

## Calendar Year 2016 Connecticut Hospitalization Tables

Inpatient hospitalizations represent the instances where a person's illness or injury required care at a hospital. As such, counts and rates of hospitalizations are one way to measure morbidity (injury and illness) in Connecticut. The Connecticut Hospitalization Tables provide a series of counts, rates, lengths of stay, charges, rankings, rate ratios and rate differences for select indicators. Diagnosis codes are presented for selected conditions which are either among the most common or for which there exists a particular public health interest (e.g. lead poisoning). These tables provide metrics that can be used to monitor hospitalizations over time and help inform the planning and allocation of resources for treatment.

### Methodology

The 2016 Hospitalization Tables have some meaningful changes in methodology and structure from previous years. In October of 2015, all hospitals began reporting diagnostic codes and hospital claims billing data using the ICD-10-CM classification system. The ICD-10 is more than an expansion of the ICD-9; it is a restructuring of the classification system. As a result, some disease categories in ICD-9 have equivalents in ICD-10 and some do not; furthermore, some diseases have come to new prominence. To handle those changes, the 2016 Tables have been reorganized and will not align with tables from 2015 and earlier.

Inpatient hospitalization tables between calendar years 1998 and 2015 were based on ICD-9-CM diagnostic codes and hospital claims billing data. The codes were chosen based upon the National Hospital Discharge Survey (NHDS) tables, the Centers of Disease Control (CDC) list of 72 leading causes of death, comparison with Council of State and Territorial Epidemiologists (CSTE) mortality consensus codes, and Healthy People 2000 and HP 2010 mortality and morbidity objectives, while also examining hospitalization tables developed by other states.

The NHDS no longer provides a model for hospitalization tables. It was replaced by the National Hospital Care Survey (NHCS), which collects data from inpatient, emergency department, outpatient, and ambulatory surgery sources, but does not produce tables. The International Shortlist for Hospital Morbidity Tabulation (ISHMT) was developed by the World Health Organization for international comparisons of hospital morbidity statistics.<sup>1</sup> Hospitalization-related measures of morbidity have been developed in successive versions of the Healthy People publications. Connecticut developed a State Health Improvement Plan and state goals based upon the national Healthy People 2020 goals. Even without these developments, Connecticut's hospitalization tables needed to reflect the change from ICD-9-CM to ICD-10-CM.

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<sup>1</sup> <https://www.who.int/classifications/icd/implementation/morbidity/ishmt/en/>

## Diagnostic Classification

As noted, the shift to ICD-10-CM affects a number of diagnostic categories. Mental and behavioral disorders and poison and injury codes are often non-comparable across the ICD-9/10 transition. The restructuring of the ICD-10 classifications also leads to newly listed major categories and sub-categories. Sub-categories for influenza and pneumonia are now listed separately from one another in Connecticut's hospitalization tables. In tables before 2016, COPD (ICD-9-CM 490-496) included asthma. In 2016, CLRD (ICD-10-CM J40-J47) includes asthma and COPD (now usually defined to exclude asthma) is not listed in the main tables.

### New Major Categories:

- diseases of the eye and adnexa (H00-H59)
- diseases of the ear and mastoid process (H60-H95)
- pregnancy, childbirth, and the puerperium (O00-O99)
- conditions originating in the perinatal period (P00-P96)
- congenital deformations & chromosomal abnormalities (Q00-Q99)
- sign and symptoms not elsewhere classified (R00-R099)
- factors influencing health status (Z00-Z99)

### New Sub-categories:

- intestinal infectious diseases (A00-A09)
- cancer of kidney and renal pelvis (C64-C65), non-Hodgkin lymphoma (C82-C85)
- anemia (D50-D64)
- obesity and hyperalimentation (E65-E68)
- mental and behavioral disorders due to alcohol (F10) and other psychoactive substances (F11-F19), mood disorders (F30-F39, among which are bipolar and major depression), anxiety, dissociative, and stress-related somatoform disorders (F40-F48)
- pulmonary heart diseases (I26-I28), conduction disorders and arrhythmias (I44-I49)
- pneumonitis (J69)
- arthroses of the hip (M16) and knee (M17)
- poisoning by narcotics and hallucinogens (T40)
- toxic effects of primarily non-medicinal substances (T51-T65)

## Table Structure

Median stay and median charge data continue to be provided in tables H-1 through H-4. Total charge data had formerly been provided only in table H-1 of all-ages by sex, but now also appears with race-ethnicity, injury, and age-specific categories (H-2, H-3, H-4).

Injury and poisoning appear as first diagnosis S and T codes in tables H-1 and H-2 and reflect anatomic site (e.g. spine). Injury and poisoning tables (H-3, H-4), as in past reports, reflect

injury and poisoning codes that capture how the event happened (e.g. a fall), and intent (e.g. unintentional), and cannot appear in the primary diagnosis field. The first V, W, X, or Y code to appear in the remaining diagnosis fields was used for tabulation, even when an injury code (S or T code) was not listed as the primary diagnosis. Counts and rates of injury and poisoning as reported in these hospitalization tables may differ from data presented by the Department of Public Health (DPH) Office of Injury Prevention. The Office of Injury Prevention uses the recommendations in the CSTE Injury Surveillance Toolkit for tabulating their statistics.

The ranking of leading causes of hospitalization by age and sex continues to appear in table H-5. The ranking by age and race-ethnicity was moved from table H-2 to table H-6. Tables H-7 and H-8 continue to show comparisons (ratios) of age-adjusted hospitalization rates between the sexes and race-ethnicities, for the diagnoses. In addition, they now also present rate (risk) differences.

As in past reports of hospitalizations, the major disease categories in tables H-1 and H-2 were used for ranking, except that diseases of the heart and cerebrovascular disease were used in place of diseases of the circulatory system (I00-I99). Hospitalizations related to the major categories for pregnancy and childbirth (O00-O99), for signs and symptoms not elsewhere classified (R00-R99), and for factors influencing health status (Z00-Z99, which includes Z38, being born) were not used in rankings (Tables H-5, H-6), as they do not represent diseases. Pregnancy and childbirth, and factors influencing health status would each outrank any other major category if they were included in rankings for all ages.

For the first time, appendices appear with inpatient and emergency department counts of visits. These are organized in three ways: by the order of (1) the ICD-10-CM codes, (2) the ISHMT, and (3) the Clinical Classifications Software. The CCS is a tool for grouping together diagnoses which are similar in clinical management.

### Summary of 2016 Data

Prior to October 2015, hospitals used ICD-9 diagnostic codes. The substantial differences between ICD-9 and currently used ICD-10 coding systems preclude finding one-to-one correspondence for most conditions in the current report compared to previous time periods, and it creates a large discontinuity in reporting.

During 2016 there were 382,609 hospitalizations of Connecticut residents in Connecticut hospitals (Table H-1), with total charges of over 15.3 billion dollars, and an age-adjusted hospitalization rate for all conditions of 9,974 per 100,000 residents. The age-adjusted hospitalization rate for all conditions other than pregnancy and birth increased 1.9% from 7,356 the previous year to 7,499 per 100,000 residents. The lowest rate for all conditions was in the 5-14 year old age group (1,466 per 100,000) and highest in the 65 years and over age group (25,270 per 100,000). Overall, the median charge per hospital stay (excluding pregnancy and

childbirth) increased 2.4% to \$29,0764 (unadjusted for inflation) from the prior year, and the median length of stay decreased from four days to three days. Among listed conditions, the longest median stay was for leukemia (eleven days), and the highest median charge was for spinal cord injury (\$110,339). Among major disease categories, the longest median length of stay was for mental and behavioral disorders (six days). The highest median charges were for congenital deformations & chromosomal abnormalities (\$53,226). The largest total charges were for diseases of the heart (two billion dollars).

The leading diagnosis was digestive diseases for all persons of all ages, for females of all ages, and for Hispanic residents of all ages. Heart disease led in males and among non-Hispanic White residents, and mental and behavioral disorders led among non-Hispanic Black residents (Tables H-5, H-6). As leading causes are based on counts rather than rates, leading causes for all ages combined are influenced by age distributions.

During ages 0-4 respiratory diseases was the leading cause of hospitalization in each sex category (all, male, female) and all race-ethnicity groups except non-Hispanic White, where perinatal conditions led. During ages 5-14, 15-24, and 25-44, mental and behavior disorders was the leading cause of hospitalization among all sex and race-ethnicity groups with the exception of non-Hispanic Black residents ages 5-14, for whom respiratory diseases led. In ages 45-64, digestive diseases was the leading cause of hospitalization in all groups except males, where mental and behavioral disorders led. In ages 65 and older, heart disease was the leading cause of hospitalization in all sex and race-ethnicity groups.

The most common type of injury-related hospitalization among all sex and race-ethnicity groups was an unintentional fall. The longest median stay was for intentional self-harm. The highest median injury charge was for assault using firearms (Tables H-3, H-4).

Hospitalization rate ratios between the sexes and by race-ethnicity groups appear in Tables H-7 and H-8.

- The female to male ratio of age-adjusted hospitalization rates for all ages and causes of hospitalization was 1.18 (18% higher for females), but was 0.91 (9% lower) after excluding pregnancy and childbirth-related causes. During ages 15-24 and 25-44 the hospitalization rate for all causes other than pregnancy and childbirth was higher in females than in males; it was higher in males before age 15 and after age 44.
- For all ages and causes, the non-Hispanic Black to non-Hispanic White ratio was 1.46; the Hispanic to non-Hispanic White ratio was 1.09.
- High male to female ratios (>50% elevated) occurred for bladder cancer, kidney cancer, hospitalizations related to alcohol and drugs, psychoses, heart disease, pneumonitis, head and spinal injury, HIV/AIDS, peptic ulcers, and the majority of injury categories presented in Table H-8.
- High female to male ratios occurred for breast cancer, in situ and benign neoplasms, obesity, and asthma.

- Non-Hispanic White to non-Hispanic Black ratios were especially elevated for hip arthrosis, hip fractures, brain cancer, intervertebral disc disorders, and injuries due to falls.
- High non-Hispanic Black to non-Hispanic White ratios and high Hispanic to non-Hispanic White ratios occurred simultaneously within several conditions, such as HIV/AIDS, anemias, diabetes, ear diseases, influenza, chronic lower respiratory disease (including asthma), firearms injury, and spinal cord injury.
- High non-Hispanic Black to non-Hispanic White ratios were also seen in several forms of heart disease, stroke, renal failure, diseases of the eye, Alzheimer’s disease, meningitis, obesity, dehydration, psychoses, drug use other than alcohol, benign neoplasms, prostate cancer, prostate hyperplasia, intestinal infectious diseases, and hernia.
- High Hispanic to non-Hispanic White ratios were also seen for gallstones and kidney stones.

Tables H-7 and H-8 also show rate differences.

- ❖ The hospitalization rates in males exceeded the rates (>100 per 100,000 population) in females within cardiovascular diseases, particularly ischemic heart disease and conduction disorders. Large excesses for males also appeared in mental and behavioral disorders due to alcohol, alcohol dependence, and septicemia.
- ❖ No rate differences exceeded 100 per 100,000 for comparisons of female to male, non-Hispanic White to non-Hispanic Black, or using injury data from tables H-3 and H-4.
- ❖ The largest excess rate comparing non-Hispanic Black to non-Hispanic White was for cardiovascular disease, especially congestive heart failure, cerebrovascular disease, and hypertensive heart diseases. Large differences were seen for anemias, psychoses, diabetes, chronic lower respiratory diseases (including asthma), septicemia, and benign neoplasms.
- ❖ The largest non-Hispanic White to Hispanic rate difference was for hip arthrosis.
- ❖ The largest Hispanic to non-Hispanic White differences appeared in chronic lower respiratory diseases (including asthma), diabetes, and septicemia.

### Other Sources of Connecticut Hospitalization Data

The Connecticut State Innovation Model Dashboard tracks ambulatory care sensitive hospitalizations.<sup>2</sup> The Office of Health Strategy makes available facility level charge, charity care, and bed utilization data.<sup>3</sup> The DPH Environmental Public Health Tracking program Data Explorer makes available hospitalization and ED visit counts and rates by year, county, age, sex, race and ethnicity for selected conditions,<sup>4</sup> as well as non-hospitalization data (e.g. suspected

<sup>2</sup> <https://health.uconn.edu/population-health/hospital-admissions-overall/>

<sup>3</sup> <https://portal.ct.gov/OHS/Health-Systems-Planning/Hospital-Financial-Data/Annual-and-12-Month-Filing-Reports>

<sup>4</sup> <https://stateofhealth.ct.gov/HealthEffects>. The conditions are asthma, 16 cancers, COPD, carbon monoxide poisoning, and heart attack.

and confirmed Lyme disease). The DPH Healthcare Associated Infections and Antimicrobial Resistance (HAI-AR) program publishes data from hospitals and other facilities.<sup>5</sup> The DPH syndromic surveillance for influenza ED visits is also on the DPH website.<sup>6</sup> The DPH Office of Injury Prevention publishes statistics that include injury hospitalizations and ED visits.<sup>7</sup>

### Limitations of Hospitalization Data

Hospitalization refers to any discharge from a non-federal, short-stay, acute-care general hospital in Connecticut. Hospitalizations are expressed as numbers of discharges, not as unduplicated patients; a single patient with multiple hospitalizations can thus be counted more than once. These data do not capture conditions treated on an outpatient basis or that result in death prior to transport to the hospital, nor can they reflect the movement of some treatments from an in-patient to an outpatient setting. As used in this report, race and ethnicity categories are mutually exclusive. Determination of race and ethnicity in billing data may vary from hospital to hospital, sometimes based on self-report and other times on attribution by hospital staff from appearance or surname. Counts of race other than white or black were too small in Connecticut to yield stable rates, nor do hospital race attributions for Asian, Pacific Islander, and Native American (used in rate numerators) match exactly with those from the US census (used in rate denominators). Charge data are easily collected but are not the same as costs or payments. They include facility charges but do not include physician charges.

Medical practices may vary across the United States, so caution should be used if comparing Connecticut with other states. It has been proposed that aspiration pneumonia and pneumonitis form a spectrum of diseases of the lung,<sup>8</sup> implying that in a locality where infection is ruled out more thoroughly than elsewhere, diagnoses would be relatively shifted from pneumonia to pneumonitis. For some conditions, hospitalization rates are also associated with bed availability. The number of hospital beds per 100,000 population varies by geography: country, state, and urban versus rural area.<sup>9</sup>

For the most accurate record of Connecticut resident births and related risk factors and outcomes, see the Registration Reports in the “Vital Statistics” section of the DPH website.<sup>10</sup> For the most accurate record of Connecticut resident cancer risk factors and outcomes, see the Data and Statistics page in the “Tumor Registry” (CTR) section of the DPH website.<sup>11</sup>

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<sup>5</sup> <https://portal.ct.gov/DPH/HAI/Healthcare-Associated-Infections-and-Antimicrobial-Resistance>

<sup>6</sup> <https://portal.ct.gov/DPH/Epidemiology-and-Emerging-Infections/Influenza-Surveillance-and-Statistics>

<sup>7</sup> <https://portal.ct.gov/DPH/Health-Education-Management--Surveillance/The-Office-of-Injury-Prevention/Office-of-Injury-Prevention>

<sup>8</sup> Neill S, Dean N. Aspiration pneumonia and pneumonitis: a spectrum of infectious/noninfectious diseases affecting the lung. *Current Opinion in Infectious Disease* 2019; 32: 152-57.

<sup>9</sup> <https://www.dartmouthatlas.org/faq/>

<sup>10</sup> <https://portal.ct.gov/DPH/Health-Information-Systems--Reporting/Hisrhome/Vital-Statistics-Registration-Reports>

<sup>11</sup> <https://authoring.ct.gov//DPH/Tumor-Registry/Data--Statistics>