	3.5
Medicaid	33,100	17,200	6.1	73.2	2.4
Private insurance	35,500	17,600	5.9	74.9	2.8
Self-pay/no charge	5,900	14,000	5.6	87.6	2.7
Other	3,400	18,400	6.5	74.1	4.0
Patient location					
Metro area	128,500	16,300	6.3	81.1	3.5
Rural, adjacent to metro area	14,800	14,300	6.1	66.2	4.3
Rural, remote area	7,600	15,000	5.9	56.8	3.6
Region of patient's residence					
Northeast	30,000	16,600	6.5	86.7	3.8
Midwest	35,300	15,500	6.3	63.4	3.0
South	53,900	14,000	6.4	84.1	3.5
West	31,700	19,400	5.8	77.7	4.0

Abbreviations: ED, emergency department

Notes: Numbers are based on all-listed diagnoses of influenza. Numbers of stays and costs are rounded to the nearest hundred.

[a] The 2015–2016 flu season was defined from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October of 2015.

[b] Self-pay/no charge includes self-pay, no charge, charity, and no expected payment.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2015–2016

- **In-hospital mortality among influenza-related inpatient stays increased with age, reaching 6.3 percent for patients aged 85 years and older.**

  During the 2015–2016 flu season, the percentage of influenza-related stays that resulted in in-hospital death increased as age increased, from 0.3 percent for patients aged 0–4 years to 6.3 percent among adults aged 85 years and older.

  The likelihood of admission from the ED also increased with age. Of influenza-related stays for patients aged 0–4 years, 63.0 percent were admitted from the ED, and this percentage increased as age increased, to 83.8 percent among adults aged 85 years and older.

  With respect to costs, the mean cost per influenza-related stay was $12,300–$12,500 for patients aged 0–4 years and 85 years and older, compared with $17,500–$18,500 for patients aged 5–64 years. In general, adults also stayed longer in the hospital than did children. On average, stays involving influenza for children less than 18 years old were 4.7–4.8 days long, compared with 6.2–6.8 days for the adult age groups.

- **Influenza-related inpatient stays were costlier and more likely to result in in-hospital death for males than for females.**

  The mean cost per influenza-related stay was $2,400 higher for males ($17,300) than for females ($14,900). The percentage of influenza-related stays that resulted in in-hospital death also was higher for males than for females (3.9 vs. 3.2 percent).

- **Influenza-related inpatient stays were approximately $3,000 costlier on average for patients from higher income communities than for patients from lower income communities.**

  The mean cost per influenza-related stay was $2,700 higher for patients from higher income communities (quartile 4, $17,800; quartile 3, $17,000) than for patients from lower income communities (quartile 2, $15,000; quartile 1, $15,100).

- **In-hospital mortality rates were higher for influenza-related stays with an expected payer of Medicare, for patients both over and under 65 years old, compared with most other payers.**

  The in-hospital mortality rate was higher for influenza-related stays with Medicare as the expected payer, both for patients aged 65 years and older (4.8 percent) and for those under 65 years old (3.5 percent), compared with stays with an expected payer of Medicaid (2.4 percent), private insurance (2.8 percent), and self-pay/no charge (2.7 percent).

  In addition to in-hospital mortality, each of the other utilization measures differed by expected payer. For instance, average costs were lowest among stays with Medicare as the expected payer for patients aged 65 years and older and those that were self-pay/no charge (around $14,000) but ranged from $17,200–18,400 among the other payer groups. The average length per influenza-related stay with Medicare for patients under 65 years old was 7.0 days, approximately 1 day longer than stays with Medicaid, private insurance, and self-pay/no charge (5.6–6.1 days).

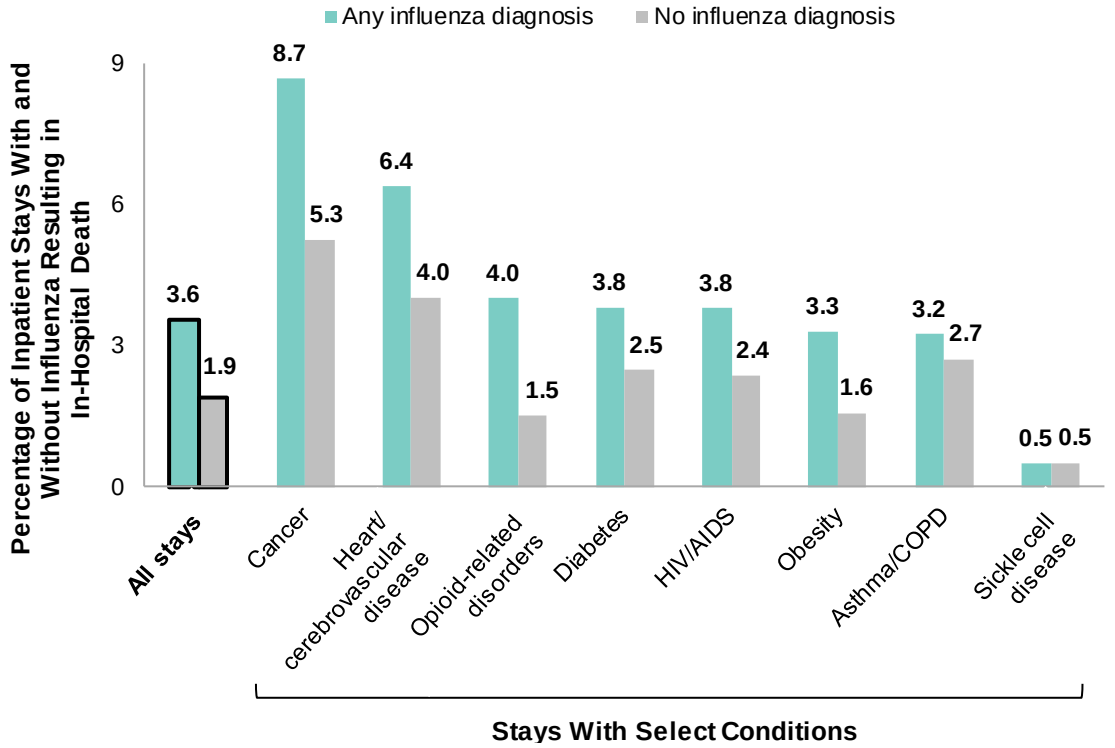
- **In-hospital mortality rates were higher in the Northeast, South, and West than in the Midwest.**

  During the 2015–2016 flu season, the percentage of influenza-related stays that resulted in in-hospital death was higher for patients who resided in the Northeast, South, and West (3.5–4.0 percent) than for those who resided in the Midwest (3.0 percent). The in-hospital mortality rate also was higher for patients from rural areas adjacent to a metro area (4.3 percent), compared with those from metro areas (3.5 percent) and rural, remote areas (3.6 percent).

  Cost, length of stay, and admission source also varied by location. For instance, the average cost per influenza-related stay was higher in metro areas ($16,300) than in rural areas adjacent to a metro area ($14,300) and higher in the West ($19,400) compared with the other regions.

Figure 5 displays in-hospital mortality rates among inpatient stays involving influenza during the 2015–2016 flu season (most recent available data). For comparison, the in-hospital mortality rate for stays without influenza also is shown. The rate is shown for stays overall and for stays with select conditions that may place individuals at a higher risk of flu-related complications.[16,17]

Figure 5. Inpatient deaths among stays with and without influenza, overall and among stays with select conditions, 2015–2016 flu season[a]



Abbreviations: COPD, chronic obstructive pulmonary disease; HIV/AIDS, human immunodeficiency virus/acquired immunodeficiency syndrome

Note: Numbers are based on all-listed diagnoses of influenza. Co-occurring diagnoses are not mutually exclusive; a patient with multiple conditions will be counted in more than one bar in Figure 5.

[a] The 2015–2016 flu season was defined from October 2015 through September 2016 because of the transition of the International Classification of Diseases coding system from the ninth to the tenth revision in October of 2015.

Source: Agency for Healthcare Research and Quality (AHRQ), Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2015–2016

- **The in-hospital mortality rate was nearly 2 times higher for inpatient stays involving influenza when compared with all other stays without influenza.**

  Overall, 3.6 percent of inpatient stays involving influenza resulted in death during the hospital stay. For reference, the in-hospital mortality rate for all inpatient stays without influenza was 1.9 percent.

  The in-hospital mortality rate for influenza-related stays was as high as 8.7 percent for stays with cancer, 6.4 percent for stays with heart/cerebrovascular disease, and 4.0 percent for stays with an opioid-related diagnosis. In comparison, stays without influenza involving these conditions had in-hospital mortality rates of 5.3 percent, 4.0 percent, and 1.5 percent, respectively.

  Heart/cerebrovascular disease was common among influenza-related stays, present in 61,800 of 151,400 total influenza-related stays (41 percent; not shown).

[16] Centers for Disease Control and Prevention. People at High Risk for Flu Complications. Page last reviewed August 27, 2018. www.cdc.gov/flu/highrisk/index.htm. Accessed July 3, 2019.
[17] Tahamtan A, Tavakoli-Yaraki M, Mokhtari-Azad T, Teymoori-Rad M, Bont L, Shokri F, et al. Opioids and viral infections: a double-edged sword. Frontiers in Microbiology. 2016;7:970.

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 2006–2016 National (Nationwide) Inpatient Sample (NIS) and Nationwide Emergency Department Sample (NEDS). 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.[18]

Definitions

Diagnoses, ICD-9-CM, ICD-10-CM/PCS, and Clinical Classifications Software (CCS)
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. *All-listed diagnoses* include the principal diagnosis plus these additional secondary conditions.

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses. There are approximately 14,000 ICD-9-CM diagnosis codes.

ICD-10-CM the International Classification of Diseases, Tenth Revision, Clinical Modification. 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.

CCS categorizes ICD-10-CM diagnosis codes into a manageable number of clinically meaningful categories.[19,20] This clinical grouper makes it easier to quickly understand patterns of diagnoses.

[18] Claritas. Claritas Demographic Profile by ZIP Code. https://claritas360.claritas.com/mybestsegments/. Accessed January 4, 2019.
[19] Agency for Healthcare Research and Quality. HCUP Clinical Classifications Software (CCS) for ICD-9-CM. Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality. Updated March 2017. www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp. Accessed January 4, 2019.
[20] Agency for Healthcare Research and Quality. Clinical Classifications Software Refined (CCSR). Healthcare Cost and Utilization Project (HCUP). Agency for Healthcare Research and Quality. Updated September 2019. www.hcup-us.ahrq.gov/toolssoftware/ccsr/ccs_refined.jsp. Accessed September 17, 2019.

Case definition
The ICD-9-CM and ICD-10-CM codes defining influenza include diagnosis codes in Table 3.

Table 3. Diagnosis codes defining influenza

ICD-9-CM code	Description
487.0	Influenza with pneumonia
487.1	Influenza with other respiratory manifestations
487.8	Influenza with other manifestations
488.01	Influenza due to identified avian flu virus with pneumonia
488.02	Influenza due to identified avian flu virus with other respiratory manifestations
488.09	Influenza due to identified avian flu virus with other manifestations
488.11	Influenza due to identified 2009 H1N1 influenza virus with pneumonia
488.12	Influenza due to identified 2009 H1N1 influenza virus with other respiratory manifestations
488.19	Influenza due to identified 2009 H1N1 influenza virus with other manifestations
488.81	Influenza due to identified novel influenza A virus with pneumonia
488.82	Influenza due to identified novel influenza A virus with other respiratory manifestations
488.89	Influenza due to identified novel influenza A virus with other manifestations
ICD-10-CM code	**Description**
J09.X1	Influenza due to identified novel influenza A virus with pneumonia
J09.X2	Influenza due to identified novel influenza A virus with other respiratory manifestations
J09.X3	Influenza due to identified novel influenza A virus with gastrointestinal manifestations
J09.X9	Influenza due to identified novel influenza A virus with other manifestations
J10.00	Influenza due to other identified influenza virus with unspecified type of pneumonia
J10.01	Influenza due to other identified influenza virus with the same other identified influenza virus pneumonia
J10.08	Influenza due to other identified influenza virus with other specified pneumonia
J10.1	Influenza due to other identified influenza virus with other respiratory manifestations
J10.2	Influenza due to other identified influenza virus with gastrointestinal manifestations
J10.81	Influenza due to other identified influenza virus with encephalopathy
J10.82	Influenza due to other identified influenza virus with myocarditis
J10.83	Influenza due to other identified influenza virus with otitis media
J10.89	Influenza due to other identified influenza virus with other manifestations
J11.00	Influenza due to unidentified influenza virus with unspecified type of pneumonia
J11.08	Influenza due to unidentified influenza virus with specified pneumonia
J11.1	Influenza due to unidentified influenza virus with other respiratory manifestations
J11.2	Influenza due to unidentified influenza virus with gastrointestinal manifestations
J11.81	Influenza due to unidentified influenza virus with encephalopathy
J11.82	Influenza due to unidentified influenza virus with myocarditis
J11.83	Influenza due to unidentified influenza virus with otitis media
J11.89	Influenza due to unidentified influenza virus with other manifestations

Abbreviations: ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification

The CCS and ICD-10-CM codes defining co-occurring conditions are provided in Table 4.

Table 4. CCS codes defining co-occurring conditions

CCS code	Description
Asthma/chronic obstructive pulmonary disease	
RSP008	Chronic obstructive pulmonary disease and bronchiectasis
RSP009	Asthma
Cancer	
NEO002	Head and neck cancers - lip and oral cavity
NEO004	Head and neck cancers - salivary gland
NEO009	Head and neck cancers - tonsils
NEO003	Head and neck cancers - throat
NEO005	Head and neck cancers - nasopharyngeal
NEO006	Head and neck cancers - hypopharyngeal
NEO007	Head and neck cancers - pharyngeal
NEO010	Head and neck cancers - all other types
NEO012	Gastrointestinal cancers - esophagus
NEO013	Gastrointestinal cancers - stomach
NEO014	Gastrointestinal cancers - small intestine
NEO015	Gastrointestinal cancers - colorectal
NEO016	Gastrointestinal cancers - anus
NEO017	Gastrointestinal cancers - liver
NEO018	Gastrointestinal cancers - bile duct
NEO019	Gastrointestinal cancers - gallbladder
NEO021	Gastrointestinal cancers - all other types
NEO051	Endocrine system cancers – pancreas
NEO008	Head and neck cancers - laryngeal
NEO022	Respiratory cancers
NEO052	Endocrine system cancers - thymus
NEO011	Cardiac cancers
NEO023	Bone cancer
NEO025	Skin cancers - melanoma
NEO028	Skin cancers - all other types
NEO026	Skin cancers - basal cell carcinoma
NEO027	Skin cancers - squamous cell carcinoma
NEO067	Mesothelioma
NEO024	Sarcoma
NEO049	Nervous system cancers - all other types
NEO020	Gastrointestinal cancers - peritoneum
NEO030	Breast cancer - all other types
NEO038	Female reproductive system cancers - all other types
NEO036	Female reproductive system cancers - vulva
NEO037	Female reproductive system cancers - vagina
NEO032	Female reproductive system cancers - cervix
NEO031	Female reproductive system cancers - uterus
NEO035	Female reproductive system cancers - endometrium
NEO033	Female reproductive system cancers - ovary
NEO034	Female reproductive system cancers - fallopian tube
NEO041	Male reproductive system cancers - penis
NEO039	Male reproductive system cancers - prostate
NEO040	Male reproductive system cancers - testis
NEO042	Male reproductive system cancers - all other types
NEO045	Urinary system cancers - kidney
NEO044	Urinary system cancers - ureter and renal pelvis
NEO043	Urinary system cancers - bladder

CCS code	Description
Cancer	
NEO046	Urinary system cancers - urethra
NEO047	Urinary system cancers - all other types
NEO001	Head and neck cancers - eye
NEO048	Nervous system cancers - brain
NEO050	Endocrine system cancers - thyroid
NEO053	Endocrine system cancers - adrenocortical
NEO056	Endocrine system cancers - all other types
NEO054	Endocrine system cancers - parathyroid
NEO055	Endocrine system cancers - pituitary gland
NEO069	Cancer of other sites
NEO070	Secondary malignancies
NEO066	Malignant neuroendocrine tumors
NEO071	Malignant neoplasm, unspecified
NEO057	Hodgkin lymphoma
NEO058	Non-Hodgkin lymphoma
NEO065	Multiple myeloma
NEO059	Leukemia - acute lymphoblastic leukemia (ALL)
NEO061	Leukemia - chronic lymphocytic leukemia (CLL)
NEO064	Leukemia - all other types
NEO063	Leukemia - hairy cell
NEO060	Leukemia - acute myeloid leukemia (AML)
NEO062	Leukemia - chronic myeloid leukemia (CML)
NEO029	Breast cancer - ductal carcinoma in situ (DCIS)
NEO072	Neoplasms of unspecified nature or uncertain behavior
NEO068	Myelodysplastic syndrome (MDS)
NEO074	Conditions due to neoplasm or the treatment of neoplasm
FAC006	Encounter for antineoplastic therapies
Diabetes	
END003	Diabetes mellitus with complication
END002	Diabetes mellitus without complication
END006	Diabetes mellitus, due to underlying condition, drug or chemical induced, or other specified type
END004	Diabetes mellitus, Type 1
END005	Diabetes mellitus, Type 2
Heart/cerebrovascular disease	
CIR004	Endocarditis and endocardial disease
CIR005	Myocarditis and cardiomyopathy
CIR006	Pericarditis and pericardial disease
CIR032	Other specified and unspecified circulatory disease
CIR029	Aortic; peripheral; and visceral artery aneurysms
CIR024	Other and ill-defined cerebrovascular disease
CIR037	Vasculitis
CIR020	Cerebral infarction
NVS012	Transient cerebral ischemia
CIR002	Acute rheumatic heart disease
CIR001	Chronic rheumatic heart disease
CIR019	Heart failure
CIR011	Coronary atherosclerosis and other heart disease
CIR009	Acute myocardial infarction
CIR010	Complications of acute myocardial infarction
CIR015	Other and ill-defined heart disease
CIR027	Arterial dissections
CIR013	Acute pulmonary embolism

CCS code	Description
Heart/cerebrovascular disease	
CIR014	Pulmonary heart disease
CIR003	Nonrheumatic and unspecified valve disorders
CIR016	Conduction disorders
CIR018	Cardiac arrest and ventricular fibrillation
CIR017	Cardiac dysrhythmias
CIR021	Acute hemorrhagic cerebrovascular disease
CIR023	Occlusion or stenosis of precerebral or cerebral arteries without infarction
CIR022	Sequela of hemorrhagic cerebrovascular disease
CIR025	Sequela of cerebral infarction and other cerebrovascular disease
CIR026	Peripheral and visceral vascular disease
CIR030	Aortic and peripheral arterial embolism or thrombosis
CIR033	Acute phlebitis; thrombophlebitis and thromboembolism
CIR034	Chronic phlebitis; thrombophlebitis and thromboembolism
CIR036	Postthrombotic syndrome and venous insufficiency/hypertension
Human immunodeficiency virus (HIV)	
INF006	HIV infection
Obesity	
END009	Obesity
Opioid-related disorders	
MBD018	Opioid-related disorders
MBD028	Opioid-related disorders; subsequent encounter
ICD-10-CM code	**Description**
Sickle cell disease	
D57.00	Hb-SS disease with crisis, unspecified
D57.01	Hb-SS disease with acute chest syndrome
D57.02	Hb-SS disease with splenic sequestration
D57.1	Sickle-cell disease without crisis
D57.20	Sickle-cell/Hb-C disease without crisis
D57.211	Sickle-cell/Hb-C disease with acute chest syndrome
D57.212	Sickle-cell/Hb-C disease with splenic sequestration
D57.219	Sickle-cell/Hb-C disease with crisis, unspecified
D57.40	Sickle-cell thalassemia without crisis
D57.411	Sickle-cell thalassemia with acute chest syndrome
D57.412	Sickle-cell thalassemia with splenic sequestration
D57.419	Sickle-cell thalassemia with crisis, unspecified
D57.80	Other sickle-cell without crisis
D57.811	Other sickle-cell disorders with acute chest syndrome
D57.812	Other sickle-cell disorders with splenic sequestration
D57.819	Other sickle-cell disorders with crisis, unspecified

Abbreviation: CCS, Clinical Classifications Software; HB-SS, hemoglobin SS disease; HB-C, hemoglobin C disease.

Types of hospitals included in the HCUP National (Nationwide) Inpatient Sample
The National (Nationwide) 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.

Types of hospitals included in the HCUP Nationwide Emergency Department Sample
The Nationwide Emergency Department Sample (NEDS) 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 NEDS includes specialty, pediatric, public, and academic medical hospitals. Excluded are long-term care facilities such as rehabilitation, psychiatric, and alcoholism and chemical dependency hospitals. Hospitals included in the NEDS have hospital-owned emergency departments (EDs) and no more than 90 percent of their ED visits resulting in admission.

Unit of analysis
The unit of analysis for the NIS 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.

The unit of analysis for the NEDS is the ED visit, not a person or patient. This means that a person who is seen in the ED multiple times in 1 year will be counted each time as a separate visit in the ED.

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).[21] *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.

Location of patients' residence
Location of patients' residence are based on the rural-urban continuum codes (RUCC) for U.S. counties developed by the United States Department of Agriculture (USDA).[22] For this Statistical Brief, we collapsed the RUCC categories into the following categories:

Metro:

- Counties in metro areas of 1 million population or more
- Counties in metro areas of 250,000 to 1 million population
- Counties in metro areas of fewer than 250,000 population

Rural (nonmetro), adjacent to metro area:

- Urban population of 20,000 or more, adjacent to a metro area
- Urban population of 2,500 to 19,999, adjacent to a metro area
- Completely rural or fewer than 2,500 urban population, adjacent to a metro area

Rural (nonmetro), remote area:

- Urban population of 20,000 or more, not adjacent to a metro area
- Urban population of 2,500 to 19,999, not adjacent to a metro area
- Completely rural or fewer than 2,500 urban population, not adjacent to a metro area

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.[23] The value

[21] 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.
[22] United States Department of Agriculture. Rural–Urban Continuum Codes. Last updated August 20, 2019. https://www.ers.usda.gov/data-products/rural-urban-continuum-codes/. Accessed June 26, 2019.
[23] Claritas. Claritas Demographic Profile by ZIP Code. https://claritas360.claritas.com/mybestsegments/. Accessed January 4, 2019.

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, the primary expected payer for the hospital stay and ED visit combines detailed categories into general groups:

- 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, and no expected payment
- Other payers: includes other Federal and local government programs (e.g., TRICARE, CHAMPVA, Indian Health Service, Black Lung, Title V) and Workers' Compensation

Hospital stays and ED visits expected to be 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.

For this Statistical Brief, when more than one payer is listed for a hospital discharge, the first-listed payer is used.

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

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 ED.

Discharge status
Discharge status reflects the disposition of the patient at discharge from the hospital and includes whether the patient died in the hospital.

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 (Nationwide) 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 2006 NIS is 8,074,825 (weighted, this represents 39,450,216 inpatient stays). The unweighted sample size for the 2016 NIS is 7,135,090 (weighted, this represents 35,675,421 inpatient stays).

About the NEDS

The HCUP Nationwide Emergency Department Database (NEDS) is a unique and powerful database that yields national estimates of emergency department (ED) visits. The NEDS was constructed using records from both the HCUP State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). The SEDD capture information on ED visits that do not result in an admission (i.e., patients who were treated in the ED and then released from the ED, or patients who were transferred to another hospital); the SID contain information on patients initially seen in the ED and then admitted to the same hospital. The NEDS was created to enable analyses of ED utilization patterns and support public health professionals, administrators, policymakers, and clinicians in their decisionmaking regarding this critical source of care. The NEDS is produced annually beginning in 2006. Over time, the sampling frame for the NEDS has changed; thus, the number of States contributing to the NEDS varies from year to year. The NEDS is intended for national estimates only; no State-level estimates can be produced. The unweighted sample size for the 2006 NEDS is 25,702,597 (weighted, this represents 120,033,750 ED visits). The unweighted sample size for the 2016 NEDS is 32,680,232 (weighted, this represents 144,842,742 ED visits).

For More Information

For other information on lung and respiratory conditions, including influenza, refer to the HCUP Statistical Briefs located at www.hcup-us.ahrq.gov/reports/statbriefs/sb_lung.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 (Nationwide) Inpatient Sample (NIS) and the Nationwide Emergency Department Sample (NEDS), 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.

Agency for Healthcare Research and Quality. Overview of the Nationwide Emergency Department Sample (NEDS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated October 2018. www.hcup-us.ahrq.gov/nedsoverview.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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