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Characteristics of Hospital Stays Involving Malnutrition, 2013

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Introduction

Undernutrition is a form of malnutrition characterized by a lack of adequate calories, protein, or other nutrients needed for tissue maintenance and repair.[1] Malnutrition (undernutrition) occurs among approximately 3 percent of adult hospital inpatient stays in the United States and is associated with increased morbidity, mortality, and health care costs.[2] Adult hospitalizations with a diagnosis of malnutrition have a longer length of stay, higher costs, more comorbidities, and 5 times the likelihood of death, compared with other adult hospital stays.[3]

Evidence suggests that early nutritional intervention may reduce complication rates, mortality, and resource use associated with malnutrition. However, many cases of malnutrition are unrecognized and untreated.[4] Clinical definitions of malnutrition and the set of diagnostic codes used to identify malnutrition in hospital administrative data have varied.[5] Standardizing definitions and treatment protocols for malnutrition is complicated by the fact that its etiology is heterogeneous. Malnutrition may result from chronic starvation and conditions such as anorexia, but it also may be a consequence of acute and chronic illness or injury.[6,7] Using a consistent set of diagnostic criteria and understanding the diseases that are associated with malnutrition are important for recognizing and treating malnutrition, as well as tracking its incidence, prevalence, and outcomes.[8]

Highlights

- In 2013, there were nearly 2 million hospital inpatient stays involving malnutrition. The most common type was protein-calorie malnutrition (63.9 percent of all malnutrition stays), accounting for 4.5 percent of all inpatient stays and 9.1 percent of aggregate costs (nonmaternal and nonneonatal only).

- Other malnutrition-related stays were for weight loss or failure to thrive (21.6 percent of all malnutrition stays), cachexia (8.3 percent), underweight (4.4 percent), postsurgical nonabsorption (1.7 percent), and nutritional neglect (0.1 percent).

- Patients with malnutrition tended to be older (especially 85 years or older), black, and from low income and rural areas.

- Compared with other types of malnutrition, in-hospital mortality was higher for stays with cachexia (11.7 percent died in the hospital) and protein-calorie malnutrition (8.4 percent)—4 to 5 times the in-hospital death rate of all nonmaternal, nonneonatal stays (2.4 percent).

- Average hospital costs were higher for stays involving protein-calorie malnutrition ($25,200) and postsurgical nonabsorption ($23,000) than for other malnutrition stays.

- Principal diagnoses varied by type of malnutrition: medical, surgical, or device complications were common for postsurgical nonabsorption; injuries and conditions due to external causes were common for nutritional neglect. Septicemia was common among all types of malnutrition.

[1] White JV, Guenter P, Jensen G, Malone A, Schofield M, Academy Malnutrition Work Group, et al. Consensus statement: Academy of Nutrition and Dietetics and American Society for Parenteral and Enteral Nutrition: characteristics recommended for the identification and documentation of adult malnutrition (undernutrition). Journal of Parenteral and Enteral Nutrition. 2012:36(3):275–83.

[2] Corkins MR, Guenter P, DiMaria-Ghalili RA, Jensen GL, Malone A, Miller S, et al. Malnutrition diagnoses in hospitalized patients: United States, 2010. Journal of Parenteral and Enteral Nutrition. 2014;38(2):186–95.

[3] Ibid.

[4] Tappenden KA, Quatrara B, Parkhurst ML, Malone AM, Fanjiang G, Ziegler TR. Critical role of nutrition in improving quality of care: an interdisciplinary call to action to address adult hospital malnutrition. Journal of the Academy of Nutrition and Dietetics. 2013;113(9):1219–37.

[5] White et al., 2012. Op. cit.

[6] Lean M, Wiseman M. Malnutrition in hospitals. BMJ. 2008;336(7639):290.

[7] White et al., 2012. Op. cit.

[8] Ibid.

This Healthcare Cost and Utilization Project (HCUP) Statistical Brief presents national estimates on the characteristics of malnutrition reported during nonmaternal and nonneonatal hospital inpatient stays in 2013. Although malnutrition can include high caloric intake associated with overweight and obesity when defined broadly as nutritional imbalance, this Statistical Brief examines undernutrition only.

Malnutrition was identified using a broad set of diagnostic codes that included the following six categories:

- Postsurgical nonabsorption
- Nutritional neglect
- Cachexia
- Protein-calorie malnutrition
- Weight loss or failure to thrive
- Underweight.

This Statistical Brief presents the frequency of occurrence of the six types of malnutrition. Patient-level characteristics, admission and discharge characteristics, and outcomes for malnutrition-related stays are provided by malnutrition type. Finally, the most common primary conditions and specific principal diagnoses are presented for the different types of malnutrition-related stays. Differences in estimates of 10 percent or greater are noted in the text.

Hospital stays involving malnutrition, 2013
Figure 1 provides the distribution of six types of malnutrition among hospital inpatient stays in 2013.

Figure 1. Types of malnutrition among hospital stays with malnutrition, 2013
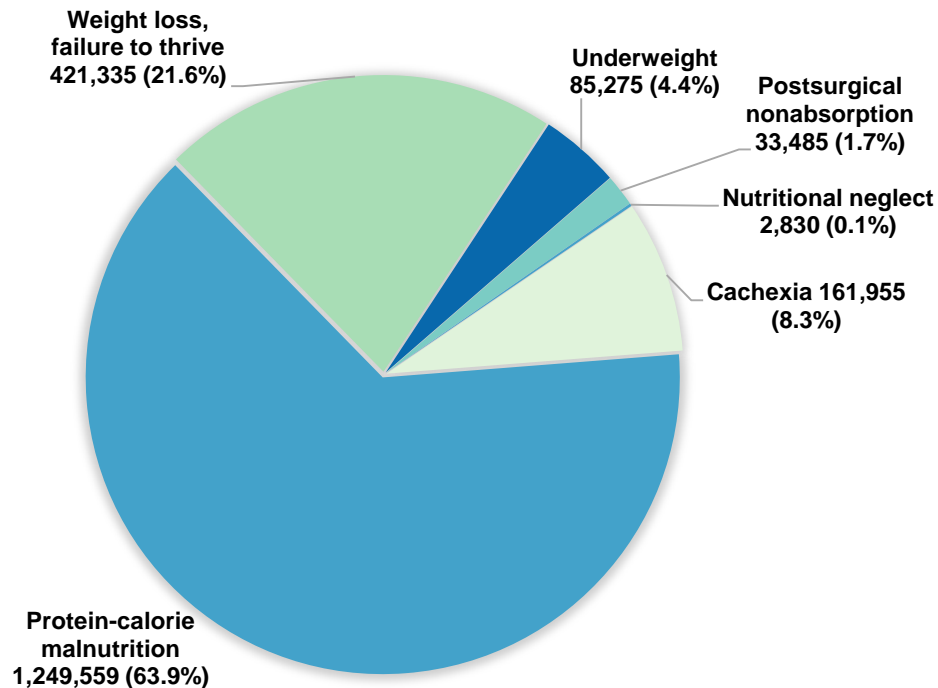
Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Protein-calorie malnutrition was the most common type of malnutrition among hospital inpatient stays.**

In 2013, there were 1.95 million hospital stays that involved malnutrition, representing 7.1 percent of the 27.6 million total nonmaternal and nonneonatal stays (data not shown). Approximately 1.25 million malnutrition-related stays (63.9 percent) were categorized as protein-calorie malnutrition.

Weight loss or failure to thrive was the next most common type of malnutrition, at 21.6 percent of all malnutrition-related stays. The remaining four malnutrition types combined constituted about 15 percent of all malnutrition-related hospital stays: cachexia (8.3 percent), underweight (4.4 percent), postsurgical nonabsorption (1.7 percent), and nutritional neglect (less than 1 percent).

Characteristics and outcomes of hospital stays involving malnutrition, 2013
Table 1 provides characteristics of malnutrition-related hospital stays by type of malnutrition in 2013.

Table 1. Characteristics of hospital stays with malnutrition by malnutrition type, 2013

Characteristic	Postsurgical nonabsorption	Nutritional neglect	Cachexia	Protein-calorie malnutrition	Weight loss, failure to thrive	Under-weight
Total number	**33,485**	**2,830**	**161,955**	**1,249,559**	**421,335**	**85,275**
Rate per 100,000 population	**10.6**	**0.9**	**51.2**	**395.3**	**133.3**	**27.0**
Age, mean years	47.1	47.5	68.3	66.9	59.7	65.0
Age, years, rate per 100,000 population						
<18	8.8	1.4	1.3	21.1	88.2	3.8
18–39	3.8	0.1	8.6	88.4	25.0	10.3
40–64	13.1	0.4	51.6	378.9	87.9	21.8
65–84	22.7	2.4	181.1	1,439.3	415.0	84.8
85+	17.8	6.6	524.0	3,612.8	1,412.7	308.1
Sex, rate per 100,000 population						
Male	7.8	0.8	53.4	383.2	131.3	19.7
Female	13.3	1.0	49.5	410.0	136.2	34.2
Race/ethnicity, rate per 100,000 population						
White	10.9	0.7	51.7	419.9	135.7	29.1
Black	11.3	1.7	73.7	450.8	157.0	31.5
Hispanic	5.5	0.5	21.8	174.7	69.5	9.2
Other	6.8	0.6	47.8	331.0	118.6	24.1
Community-level income, rate per 100,000 population						
Quartile 1 (lowest)	11.2	1.5	65.5	493.7	162.6	34.6
Quartile 2	11.5	1.0	50.8	423.4	138.0	28.0
Quartile 3	10.6	0.6	43.4	350.9	117.0	22.7
Quartile 4 (highest)	8.3	0.4	40.3	285.3	106.7	20.9
Location of residence, rate per 100,000 population						
Large central metropolitan	9.9	0.9	56.5	389.2	128.7	26.4
Large fringe metropolitan (suburbs)	10.5	0.7	48.0	348.7	133.0	25.7
Medium/small metropolitan	10.8	0.9	46.7	397.5	128.4	26.1
Micropolitan/noncore (rural)	11.8	1.0	52.4	469.9	149.6	31.3

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **On average, patients with cachexia, protein-calorie malnutrition, and underweight were older, whereas patients with postsurgical nonabsorption and nutritional neglect tended to be younger.**

The mean patient age among malnutrition-related hospital stays was highest for stays involving cachexia (68.3 years), protein-calorie malnutrition (66.9 years), and underweight (65.0 years). Mean patient age was approximately 20 years younger for malnutrition-related stays involving postsurgical nonabsorption (47.1 years) and nutritional neglect (47.5 years).

The rate of hospitalization was highest for patients aged 65 years and older across all six types of malnutrition. Furthermore, the hospitalization rate for patients aged 85 years and older was 2.5–3.5

times higher than for patients aged 65–84 years for all types of malnutrition except postsurgical nonabsorption. For example, among patients aged 85+ years, there were 3,613 hospital stays per 100,000 population for protein-calorie malnutrition compared with 1,439 stays per 100,000 among those aged 65–84 years. A similar pattern was seen for weight loss, failure to thrive—1,413 stays per 100,000 for those aged 85 years and older compared with 415 per 100,000 among 65–84 year olds.

- **Blacks had the highest rate of hospitalization involving malnutrition-related stays, and Hispanics had the lowest rate.**

  Across all six types of malnutrition-related hospital stays, Blacks had the highest hospitalization rate, Whites had the next highest rate, and Hispanics had the lowest rate. For example, for the most common type of malnutrition (protein-calorie malnutrition), there were 451 stays per 100,000 population among Blacks compared with 175 stays per 100,000 population among Hispanics.

- **The rate of malnutrition-related hospital stays was highest for the lowest-income communities.**

  Across all six types of malnutrition-related hospital stays, the rate of hospitalization was generally highest in low-income communities and decreased progressively with increases in community income level. Again, focusing on the most common type of malnutrition (protein-calorie malnutrition), there were 494 hospital stays per 100,000 population in the lowest-income communities (quartile 1) compared with 285 stays per 100,000 in the highest-income communities (quartile 4).

- **For most types of malnutrition, the highest rate of hospitalization was in rural areas.**

  Patients from rural areas tended to be hospitalized with malnutrition at a higher rate than did those from more populated areas. For example, among patients with protein-calorie malnutrition, there were 470 hospital stays per 100,000 population for rural patients compared with 349 stays per 100,000 for patients from suburban areas.

Figure 2 provides the expected payer distribution of malnutrition-related hospital stays by type of malnutrition in 2013. For reference, the distribution of all 2013 nonmaternal, nonneonatal stays also is provided.

Figure 2. Distribution of expected payer across hospital stays with malnutrition by malnutrition type, 2013
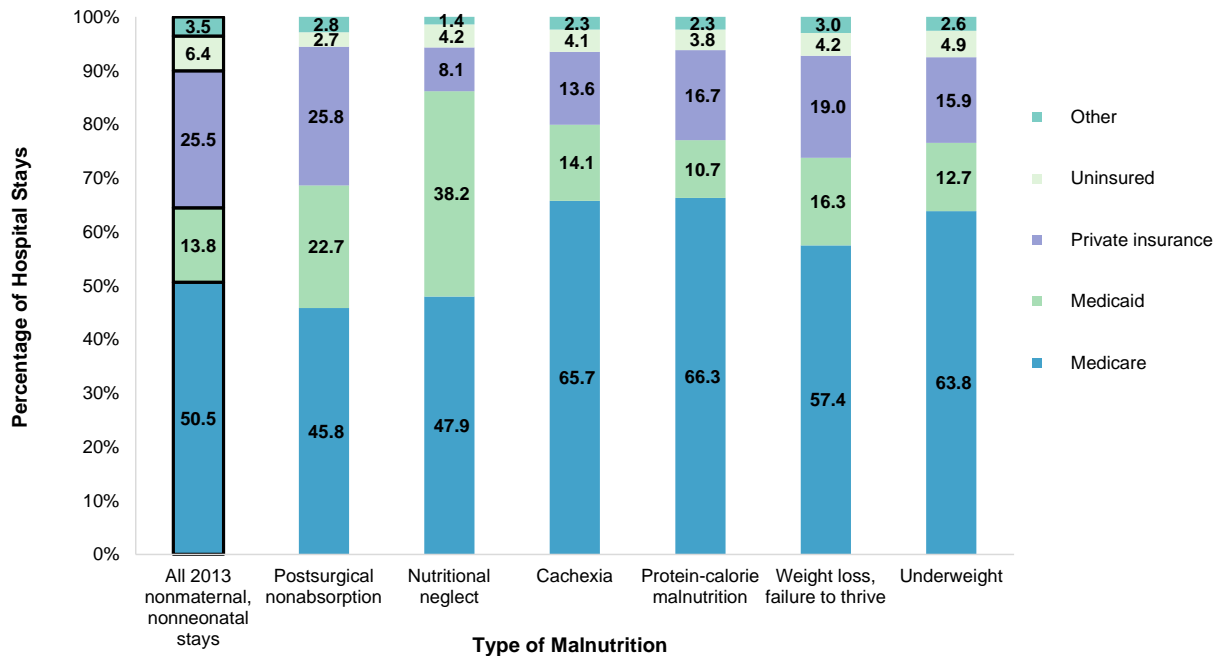
Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Medicaid was the expected payer for a disproportionate share of malnutrition stays involving postsurgical nonabsorption and nutritional neglect; Medicare was the expected payer for a disproportionate share of other types of malnutrition-related stays.**

Compared with all nonmaternal, nonneonatal hospital stays in 2013, a higher proportion of stays involving postsurgical nonabsorption or nutritional neglect had an expected primary payer of Medicaid (22.7 and 38.2 percent, respectively, vs. 13.8 percent for all stays). Among the other four types of malnutrition-related stays, between 57.4 and 66.3 percent of stays had an expected primary payer of Medicare compared with only half of all nonmaternal, nonneonatal stays (50.5 percent).

Table 2 provides admission and discharge characteristics and outcomes for malnutrition-related hospital stays by malnutrition type, in 2013.

Table 2. Admission and discharge characteristics and outcomes for hospital stays involving malnutrition by malnutrition type, 2013

Characteristic or outcome	Postsurgical nonabsorption	Nutritional neglect	Cachexia	Protein-calorie malnutrition	Weight loss, failure to thrive	Under-weight
Total number	**33,485**	**2,830**	**161,955**	**1,249,559**	**421,335**	**85,275**
Admission, %						
Malnutrition diagnosis present on admission	84.1	88.0	88.6	80.2	88.5	—a
Malnutrition listed as secondary diagnosis only	93.8	82.5	99.9	99.4	96.8	100.0
Elective admission	15.2	5.8	7.5	11.7	13.1	12.4
Received emergency department services	60.9	70.0	76.6	68.8	65.9	71.4
Discharge status, %						
Routine discharge	53.1	39.9	31.2	29.0	47.5	48.5
Transfer to another acute care hospital	2.8	3.7	2.6	3.1	2.6	1.9
Transfer to another facilityb	13.8	41.0	31.2	38.5	27.8	26.2
Home health care	27.2	10.4	21.8	20.2	16.7	18.3
Against medical advice	0.7	0.9	1.3	0.7	0.7	1.3
Died during hospital stay	2.3	3.9	11.7	8.4	4.5	3.7
Outcome						
Length of stay, mean days	9.6	9.2	7.5	10.7	6.5	6.0
Hospital costs, mean $	23,000	14,700	16,200	25,200	14,100	12,100
Aggregate hospital costs, mean $ millions	770	42	2,627	31,465	5,945	1,034
Receipt of enteral/parenteral nutrition, %						
Received enteral nutrition	5.1	3.2	3.1	4.7	3.8	1.8
Received parenteral nutrition	28.7	1.6	2.4	6.6	2.0	1.2

a Because two frequent codes in the underweight malnutrition type (V85.0 and V85.51) are exempt from present-on-admission reporting, this information is not reported.

b Includes transfer to a skilled nursing facility, intermediate care facility, or another type of health care facility.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Malnutrition was present on admission and was reported as a secondary diagnosis for the majority of malnutrition-related hospital stays.**

Malnutrition was identified as present on admission for more than 80 percent of hospital stays involving malnutrition across all types of malnutrition except underweight.[9] (For this condition, several diagnostic codes are exempt from present-on-admission reporting.) Malnutrition also was much more likely to be reported as a secondary than as a principal diagnosis, ranging from 82.5 percent of stays involving nutritional neglect to 100.0 percent of stays with underweight diagnoses.

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[9] Only 28.3 percent of stays with underweight diagnoses were reported as present on admission. However, the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) V codes for body mass index that are part of the underweight malnutrition type (V85.0 and V85.51) are exempt from present-on-admission reporting.

- **Hospital stays involving malnutrition accounted for over 12 percent of aggregate hospital costs among nonmaternal and nonneonatal stays in 2013.**

  In 2013, the aggregate cost of all nonmaternal and nonneonatal stays was $346.1 billion (data not shown). Hospital stays involving malnutrition accounted for nearly $42 billion, or 12.1 percent of aggregate nonmaternal, nonneonatal hospital costs. In contrast, as described earlier, hospital stays involving malnutrition constituted only 7.1 percent of all nonmaternal and nonneonatal hospital stays in 2013.

- **Hospitals stays involving malnutrition were discharged to home less often compared with all nonmaternal, nonneonatal stays.**

  Compared with all nonmaternal, nonneonatal hospital stays in 2013, a lower proportion of stays across all six types of malnutrition had a routine discharge (ranging from a low of 31.2 percent for cachexia to a high of 53.1 percent for postsurgical nonabsorption, vs. 62.5 percent for all nonmaternal, nonneonatal stays, data not shown).

- **Very few malnutrition-related stays included enteral or parenteral nutrition services.**

  With one exception, fewer than 7 percent of malnutrition-related stays, across malnutrition types, included coding of enteral or parenteral nutrition services. Parenteral nutrition was coded during 28.7 percent of stays involving postsurgical nonabsorption.

Figure 3 presents information on in-hospital deaths by type of malnutrition in 2013. For reference, the proportion of in-hospital deaths among all nonmaternal, nonneonatal hospital stays also is provided.

Figure 3. Percentage of stays that resulted in in-hospital death by malnutrition type, 2013
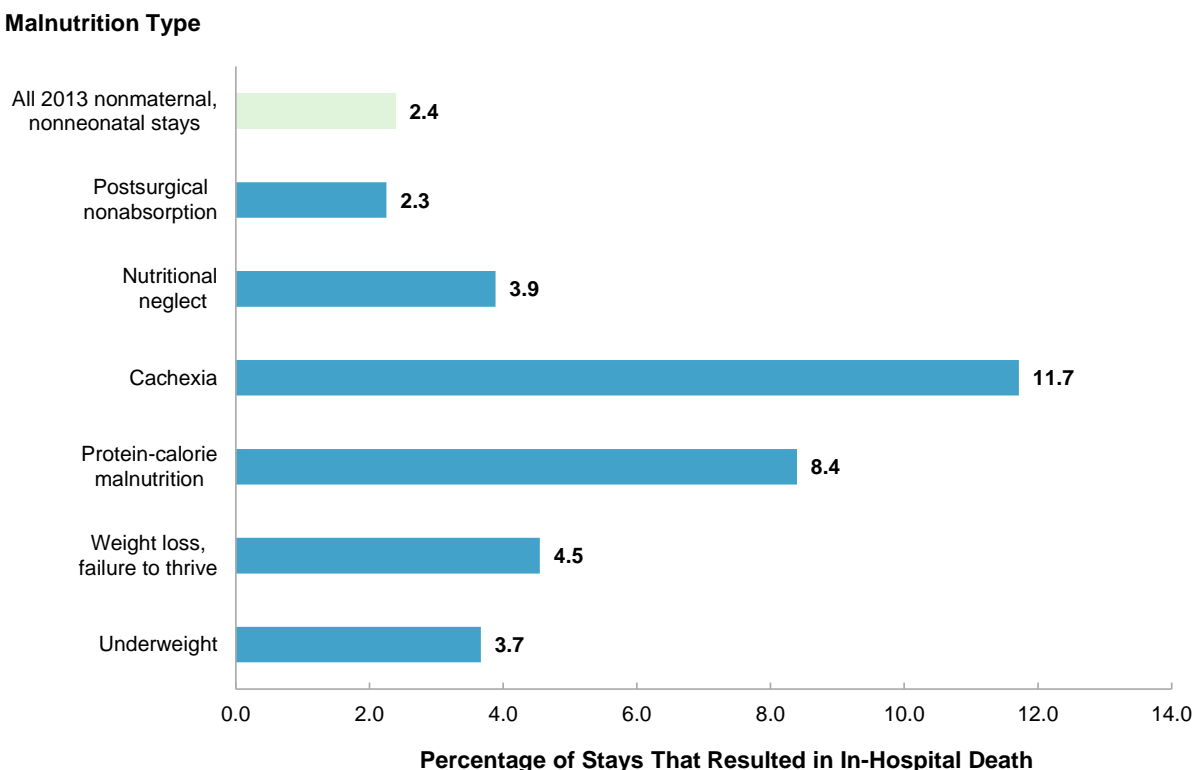
Malnutrition Type

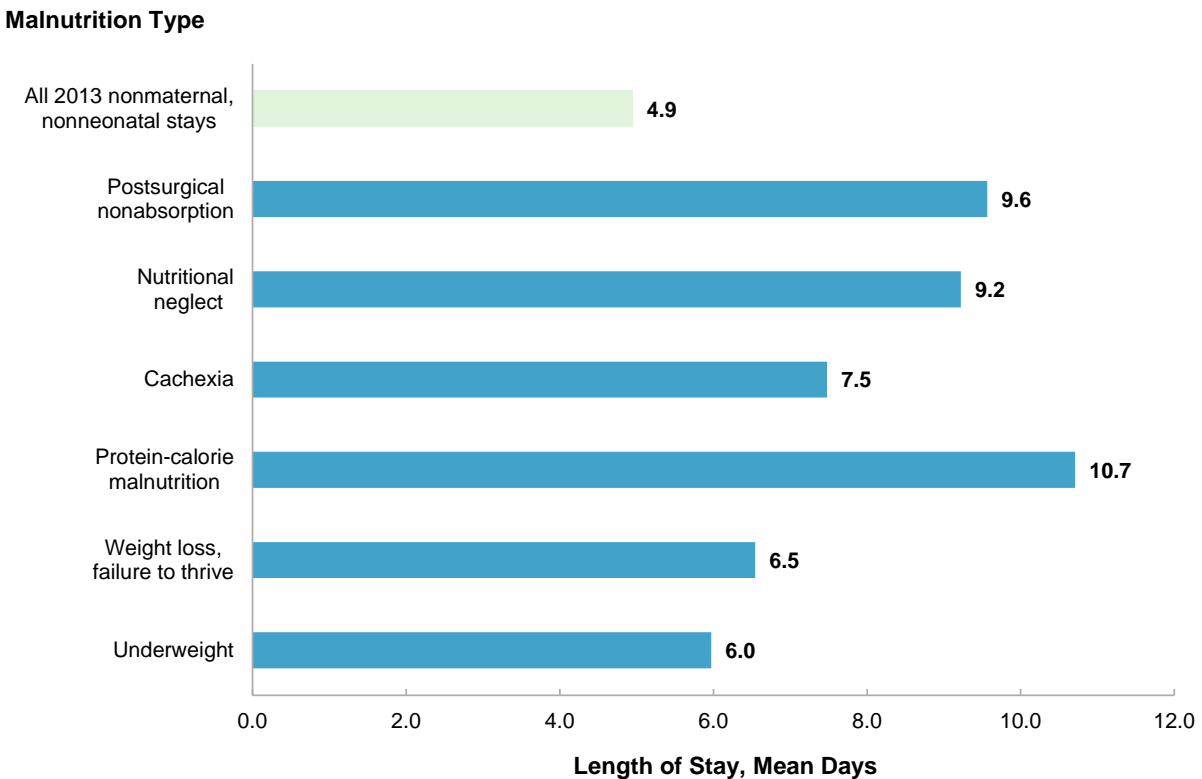Percentage of Stays That Resulted in In-Hospital Death

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Hospital stays involving cachexia and protein-calorie malnutrition had the highest mortality rate compared with other malnutrition-related hospital stays.**

Compared with the in-hospital death rate among all nonmaternal, nonneonatal hospital stays (2.4 percent), malnutrition-related stays for all types of malnutrition except postsurgical nonabsorption had a substantially higher proportion of in-hospital deaths, ranging from 1.5 times higher for underweight diagnoses to nearly 5 times higher for cachexia. Overall, more than 1 in 10 hospital stays involving cachexia (11.7 percent) and more than 1 in 12 stays involving protein-calorie malnutrition (8.4 percent) resulted in death in the hospital.

Figure 4 presents the average length of stay in the hospital by type of malnutrition in 2013. For reference, the average length of stay among all nonmaternal, nonneonatal hospital stays also is provided.

Figure 4. Average length of hospital stay by malnutrition type, 2013
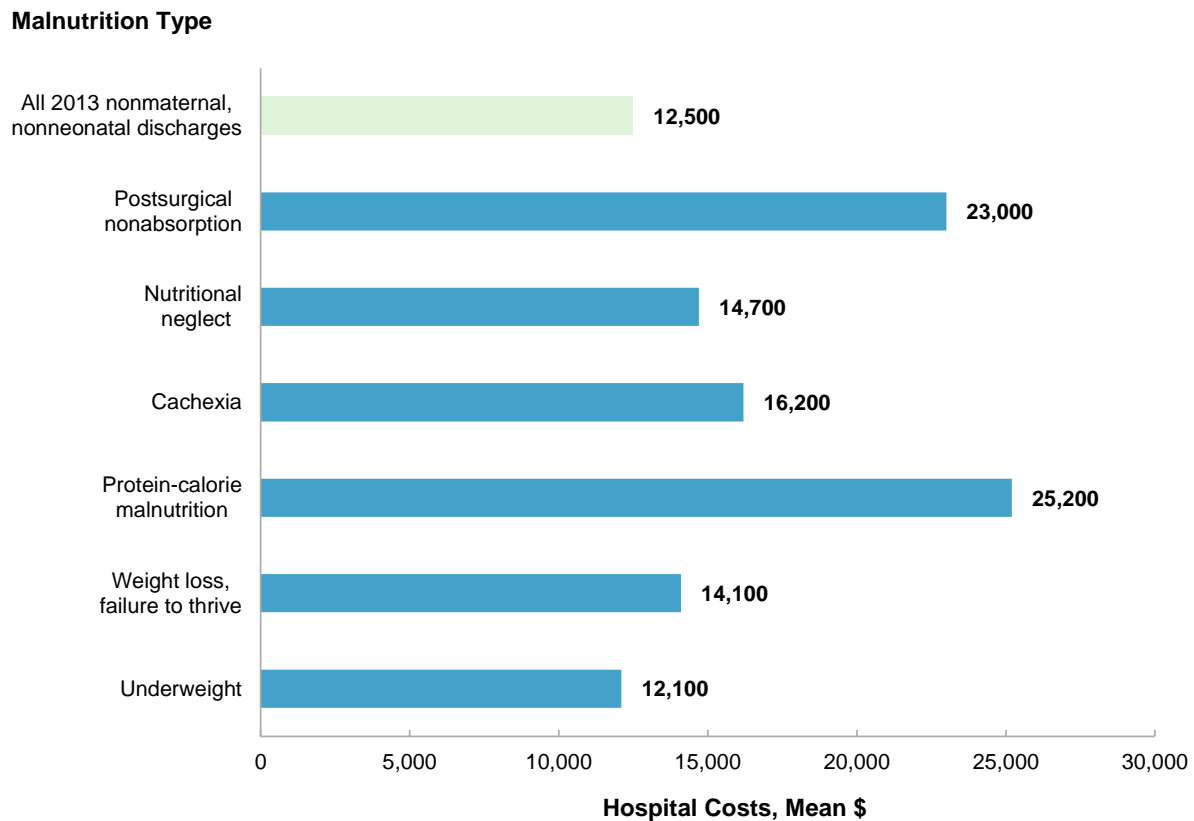
Malnutrition Type

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Hospital stays involving protein-calorie malnutrition, postsurgical nonabsorption, and nutritional neglect were longer on average compared with other malnutrition-related hospital stays and about twice as long as the average length of stay overall.**

Compared with the average length of all nonmaternal, nonneonatal hospital stays (4.9 days), malnutrition-related stays for all six types of malnutrition were longer on average, ranging from 20 percent longer for underweight diagnoses to more than twice as long for protein-calorie malnutrition. On average, the longest malnutrition-related stays involved protein-calorie malnutrition (10.7 days), postsurgical nonabsorption (9.6 days), and nutritional neglect (9.2 days).

Figure 5 presents average hospital costs for stays by type of malnutrition in 2013. For reference, the average hospital cost among all nonmaternal, nonneonatal hospital stays also is provided.

Figure 5. Average hospital costs by malnutrition type, 2013

Malnutrition Type

Malnutrition Type	Hospital Costs, Mean $
All 2013 nonmaternal, nonneonatal discharges	12,500
Postsurgical nonabsorption	23,000
Nutritional neglect	14,700
Cachexia	16,200
Protein-calorie malnutrition	25,200
Weight loss, failure to thrive	14,100
Underweight	12,100

Hospital Costs, Mean $

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Hospital stays involving protein-calorie malnutrition and postsurgical nonabsorption were the most costly compared with other malnutrition-related hospital stays.**

Compared with the average cost of all nonmaternal, nonneonatal hospital stays ($12,500), malnutrition-related stays for all types of malnutrition except underweight were more costly, ranging from 13 percent more costly for weight loss or failure to thrive diagnoses to twice as costly for protein-calorie malnutrition. On average, the highest-cost malnutrition-related stays involved protein-calorie malnutrition ($25,200) and postsurgical nonabsorption ($23,000).

Reasons for hospital stays with malnutrition, 2013
The most common reasons for hospital stays involving malnutrition by malnutrition type in 2013 are provided in Table 3 (general reasons) and Table 4 (specific reasons). Table 3 focuses on primary condition groupings, which are based on broad body systems or etiology. Table 4 focuses on principal diagnoses, which are more specific categories of conditions.

Table 3. Top five primary condition groupings among hospital stays involving malnutrition by malnutrition type, 2013

Primary condition grouping[a]	Postsurgical non-absorption		Nutritional neglect		Cachexia		Protein-calorie malnutrition		Weight loss, failure to thrive		Under-weight	
	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%
Injury and poisoning[b]	1	27.5	1	27.4	–	–	5	9.9	–	–	4	9.3
Digestive system	2	20.5	–	–	5	10.0	2	14.6	1	14.0	3	13.6
Genitourinary system	3	8.8	5	8.3	–	–	–	–	–	–	–	–
Endocrine/nutritional/metabolic	4	7.6	2	13.3	–	–	–	–	3	11.6	–	–
Infectious and parasitic	5	7.5	3	10.4	2	14.6	1	17.1	–	–	–	–
Mental illness	–	–	4	10.2	–	–	–	–	–	–	–	–
Respiratory system	–	–	–	–	1	20.5	3	12.7	2	13.5	1	17.3
Circulatory system	–	–	–	–	3	12.5	4	11.7	4	11.2	2	13.6
Neoplasms	–	–	–	–	4	12.0			5	9.8	5	7.5

Notes: A dash indicates that the condition did not rank among the top five primary condition groupings for that type of malnutrition. Denominators for all percentage calculations are the total number of hospital stays for each malnutrition type.

[a] Primary condition grouping was identified based on the diagnosis chapter of the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM).

[b] Includes complications of surgical procedures or medical care, and complication of device, implant or graft.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Injury and poisoning was the most common primary condition grouping for malnutrition-related stays involving postsurgical nonabsorption and nutritional neglect; respiratory and digestive system diseases were common among other types of malnutrition-related stays.**

More than one-fourth of malnutrition-related hospital stays involving postsurgical nonabsorption or nutritional neglect had an injury and poisoning primary condition grouping, a broad category of conditions that includes trauma, burns, hip fractures, and complications of care. Respiratory system disease was the most common primary condition grouping among stays involving cachexia (20.5 percent) and underweight diagnoses (17.3 percent). Respiratory system disease also was common for malnutrition-related stays involving weight loss or failure to thrive diagnoses (13.5 percent) and protein-calorie malnutrition (12.7 percent).

Other common primary condition groupings included digestive system disease (ranked in the top five conditions for all malnutrition types except nutritional neglect, and first for weight loss or failure to thrive), infectious and parasitic disease (ranked in the top five conditions for all malnutrition types except weight loss/failure to thrive and underweight, and first for protein-calorie malnutrition), and circulatory system disease (ranked in the top 5 conditions for all malnutrition types except postsurgical nonabsorption and nutritional neglect).

Mental illness was the fourth most common primary condition grouping and represented more than 10 percent of malnutrition-related stays involving nutritional neglect. Neoplasms were among the top five grouped conditions for stays involving cachexia, weight loss or failure to thrive, and underweight diagnoses.

Table 4 lists the five most common principal diagnoses for malnutrition-related hospital stays by malnutrition type in 2013. These are more specific categories of conditions than the body system/etiology groupings in Table 3.

Table 4. Top five principal diagnoses among hospital stays involving malnutrition by malnutrition type, 2013

Principal diagnosis CCS	Postsurgical non-absorption		Nutritional neglect		Cachexia		Protein-calorie malnutrition		Weight loss, failure to thrive		Under-weight	
	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%
Complication of device; implant or graft	1	15.3	–	–	–	–	5	2.8	–	–	–	–
Complications of surgical procedures or medical care	2	10.6	–	–	–	–	–	–	–	–	–	–
Septicemia (except in labor)	3	6.4	2	9.5	1	11.5	1	15.7	1	5.4	2	5.6
Acute and unspecified renal failure	4	6.2	5	3.9	–	–	3	3.6	4	4.5	5	3.1
Intestinal obstruction without hernia	5	5.7	–	–	–	–	–	–	–	–	–	–
Other injuries and conditions due to external causes	–	–	1	19.1	–	–	–	–	–	–	–	–
Other nutritional; endocrine; and metabolic disorders	–	–	3	5.3	–	–	–	–	3	4.5	–	–
Urinary tract infections	–	–	4	4.4	–	–	–	–	–	–	–	–
Pneumonia	–	–	–	–	2	6.3	2	4.6	2	4.5	1	5.7
Chronic obstructive pulmonary disease and bronchiectasis	–	–	–	–	3	5.2	–	–	–	–	3	5.4
Respiratory failure; insufficiency; arrest (adult)	–	–	–	–	4	4.1	–	–	–	–	–	–
Congestive heart failure; nonhypertensive	–	–	–	–	5	3.6	4	2.8	–	–	–	–
Fluid and electrolyte disorders	–	–	–	–	–	–	–	–	5	4.2	4	3.2

Abbreviation: CCS, Clinical Classifications Software

Notes: A dash indicates that the condition did not rank among the top five principal Clinical Classifications Software (CCS) diagnoses for that type of malnutrition. Denominators for all percentage calculations are the total number of hospital stays for each malnutrition type.

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

■ **Septicemia was a common principal diagnosis among all types of malnutrition-related stays.**

Septicemia—a potentially overwhelming infection of the bloodstream—was the most common principal diagnosis among malnutrition-related stays categorized as protein-calorie malnutrition (15.7 percent of stays), cachexia (11.5 percent of stays), and weight loss or failure to thrive (5.4 percent of stays). Septicemia also was the second most common principal diagnosis for stays involving nutritional neglect (9.5 percent of stays) and stays with underweight diagnoses (5.6 percent of stays), and it ranked third for stays involving postsurgical nonabsorption (6.4 percent of stays).

■ **Other common principal diagnoses among malnutrition-related stays included medical or device complications (for postsurgical nonabsorption), injuries and conditions due to external causes (for nutritional neglect), and pneumonia (for other types of malnutrition-related stays).**

More than one-fourth of stays involving postsurgical nonabsorption were for complications of medical devices (15.3 percent) or medical or surgical care (10.6 percent). Nearly one in five stays involving

nutritional neglect were for injuries and conditions due to external causes (19.1 percent). For the remaining four malnutrition types, pneumonia was a leading primary condition, ranking first among stays categorized as underweight and second among stays categorized as cachexia, protein-calorie malnutrition, and weight loss or failure to thrive.

Data Source

The estimates in this Statistical Brief are based upon data from the Healthcare Cost and Utilization Project (HCUP) 2013 National Inpatient Sample (NIS). Supplemental sources included population denominator data derived from demographic data provided by the Nielsen Company, a vendor that compiles and adds value to the U.S. Bureau of Census data. Nielsen uses intra-census methods to estimate household and demographic statistics by ZIP Code.[10]

Definitions

Diagnoses, procedures, ICD-9-CM, 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.

All-listed procedures include all procedures performed during the hospital stay, whether for definitive treatment or for diagnostic or exploratory purposes. The *first-listed procedure* is the procedure that is listed first on the discharge record. Inpatient data define this as the *principal procedure*—the procedure that is performed for definitive treatment rather than for diagnostic or exploratory purposes (i.e., the procedure that was necessary to take care of a complication).

ICD-9-CM is the International Classification of Diseases, Ninth Revision, Clinical Modification, which assigns numeric codes to diagnoses and procedures. There are approximately 14,000 ICD-9-CM diagnosis codes and 4,000 ICD-9-CM procedure codes.

CCS categorizes ICD-9-CM diagnosis codes and procedure codes into a manageable number of clinically meaningful categories.[11] This clinical grouper makes it easier to quickly understand patterns of diagnoses and procedure use. CCS categories identified as Other typically are not reported; these categories include miscellaneous, otherwise unclassifiable diagnoses and procedures that may be difficult to interpret as a group.

Case definition
The six types of malnutrition were defined using the ICD-9-CM diagnosis codes listed in Table 5. Maternal and neonatal discharges, identified by Major Diagnostic Category (MDC) 14 (Pregnancy, Childbirth & the Puerperium) and MDC 15 (Newborns and Other Neonates With Conditions Originating in the Perinatal Period), were excluded from the analysis. Discharges identified only as a personal history or screening for malnutrition were not included (V12.1, Personal history of nutritional deficiency; V77.2, Special screening for malnutrition).

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[10] The Nielsen Company. *Nielsen Demographic Data.* Available: http://www.tetrad.com/demographics/usa/nielsen/. Accessed August 31, 2016.
[11] Agency for Healthcare Research and Quality. HCUP Clinical Classifications Software (CCS). Healthcare Cost and Utilization Project (HCUP). Rockville, MD: Agency for Healthcare Research and Quality. Updated June 2015. http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp. Accessed February 17, 2016.

Table 5. ICD-9-CM diagnosis codes for malnutrition

ICD-9-CM diagnosis code	Description
Postsurgical nonabsorption	
579.3	Other and unspecified postsurgical nonabsorption
Nutritional neglect	
995.52	Child neglect (nutritional)
995.84	Adult neglect (nutritional)
Cachexia	
799.4	Cachexia
Protein-calorie malnutrition	
260	Kwashiorkor
261	Nutritional marasmus
262	Other severe protein-calorie malnutrition
263.0	Malnutrition of moderate degree
263.1	Malnutrition of mild degree
263.2	Arrested development following protein-calorie malnutrition
263.8	Other protein-calorie malnutrition
263.9	Unspecified protein-calorie malnutrition
Weight loss, failure to thrive	
783.21	Loss of weight
783.3	Feeding difficulties and mismanagement
783.41	Failure to thrive (child)
783.7	Adult failure to thrive
Underweight	
783.22	Underweight
V85.0	Body Mass Index less than 19, adult
V85.51	Body Mass Index, pediatric, less than 5th percentile for age

Each hospital stay involving malnutrition was categorized into only one malnutrition type based on the following hierarchy:

1. Postsurgical nonabsorption or nutritional neglect
2. Cachexia or protein-calorie malnutrition
3. Weight loss/failure to thrive or underweight

If a single inpatient record included multiple diagnosis codes indicating different types of malnutrition (e.g., nutritional neglect and underweight), the record was classified into the higher-ranked type of malnutrition (in this example, nutritional neglect). If both types of malnutrition at the same hierarchy level appeared on a discharge record (e.g., both postsurgical nonabsorption and nutritional neglect), then the record was classified into the malnutrition type that appeared first on the record.

Table 6 reports the frequency of the six different types of malnutrition by individual diagnosis code among hospital inpatient stays in 2013. The following two additional statistics are provided: (1) the frequency with which each code is the only type of malnutrition code reported on the hospital discharge record and (2) the frequency with which each code occurs either alone or before any other malnutrition code reported on the record.

Table 6. Number and co-occurrence of different types of malnutrition, 2013

Malnutrition type	Diagnosis code	Code description	Total records with this malnutrition code	Records with only this malnutrition code		Records with only this malnutrition code or with this malnutrition code listed first	
			N	N	%	N	%
Postsurgical nonabsorption	579.3	Other and unspecified postsurgical nonabsorption	33,500	21,665	64.7	27,550	82.2
Nutritional neglect	995.52	Child neglect (nutritional)	1,035	510	49.3	825	79.7
	995.84	Adult neglect (nutritional)	1,800	820	45.6	1,195	66.4
Cachexia	799.4	Cachexia	211,210	78,995	37.4	154,180	73.0
Protein-calorie malnutrition	260	Kwashiorkor	1,990	1,380	69.3	1,885	94.7
	261	Nutritional marasmus	85,795	51,975	60.6	82,625	96.3
	262	Other severe protein-calorie malnutrition	270,475	179,265	66.3	261,765	96.8
	263.0	Malnutrition of moderate degree	195,225	150,205	76.9	183,620	94.1
	263.1	Malnutrition of mild degree	75,335	61,150	81.2	71,540	95.0
	263.2	Arrested development following protein-calorie malnutrition	85	55	64.7	70	82.4
	263.8	Other protein-calorie malnutrition	16,340	12,345	75.6	15,250	93.3
	263.9	Unspecified protein-calorie malnutrition	650,320	496,530	76.4	610,375	93.9
Weight loss, failure to thrive	783.21	Loss of weight	257,195	164,140	63.8	173,550	67.5
	783.3	Feeding difficulties and mismanagement	47,595	32,380	68.0	35,630	74.9
	783.41	Failure to thrive (child)	36,740	23,075	62.8	30,530	83.1
	783.7	Adult failure to thrive	305,215	177,275	58.1	195,815	64.2
Underweight	783.22	Underweight	29,470	5,975	20.3	8,710	29.6
	V85.0	Body Mass Index less than 19, adult	307,915	39,980	13.0	98,450	32.0
	V85.51	Body Mass Index, pediatric, less than 5th percentile for age	2,980	615	20.6	880	29.5

Source: Agency for Healthcare Research and Quality (AHRQ), Center for Delivery, Organization, and Markets, Healthcare Cost and Utilization Project (HCUP), National Inpatient Sample (NIS), 2013

Receipt of enteral and parenteral nutrition was based on CCS procedure category 223. CCS 223 includes ICD-9-CM procedure code 966 (Enteral infusion of concentrated nutritional substances) and ICD-9-CM procedure code 9915 (Parenteral infusion of concentrated nutritional substances).

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.

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).[12] *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, mean costs are reported to the nearest hundred.

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.[13] 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, 2012 outpatient gross revenues (or charges) were about 44 percent of total hospital gross revenues.[14]

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):

- Large Central Metropolitan: Central counties of metropolitan areas with 1 million or more residents
- Large Fringe Metropolitan: Fringe counties of counties of metropolitan areas with 1 million or more residents
- Medium Metropolitan: Counties in metropolitan areas of 250,000–999,999 residents
- Small Metropolitan: Counties in metropolitan areas of 50,000–249,999 residents
- Micropolitan: Nonmetropolitan counties areas of 10,000 or more residents
- Noncore: Nonmetropolitan and nonmicropolitan counties

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[12] Agency for Healthcare Research and Quality. HCUP Cost-to-Charge Ratio (CCR) Files. Healthcare Cost and Utilization Project (HCUP). 2001–2013. Rockville, MD: Agency for Healthcare Research and Quality. Updated November 2015. http://www.hcup-us.ahrq.gov/db/state/costtocharge.jsp. Accessed February 17, 2016.
[13] For additional information about the NHEA, see Centers for Medicare & Medicaid Services (CMS). National Health Expenditure Data. CMS Web site May 2014. http://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/NationalHealthExpendData/index.html?redirect=/NationalHealthExpendData/. Accessed February 17, 2016.
[14] American Hospital Association. TrendWatch Chartbook, 2014. Table 4.2. Distribution of Inpatient vs. Outpatient Revenues, 1992–2012. http://www.aha.org/research/reports/tw/chartbook/2014/table4-2.pdf. Accessed February 17, 2016.

Median community-level income
Median community-level income is the median household income of the patient's ZIP Code of residence. Income levels are separated into population-based quartiles with cut-offs determined using ZIP Code demographic data obtained from the Nielsen Company. The income quartile is missing for patients who are homeless or foreign.

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

- Medicare: includes patients covered by fee-for-service and managed care Medicare
- Medicaid: includes patients covered by fee-for-service and managed care Medicaid
- Private Insurance: includes Blue Cross, commercial carriers, and private health maintenance organizations (HMOs) and preferred provider organizations (PPOs)
- Uninsured: includes an insurance status of *self-pay* and *no charge*
- Other: includes Workers' Compensation, TRICARE/CHAMPUS, CHAMPVA, Title V, and other government programs

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 patients in SCHIP 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.

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. Admission from another hospital indicates that the patient was admitted to this hospital from another short-term, acute-care hospital. This usually signifies that the patient required the transfer in order to obtain more specialized services that the originating hospital could not provide. Admission from a long-term care facility indicates that the patient was admitted from a long-term facility such as a nursing home.

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

Reporting of race and ethnicity
Data on Hispanic ethnicity are collected differently among the States and also can differ from the Census methodology of collecting information on race (White, Black, Asian/Pacific Islander, American Indian/Alaska Native, Other (including mixed race)) separately from ethnicity (Hispanic, non-Hispanic). State data organizations often collect Hispanic ethnicity as one of several categories that include race. Therefore, for multistate analyses, HCUP creates the combined categorization of race and ethnicity for data from States that report ethnicity separately. When a State data organization collects Hispanic ethnicity separately from race, HCUP uses Hispanic ethnicity to override any other race category to create a Hispanic category for the uniformly coded race/ethnicity data element, while also retaining the original race and ethnicity data. This Statistical Brief reports race/ethnicity for the following categories: Hispanic, non-Hispanic White, non-Hispanic Black, and non-Hispanic Other.

Present on admission
In many cases the hospital discharge record includes an indication that the diagnosis was present on admission, the diagnosis occurred during the hospital stay, or onset could not be determined.[15]

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 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
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 and Hospitals
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 Department of Health
Missouri Hospital Industry Data Institute
Montana MHA - An Association of Montana Health Care Providers
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

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[15] Centers for Medicare & Medicaid Services. Hospital-Acquired Conditions (Present on Admission Indicator). Reporting. Last modified February 12, 2014. http://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/HospitalAcqCond/Reporting.html. Accessed June 29, 2016.

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 Health Care Authority
Wisconsin Department of Health Services
Wyoming Hospital Association

About Statistical Briefs

HCUP Statistical Briefs are descriptive summary reports presenting statistics on hospital inpatient and emergency department use and costs, quality of care, access to care, medical conditions, procedures, patient populations, and other topics. The reports use HCUP administrative health care data.

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 2012 NIS was redesigned to optimize national estimates. The redesign incorporates two critical changes:

- Revisions to the sample design—starting with 2012, the NIS is now a *sample of discharge records from all HCUP-participating hospitals*, rather than a sample of hospitals from which all discharges were retained (as is the case for NIS years before 2012).

- Revisions to how hospitals are defined—the NIS now uses the *definition of hospitals and discharges supplied by the statewide data organizations* that contribute to HCUP, rather than the definitions used by the American Hospital Association (AHA) Annual Survey of Hospitals.

The new sampling strategy is expected to result in more precise estimates than those that resulted from the previous NIS design by reducing sampling error: for many estimates, confidence intervals under the new design are about half the length of confidence intervals under the previous design. The change in sample design for 2012 necessitates recomputation of prior years' NIS data to enable analysis of trends that uses the same definitions of discharges and hospitals.

For More Information

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

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

For information on other hospitalizations in the United States, refer to the following HCUP Statistical Briefs located at http://www.hcup-us.ahrq.gov/reports/statbriefs/statbriefs.jsp:

- Statistical Brief #180, Overview of Hospital Stays in the United States, 2012
- Statistical Brief #181, Costs for Hospital Stays in the United States, 2012
- Statistical Brief #186, Most Frequent Operating Room Procedures Performed in U.S. Hospitals, 2003–2012
- Statistical Brief #162, Most Frequent Conditions in U.S. Hospitals, 2011

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 November 2015. http://www.hcup-us.ahrq.gov/nisoverview.jsp. Accessed February 17, 2016.

Suggested Citation

Acknowledgments

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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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