

Infectious Disease Hospitalizations

United States, 2001 to 2014

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CHEST 2019; 156(2):255-268

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e-Table 1. Categorization of *International Classification of Diseases, 9th Revision, Clinical Modification* Codes for Infectious Diseases by Site of Infection or Sepsis used to Evaluate Infectious Disease Hospitalizations — United States, 2001–2014

Site of Infection	ICD-9-CM Codes
Cardiovascular System	036.4, 074.2, 112.81, 130.3, 390, 391, 392, 393, 394, 395, 396, 397, 398, 420.90, 420.91, 420.99, 421.0, 421.9, 422.92
Gastrointestinal System	001, 002, 003.0, 004, 005, 006.0, 006.1, 006.2, 007, 008.0, 008.1, 008.2, 008.3, 008.4, 008.5, 008.6, 008.8, 009, 014, 017.8, 021.1, 022.2, 040.2, 041.86, 112.84, 112.85, 129, 530.86, 536.41, 566, 567.1, 567.2, 567.82, 567.89, 567.9, 569.5, 569.61
Hepatobiliary System	006.3, 070, 072.3, 072.71, 072.72, 130.5, 567.81, 572.0, 572.1, 575.0, 575.1, 576.1
Musculoskeletal System	003.23, 003.24, 015, 036.82, 037, 056.71, 137.3, 383.0, 383.21, 567.31, 567.38, 567.39, 711.0, 711.9, 730.0, 730.1, 730.2, 730.9
Nervous System	003.21, 006.5, 013, 017.3, 017.4, 021.3, 036.0, 036.1, 036.81, 036.89, 036.9, 045, 046, 047, 048, 049, 052.0, 052.2, 053, 054.3, 054.4, 054.72, 054.74, 055.0, 055.2, 055.71, 056.0, 058.2, 062, 063, 064, 071, 072.1, 072.2, 076, 077.0, 077.1, 077.2, 077.3, 077.4, 077.8, 077.98, 077.99, 112.83, 114.2, 130.0, 130.1, 130.2, 137.1, 138, 139.0, 320.0, 320.1, 320.2, 320.3, 320.8, 320.9, 324, 326, 357.0
Renal, Urinary, or Reproductive System	016, 072.0, 078.6, 079.4, 091, 092, 093, 094, 095, 096, 097, 098, 099, 112.1, 112.2, 131.0, 137.2, 590.1, 590.2, 590.3, 590.8, 590.9, 595.0, 597.0, 598.00, 599.0, 601.0, 601.2, 601.3, 601.9, 604.0, 604.9, 608.0, 614.0, 614.2, 614.3, 614.4, 614.5, 614.6, 614.9, 616.0, 616.10, 616.3, 616.4, 625.71, 634.0, 635.0, 636.0, 637.0, 638.0, 639.0, 646.6, 647.0, 647.1, 647.2, 647.3, 647.4, 647.5, 647.6, 647.8, 647.9, 658.4, 659.3, 670, 673.3, 675
Upper Respiratory Tract	032, 034, 054.2, 074.0, 079.6, 101, 112.0, 460, 461, 462, 463, 464.0, 464.1, 464.2, 464.3, 464.4, 464.5, 465, 466.0, 466.11, 466.19, 475, 478.21, 478.22, 478.24, 478.29, 478.71, 487.1, 488.02, 488.12, 488.82, 519.01, 522.5, 522.7, 523.31, 527.3
Lower Respiratory Tract	003.22, 006.4, 010, 011, 012, 018, 020.3, 020.4, 020.5, 021.2, 022.1, 031.0, 033, 052.1, 055.1, 073, 079.82, 112.4, 114.0, 114.4, 114.5, 130.4, 136.3, 137.0, 480, 481, 482, 483.0, 483.1, 483.8, 484.1, 484.3, 484.5, 484.6, 484.7, 484.8, 485, 486, 487.0, 488.01, 488.11, 488.81, 510, 511.1, 513, 770.0



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Hematologic, Lymphatic, or Immune System	017.2, 017.7, 020.0, 020.1, 042, 075, 078.3, 079.50, 079.51, 079.52, 079.53, 079.59, 084, 088.82
Dermatologic System	006.6, 017.0, 017.1, 021.0, 022.0, 031.1, 035, 051, 052.9, 054.0, 054.1, 054.6, 054.73, 057, 058.1, 059, 074.3, 078.0, 078.1, 103, 110, 111, 112.3, 132, 133, 134, 376.01, 528.3, 680, 681, 682, 683, 684, 685, 686
Sepsis	003.1, 020.2, 022.3, 036.2, 038.0, 038.1, 038.2, 038.3, 038.4, 038.8, 038.9, 054.5, 449, 785.52, 790.7, 995.9
Other or Not specified	003.20, 003.29, 003.8, 003.9, 006.8, 006.9, 017.5, 017.6, 017.9, 020.8, 020.9, 021.8, 021.9, 022.8, 022.9, 023, 024, 025, 026, 027, 030, 031.2, 031.8, 031.9, 036.3, 039, 040.0, 040.1, 040.3, 040.4, 040.8, 041.0, 041.1, 041.2, 041.3, 041.4, 041.5, 041.6, 041.7, 041.81, 041.82, 041.83, 041.84, 041.85, 041.89, 041.9, 050, 052.7, 052.8, 054.71, 054.79, 054.8, 054.9, 055.79, 055.8, 055.9, 056.79, 056.8, 056.9, 058.8, 060, 061, 065, 066, 072.79, 072.8, 072.9, 074.1, 074.8, 078.2, 078.4, 078.5, 078.7, 078.88, 078.89, 079.0, 079.1, 079.2, 079.3, 079.81, 079.83, 079.88, 079.89, 079.98, 079.99, 080, 081, 082, 083, 085, 086, 087, 088.0, 088.81, 088.89, 088.9, 090, 100, 102, 104, 112.5, 112.82, 112.89, 112.9, 114.1, 114.3, 114.9, 115, 116, 117, 118, 120, 121, 122, 123, 124, 125, 126, 127, 128, 130.7, 130.8, 130.9, 131.8, 131.9, 136.2, 136.4, 136.5, 136.8, 136.9, 137.4, 139.1, 139.8, 254.1, 360.0, 364.03, 370.55, 373.12, 373.13, 379.6, 380.10, 380.11, 380.12, 380.13, 487.8, 488.09, 488.19, 488.89, 655.3, 760.2, 771, 790.8, 958.3, 996.6, 998.5, 999.3

ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification

e-Table 2. Categorization of *International Classification of Diseases, 9th Revision, Clinical Modification* Codes for Infectious Diseases by Pathogen Type used to Evaluate Infectious Disease Hospitalizations — United States, 2001–2014

Pathogen type	ICD-9-CM Codes
Virus (other than HIV)	008.6, 045, 047, 048, 049, 050, 051, 052.0, 052.1, 052.2, 052.7, 052.8, 052.9, 053, 054.0, 054.1, 054.2, 054.3, 054.4, 054.5, 054.6, 054.71, 054.72, 054.73, 054.74, 054.79, 054.8, 054.9, 055.0, 055.1, 055.2, 055.71, 055.79, 055.8, 055.9, 056.0, 056.71, 056.79, 056.8, 056.9, 057, 058.1, 058.2, 058.8, 059, 060, 061, 062, 063, 064, 065, 066, 070, 071, 072.0, 072.1, 072.2, 072.3, 072.71, 072.72, 072.79, 072.8, 072.9, 074.0, 074.1, 074.2, 074.3, 074.8, 075, 077.3, 077.8, 077.99, 078.0, 078.1, 078.4, 078.5, 078.6, 078.7, 078.89, 079.0, 079.1, 079.2, 079.3, 079.4, 079.50, 079.51, 079.52, 079.59, 079.6, 079.81, 079.82, 079.83, 079.89, 079.99, 138, 139.0, 460, 464.4, 466.11, 480, 484.1, 487.0, 487.1, 487.8, 488.01, 488.02, 488.09, 488.11, 488.12, 488.19, 488.81, 488.82, 488.89, 647.5, 647.6, 655.3, 790.8
HIV	042, 079.53
Bacteria (other than Tuberculosis)	001, 002, 003.0, 003.1, 003.20, 003.21, 003.22, 003.23, 003.24, 003.29, 003.8, 003.9, 004, 005, 008.0, 008.1, 008.2, 008.3, 008.4, 008.5, 020.0, 020.1, 020.2, 020.3, 020.4, 020.5, 020.8, 020.9, 021.0, 021.1, 021.2, 021.3, 021.8, 021.9, 022.0, 022.1, 022.2, 022.3, 022.8, 022.9, 023, 024, 025, 026, 027, 030, 031.0, 031.1, 031.2, 031.8, 031.9, 032, 033, 034, 035, 036.0, 036.1, 036.2, 036.3, 036.4, 036.81, 036.82, 036.89, 036.9, 037, 038.0, 038.1, 038.2, 038.3, 038.4, 039, 040.0, 040.1, 040.2, 040.3, 040.4, 040.8, 041.0, 041.1, 041.2, 041.3, 041.4, 041.5, 041.6, 041.7, 041.81, 041.82, 041.83, 041.84, 041.85, 041.86, 041.89, 041.9, 073, 076, 077.98, 078.3, 078.88, 079.88, 079.98, 080, 081, 082, 083, 087, 088.0, 088.81, 090, 091, 092, 093, 094, 095, 096, 097, 098, 099, 100, 101, 102, 103, 104, 139.1, 254.1, 320.0, 320.1, 320.2, 320.3, 320.8, 320.9, 324, 326, 360.0, 370.55, 373.12, 373.13, 376.01, 380.10, 380.11, 380.12, 383.0, 383.21, 390, 391, 392, 393, 394, 395, 396, 397, 398, 420.99, 421.0, 422.92, 475, 478.21, 478.22, 478.24, 478.29, 478.71, 481, 482, 483.0, 483.1, 484.3, 484.5, 510, 511.1, 513, 522.5, 522.7, 523.31, 527.3, 528.3, 566, 567.1, 567.2, 567.31, 567.38, 567.81, 567.82, 567.89, 567.9, 569.5, 569.61, 572.0, 572.1, 575.0, 575.1, 576.1, 597.0, 601.0, 601.2, 601.3, 601.9, 604.0, 608.0, 614.0, 614.2, 614.3, 614.4, 614.5, 614.9, 616.0, 616.10, 616.3, 616.4, 625.71, 634.0, 635.0, 636.0, 637.0, 638.0, 639.0, 646.6, 647.0, 647.1, 670, 673.3, 675, 680, 681, 682, 683, 684, 685, 686, 711.0, 730.0, 730.1, 730.2, 760.2, 785.52, 790.7, 958.3

Tuberculosis	010, 011, 012, 013, 014, 015, 016, 017.0, 017.1, 017.2, 017.3, 017.4, 017.5, 017.6, 017.7, 017.8, 017.9, 018, 137.0, 137.1, 137.2, 137.3, 137.4, 647.3
Fungi	110, 111, 112.0, 112.1, 112.2, 112.3, 112.4, 112.5, 112.81, 112.82, 112.83, 112.84, 112.85, 112.89, 112.9, 114.0, 114.1, 114.2, 114.3, 114.4, 114.5, 114.9, 115, 116, 117, 118, 484.6, 484.7
Parasite	006.0, 006.1, 006.2, 006.3, 006.4, 006.5, 006.6, 006.8, 006.9, 007, 084, 085, 086, 088.82, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130.0, 130.1, 130.2, 130.3, 130.4, 130.5, 130.7, 130.8, 130.9, 131.0, 131.8, 131.9, 132, 133, 134, 136.2, 136.3, 136.4, 136.5, 647.4
Other or Not Specified	008.8, 009, 038.8, 038.9, 046, 077.0, 077.1, 077.2, 077.4, 078.2, 088.89, 088.9, 136.8, 136.9, 139.8, 357.0, 364.03, 379.6, 380.13, 420.90, 420.91, 421.9, 449, 461, 462, 463, 464.0, 464.1, 464.2, 464.3, 464.5, 465, 466.0, 466.19, 483.8, 484.8, 485, 486, 519.01, 530.86, 536.41, 567.39, 590.1, 590.2, 590.3, 590.8, 590.9, 595.0, 598.00, 599.0, 604.9, 614.6, 647.2, 647.8, 647.9, 658.4, 659.3, 711.9, 730.9, 770.0, 771, 995.9, 996.6, 998.5, 999.3

HIV: Human immunodeficiency virus; ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification

e-Table 3. Ten Leading Non-Sepsis Infectious Disease Secondary Diagnoses^a for Hospitalizations with a Principal Diagnosis of Sepsis^b — United States, 2001–2014

ICD-9-CM Code ^{c, d}	Diagnosis	No. of Hospitalizations (SE)	Percentage of Hospitalizations (SE) ^{e, f}	No. of Hospitalizations with In-Hospital Death (SE)	Percentage of Hospitalizations with In-Hospital Death (95% CI) ^f
NA	Total	10,697,272 (68,172)	100	1,597,171 (11,098)	14.94 (14.83–15.05)
599.0	Urinary tract infection	3,798,811 (27,130)	35.5 (0.1)	468,045 (3,990)	12.33 (12.21–12.45)
486	Pneumonia, organism unspecified	2,492,885 (19,290)	23.3 (0.1)	486,274 (4,097)	19.52 (19.33–19.71)
008.45	Intestinal infection due to Clostridium [Clostridioides] difficile	546,865 (5,609)	5.1 (0.03)	114,571 (1,469)	20.96 (20.68–21.26)
682.6	Cellulitis and abscess of leg, except foot	517,866 (4,136)	4.8 (0.02)	46,448 (588)	8.98 (8.79–9.17)
041.4	Bacterial infection in conditions classified elsewhere and of unspecified site, Escherichia coli	388,206 (4,346)	3.6 (0.03)	19,541 (401)	5.04 (4.87–5.21)
590.80	Pyelonephritis, unspecified	335,394 (3,173)	3.1 (0.02)	12,326 (290)	3.68 (3.53–3.83)
590.10	Acute pyelonephritis, without renal medullary necrosis	250,999 (2,758)	2.4 (0.02)	6,542 (231)	2.61 (2.45–2.78)
112.0	Candidiasis of mouth	206,915 (2,033)	1.9 (0.01)	21,768 (380)	10.53 (10.23–10.84)
041.49	Bacterial infection in conditions classified elsewhere and of unspecified site, Other and unspecified Escherichia coli	186,133 (1,965)	1.7 (0.02)	5,867 (179)	3.15 (2.98–3.34)

041.11	Bacterial infection in conditions classified elsewhere and of unspecified site, Methicillin susceptible Staphylococcus aureus	162,413 (1,733)	1.5 (0.01)	11,164 (269)	6.88 (6.60–7.17)
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ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification; No: Number

^aSecondary diagnoses include any diagnosis on the discharge record other than the principal diagnosis; up to 14 secondary diagnoses were examined.

^bPrincipal diagnosis of sepsis was defined as listing of ICD-9-CM codes 003.1, 020.2, 022.3, 036.2, 038.0, 038.1, 038.2, 038.3, 038.4, 038.8, 038.9, 054.5, 449, 785.52, 790.7, or 995.9 as the principal diagnosis.

^cThe counts for larger categories do not include counts from the subcategories; for example, counts for ICD-9-CM code 041.4 do not include counts for ICD-9-CM code 041.49.

^dThe counts reported align strictly with active ICD-9-CM codes.

^eMore than one infectious disease secondary diagnosis can be listed for each hospitalization with a principal diagnosis of sepsis, and therefore this column does not add to 100%.

^fPercentages with 95% CIs were calculated using SUDAAN.

e-Table 4. Ten Most Commonly Listed Infectious Disease Diagnoses within the Other or Not Specified Category by Site of Infection and Pathogen Type — United States, 2001–2014

ICD-9-CM code	Diagnosis	No. of Hospitalizations (SE)	Percentage of Other or Not Specified Category (SE) ^a	Mean Annual Age-Adjusted Hospitalization Rate ^b (95% CI)	No. of Hospitalizations with In-Hospital Death (SE)	Percentage of Hospitalizations with In-Hospital Death (95% CI) ^a
Other or Not Specified Site of Infection						
NA	Total	6,251,090 (42,868)	100	142.8 (141.6–144.0)	128,555 (1,391)	2.06 (2.03–2.09)
998.59	Other postoperative infection	1,886,228 (14,403)	30.2 (0.1)	42.8 (42.4–43.2)	19,154 (370)	1.02 (0.98–1.05)
996.62	Infection and inflammatory reaction due to vascular device, implant, and graft	847,810 (9,315)	13.6 (0.1)	19.2 (18.9–19.5)	35,438 (577)	4.19 (4.08–4.29)
079.99	Unspecified viral infection	552,378 (7,032)	8.8 (0.1)	13.2 (12.9–13.4)	316 (40)	0.06 (0.04–0.07)
996.66	Infection and inflammatory reaction due to internal joint prosthesis	424,503 (5,114)	6.8 (0.1)	9.4 (9.3–9.6)	4,384 (155)	1.04 (0.97–1.11)
996.64	Infection and inflammatory reaction due to indwelling urinary catheter	408,880 (4,573)	6.5 (0.1)	9.2 (9.1–9.3)	9,439 (256)	2.31 (2.21–2.42)
996.67	Infection and inflammatory reaction due to other internal orthopedic device, implant and graft	233,602 (2,750)	3.7 (0.04)	5.3 (5.2–5.4)	1,510 (87)	0.65 (0.58–0.72)

999.31	Other and unspecified infection due to central venous catheter	212,805 (4,303)	3.4 (0.1)	9.0 (8.8–9.2) ^c	7,609 (246)	3.58 (3.39–3.77)
996.69	Infection and inflammatory reaction due to other internal prosthetic device, implant and graft	192,771 (2,036)	3.1 (0.02)	4.3 (4.3–4.4)	2,732 (121)	1.42 (1.30–1.54)
996.61	Infection and inflammatory reaction due to cardiac device, implant and graft	173,233 (2,913)	2.8 (0.04)	3.9 (3.8–4.0)	10,116 (293)	5.85 (5.60–6.11)
999.32	Bloodstream infection due to central venous catheter	102,091 (1,441)	1.6 (0.02)	9.3 (9.1–9.5) ^c	4,370 (158)	4.28 (4.01–4.58)
Other or Not Specified Pathogen Type						
NA	Total	36,570,519 (168,961)	100	833.3 (828.7–837.8)	1,899,161 (11,885)	5.20 (5.15–5.24)
486	Pneumonia, organism unspecified	12,876,229 (64,035)	35.2 (0.1)	292.6 (290.9–294.3)	489,684 (3,454)	3.81 (3.77–3.85)
038.9	Unspecified septicemia	6,680,708 (50,947)	18.3 (0.1)	150.1 (148.8–151.4)	1,159,316 (8,794)	17.36 (17.21–17.52)
599.0	Urinary tract infection	5,195,634 (29,810)	14.2 (0.1)	117.4 (116.5–118.2)	66,671 (807)	1.28 (1.26–1.31)
998.59	Other postoperative infection	1,886,228 (14,403)	5.2 (0.03)	42.8 (42.4–43.2)	19,154 (370)	1.02 (0.98–1.05)
590.80	Pyelonephritis, unspecified	894,145 (7,499)	2.4 (0.02)	21.0 (20.8–21.2)	2,163 (107)	0.24 (0.22–0.27)

466.0	Acute bronchitis	853,685 (7,642)	2.3 (0.02)	19.4 (19.2–19.6)	2,382 (111)	0.28 (0.26–0.31)
008.8	Intestinal infections due to other organism, not elsewhere classified	851,035 (7,503)	2.3 (0.02)	19.7 (19.5–20.0)	1,225 (78)	0.14 (0.13–0.16)
996.62	Infection and inflammatory reaction due to vascular device, implant and graft	847,810 (9,315)	2.3 (0.02)	19.2 (18.9–19.5)	35,438 (577)	4.19 (4.08–4.29)
590.10	Acute pyelonephritis without renal medullary necrosis	837,598 (6,875)	2.3 (0.02)	19.7 (19.5–19.9)	1,946 (102)	0.23 (0.21–0.26)
466.19	Acute bronchiolitis due to other infectious organisms	711,058 (13,926)	1.9 (0.04)	17.5 (16.9–18.0)	273 (38)	0.04 (0.03–0.05)

CI: Confidence interval; ICD-9-CM: International Classification of Diseases, Ninth Revision, Clinical Modification; No: Number; SE: Standard error

^aPercentages with 95% CIs were calculated using SUDAAN.

^bRates are expressed as the number of hospitalizations per 100,000 population. Age-adjusted rates with 95% CIs were calculated using the direct method.

^cICD-9-CM codes 999.31 and 999.32 were not created until October 1, 2007 and October 1, 2011, respectively. The rates for these two ICD-9-CM codes were calculated using the next available calendar year.