

Supplemental Appendix 1. ICD 10 Code Sets for Bacterial Infections

Supplemental Table 1. Diagnosis Codes for Bacterial infection

ICD 10 Code	Description	Sub-Categories
A00.0	Cholera due to <i>Vibrio cholerae</i> 01, biovar cholerae	Gastrointestinal
A00.1	Cholera due to <i>Vibrio cholerae</i> 01, biovar eltor	Gastrointestinal
A00.9	Cholera, unspecified	Gastrointestinal
A01.00	Typhoid fever, unspecified	Gastrointestinal
A01.01	Typhoid meningitis	Central nervous system
A01.02	Typhoid fever with heart involvement	
A01.03	Typhoid pneumonia	Pneumonia/respiratory
A01.04	Typhoid arthritis	Bone/joint
A01.05	Typhoid osteomyelitis	Bone/joint
A01.09	Typhoid fever with other complications	Gastrointestinal
A01.*	Paratyphoid fever	Gastrointestinal
A02.0	Salmonella enteritis	Gastrointestinal
A02.1	Salmonella sepsis	Sepsis
A02.20	Localized salmonella infection, unspecified	
A02.21	Salmonella meningitis	Central nervous system
A02.22	Salmonella pneumonia	Pneumonia/respiratory
A02.23	Salmonella arthritis	Bone/joint
A02.24	Salmonella osteomyelitis	Bone/joint
A02.25	Salmonella pyelonephritis	Genitourinary
A02.29	Salmonella with other localized infection	
A02.8	Other specified salmonella infections	
A02.9	Salmonella infection, unspecified	
A03.*	Shigellosis	Gastrointestinal
A04.*	Bacterial intestinal infection	Gastrointestinal
A20.0	Bubonic plague	Skin/soft tissue
A20.1	Cellulocutaneous plague	Skin/soft tissue
A20.2	Pneumonic plague	Pneumonia/respiratory
A20.3	Plague meningitis	Central nervous system
A20.7	Septicemic plague	Sepsis
A20.8	Other forms of plague	
A20.9	Plague, unspecified	
A21.0	Ulceroglandular tularemia	Skin/soft tissue
A21.1	Oculoglandular tularemia	
A21.2	Pulmonary tularemia	Pneumonia/respiratory
A21.3	Gastrointestinal tularemia	Gastrointestinal
A21.7	Generalized tularemia	Sepsis
A21.8	Other forms of tularemia	
A21.9	Tularemia, unspecified	
A22.0	Cutaneous anthrax	Skin/soft tissue
A22.1	Pulmonary anthrax	Pneumonia/respiratory
A22.2	Gastrointestinal anthrax	Gastrointestinal
A22.7	Anthrax sepsis	Sepsis
A22.8	Other forms of anthrax	
A22.9	Anthrax, unspecified	
A23.0	Brucellosis due to <i>Brucella melitensis</i>	
A23.1	Brucellosis due to <i>Brucella abortus</i>	
A23.2	Brucellosis due to <i>Brucella suis</i>	
A23.3	Brucellosis due to <i>Brucella canis</i>	
A23.8	Other brucellosis	
A23.9	Brucellosis, unspecified	
A24.0	Glanders	
A24.1	Acute and fulminating melioidosis	
A24.3	Other melioidosis	
A24.9	Melioidosis, unspecified	
A25.0	Spirillosis	
A25.1	Streptobacillosis	
A26.0	Cutaneous erysipeloid	Skin/soft tissue
A26.7	Erysipelothrix sepsis	Sepsis
A26.8	Other forms of erysipeloid	
A26.9	Erysipeloid, unspecified	

A27.0	Leptospirosis icterohemorrhagica	
A27.81	Aseptic meningitis in leptospirosis	Central nervous system
A27.89	Other forms of leptospirosis	
A28.0	Pasteurellosis	
A28.1	Cat-scratch disease	Skin/soft tissue
A28.2	Extraintestinal yersiniosis	
A28.8	Other zoonotic bacterial diseases, not elsewhere classified	
A28.9	Zoonotic bacterial disease, unspecified	
A32.0	Cutaneous listeriosis	Skin/soft tissue
A32.11	Listerial meningitis	Central nervous system
A32.12	Listerial meningoencephalitis	Central nervous system
A32.7	Listerial sepsis	Sepsis
A32.81	Oculoglandular listeriosis	
A32.82	Listerial endocarditis	
A32.89	Other forms of listeriosis	
A32.9	Listeriosis, unspecified	
A34	Obstetrical tetanus	
A35	Other tetanus	
A36.0	Pharyngeal diphtheria	Pneumonia/respiratory
A36.1	Nasopharyngeal diphtheria	Pneumonia/respiratory
A36.2	Laryngeal diphtheria	Pneumonia/respiratory
A36.3	Cutaneous diphtheria	Skin/soft tissue
A36.9	Diphtheria, unspecified	
A37.00	Whooping cough due to Bordetella pertussis without pneumonia	Pneumonia/respiratory
A37.01	Whooping cough due to Bordetella pertussis with pneumonia	Pneumonia/respiratory
A37.10	Whooping cough due to Bordetella parapertussis w/o pneumonia	Pneumonia/respiratory
A37.11	Whooping cough due to Bordetella parapertussis with pneumonia	Pneumonia/respiratory
A37.80	Whooping cough due to other Bordetella species w/o pneumonia	Pneumonia/respiratory
A37.81	Whooping cough due to other Bordetella species with pneumonia	Pneumonia/respiratory
A37.90	Whooping cough, unspecified species without pneumonia	Pneumonia/respiratory
A37.91	Whooping cough, unspecified species with pneumonia	Pneumonia/respiratory
A38.0	Scarlet fever with otitis media	
A38.1	Scarlet fever with myocarditis	
A38.8	Scarlet fever with other complications	
A38.9	Scarlet fever, uncomplicated	
A39.0	Meningococcal meningitis	Central nervous system
A39.2	Acute meningococcemia	Sepsis
A39.4	Meningococcemia, unspecified	Sepsis
A39.50	Meningococcal carditis, unspecified	
A39.51	Meningococcal endocarditis	
A39.52	Meningococcal myocarditis	
A39.53	Meningococcal pericarditis	
A39.81	Meningococcal encephalitis	Central nervous system
A39.82	Meningococcal retrobulbar neuritis	Central nervous system
A39.83	Meningococcal arthritis	Bone/joint
A39.89	Other meningococcal infections	
A39.9	Meningococcal infection, unspecified	
A40.*	Streptococcal Sepsis	Sepsis
A41.0*	Sepsis due to Methicillin susceptible Staphylococcus aureus	Sepsis
A41.1	Sepsis due to other specified staphylococcus	Sepsis
A41.2	Sepsis due to unspecified staphylococcus	Sepsis
A41.3	Sepsis due to Hemophilus influenzae	Sepsis
A41.4	Sepsis due to anaerobes	Sepsis
A41.5*	Gram-negative sepsis	Sepsis
A41.81	Sepsis due to Enterococcus	Sepsis
A42.0	Pulmonary actinomycosis	Pneumonia/respiratory
A42.1	Abdominal actinomycosis	Intra-abdominal
A42.2	Cervicofacial actinomycosis	
A42.7	Actinomycotic sepsis	Sepsis
A42.81	Actinomycotic meningitis	Central nervous system
A42.82	Actinomycotic encephalitis	Central nervous system
A42.89	Other forms of actinomycosis	
A42.9	Actinomycosis, unspecified	
A43.0	Pulmonary nocardiosis	Pneumonia/respiratory
A43.1	Cutaneous nocardiosis	Skin/soft tissue
A43.8	Other forms of nocardiosis	

A43.9	Nocardiosis, unspecified	
A44.0	Systemic bartonellosis	
A44.1	Cutaneous and mucocutaneous bartonellosis	Skin/soft tissue
A44.8	Other forms of bartonellosis	
A44.9	Bartonellosis, unspecified	
A46	Erysipelas	Skin/soft tissue
A48.0	Gas gangrene	Skin/soft tissue
A48.1	Legionnaires disease	Pneumonia/respiratory
A48.2	Nonpneumonic Legionnaires disease [Pontiac fever]	
A48.3	Toxic shock syndrome	
A48.4	Brazilian purpuric fever	
A48.52	Wound botulism	Skin/soft tissue
A48.8	Other specified bacterial diseases	
A49.01	Methicillin susceptible Staphylococcal infection, unspecified site	
A49.02	Methicillin resistant Staphylococcal infection, unspecified site	
A49.1	Streptococcal infection, unspecified site	
A49.2	Hemophilus influenzae infection, unspecified site	
A49.3	Mycoplasma infection, unspecified site	
A49.8	Other bacterial infections of unspecified site	
A49.9	Bacterial infection, unspecified	
A51.0	Primary genital syphilis	Genitourinary
A51.1	Primary anal syphilis	Gastrointestinal
A51.2	Primary syphilis of other sites	
A51.31	Condyloma latum	Skin/soft tissue
A51.32	Syphilitic alopecia	
A51.39	Other secondary syphilis of skin	Skin/soft tissue
A51.41	Secondary syphilitic meningitis	Central nervous system
A51.42	Secondary syphilitic female pelvic disease	Genitourinary
A51.43	Secondary syphilitic oculopathy	
A51.44	Secondary syphilitic nephritis	
A51.45	Secondary syphilitic hepatitis	Intra-abdominal
A51.46	Secondary syphilitic osteopathy	Bone/joint
A51.49	Other secondary syphilitic conditions	
A51.5	Early syphilis, latent	
A51.9	Early syphilis, unspecified	
A52.00	Cardiovascular syphilis, unspecified	
A52.01	Syphilitic aneurysm of aorta	
A52.02	Syphilitic aortitis	
A52.03	Syphilitic endocarditis	
A52.04	Syphilitic cerebral arteritis	Central nervous system
A52.05	Other cerebrovascular syphilis	Central nervous system
A52.06	Other syphilitic heart involvement	
A52.09	Other cardiovascular syphilis	
A52.10	Symptomatic neurosyphilis, unspecified	Central nervous system
A52.12	Other cerebrospinal syphilis	Central nervous system
A52.2	Asymptomatic neurosyphilis	Central nervous system
A52.3	Neurosyphilis, unspecified	Central nervous system
A52.72	Syphilis of lung and bronchus	Pneumonia/respiratory
A52.73	Symptomatic late syphilis of other respiratory organs	
A52.74	Syphilis of liver and other viscera	Intra-abdominal
A52.75	Syphilis of kidney and ureter	Genitourinary
A52.76	Other genitourinary symptomatic late syphilis	Genitourinary
A52.77	Syphilis of bone and joint	Bone/joint
A52.78	Syphilis of other musculoskeletal tissue	Skin/soft tissue
A52.79	Other symptomatic late syphilis	
A52.8	Late syphilis, latent	
A52.9	Late syphilis, unspecified	
A53.0	Latent syphilis, unspecified as early or late	
A53.9	Syphilis, unspecified	
A54.0-2*	Gonococcal genitourinary infection	Genitourinary
A54.30	Gonococcal infection of eye, unspecified	
A54.31	Gonococcal conjunctivitis	
A54.32	Gonococcal iridocyclitis	
A54.33	Gonococcal keratitis	
A54.39	Other gonococcal eye infection	
A54.40	Gonococcal infection of musculoskeletal system, unspecified	Skin/soft tissue

A54.42	Gonococcal arthritis	Bone/joint
A54.43	Gonococcal osteomyelitis	Bone/joint
A54.49	Gonococcal infection of other musculoskeletal tissue	Skin/soft tissue
A54.5	Gonococcal pharyngitis	Pneumonia/respiratory
A54.6	Gonococcal infection of anus and rectum	Gastrointestinal
A54.81	Gonococcal meningitis	Central nervous system
A54.82	Gonococcal brain abscess	Central nervous system
A54.83	Gonococcal heart infection	
A54.84	Gonococcal pneumonia	Pneumonia/respiratory
A54.85	Gonococcal peritonitis	Intra-abdominal
A54.86	Gonococcal sepsis	Sepsis
A54.89	Other gonococcal infections	
A54.9	Gonococcal infection, unspecified	
A55	Chlamydial lymphogranuloma (venereum)	Genitourinary
A56.0*	Chlamydial infection of lower genitourinary tract	Genitourinary
A56.11	Chlamydial female pelvic inflammatory disease	Genitourinary
A56.19	Other chlamydial genitourinary infection	Genitourinary
A56.2	Chlamydial infection of genitourinary tract, unspecified	Genitourinary
A56.3	Chlamydial infection of anus and rectum	Gastrointestinal
A56.4	Chlamydial infection of pharynx	Pneumonia/respiratory
A56.8	Sexually transmitted chlamydial infection of other sites	Genitourinary
A57	Chancroid	Genitourinary
A58	Granuloma inguinale	Genitourinary
A68.0	Louse-borne relapsing fever	
A68.1	Tick-borne relapsing fever	
A69.20	Lyme disease, unspecified	
A69.21	Meningitis due to Lyme disease	Central nervous system
A69.98	Other specified spirochetal infections	
A69.9	Spirochetal infection, unspecified	
A70	Chlamydia psittaci infections	
A71.0	Initial stage of trachoma	
A71.1	Active stage of trachoma	
A71.9	Trachoma, unspecified	
A74.0	Chlamydial conjunctivitis	
A74.81	Chlamydial peritonitis	Intra-abdominal
A74.89	Other chlamydial diseases	
A74.9	Chlamydial infection, unspecified	
A75.*	Rickettsial infections	
A77.*	Spotted fever and ehrlichiosis	
A78	Q fever	
A79.*	Other Rickettsioses	
B95.0	Streptococcus, group A, causing diseases classified elsewhere	
B95.1	Streptococcus, group B, causing diseases classified elsewhere	
B95.2	Enterococcus as the cause of diseases classified elsewhere	
B95.3	Streptococcus pneumoniae causing diseases classified elsewhere	
B95.4	Other streptococcus as the cause of diseases classified elsewhere	
B95.5	Unspecified streptococcus as the cause of diseases classified elsewhere	
B95.61	Methicillin susceptible staph infection causing diseases classified elsewhere	
B95.62	Methicillin resistant staph infection causing diseases classified elsewhere	
B95.7	Other staphylococcus as the cause of diseases classified elsewhere	
B95.8	Unspecified staphylococcus as the cause of diseases classified elsewhere	
B96.0	Mycoplasma pneumoniae as the cause of diseases classified elsewhere	
B96.1	Klebsiella pneumoniae as the cause of diseases classified elsewhere	
B96.20	Unspecified Escherichia coli as the cause of diseases classified elsewhere	
B96.21	Shiga toxin E coli (STEC) O157 causing diseases classified elsewhere	
B96.22	Other shiga toxin E coli (STEC) causing diseases classified elsewhere	
B96.23	Unspecified shiga toxin E coli (STEC) causing diseases classified elsewhere	
B96.29	Other Escherichia coli as the cause of diseases classified elsewhere	
B96.3	Hemophilus influenzae as the cause of diseases classified elsewhere	
B96.4	Proteus (mirabilis) (morganii) causing diseases classified elsewhere	
B96.5	Pseudomonas (mallei) causing diseases classified elsewhere	
B96.6	Bacteroides fragilis as the cause of diseases classified elsewhere	
B96.7	Clostridium perfringens causing diseases classified elsewhere	
B96.81	Helicobacter pylori as the cause of diseases classified elsewhere	
B96.82	Vibrio vulnificus as the cause of diseases classified elsewhere	
B96.89	Other bacterial agents as the cause of diseases classified elsewhere	

D73.3	Abscess of spleen	Intra-abdominal
G0.0*	Bacterial meningitis	Central nervous system
G01	Meningitis in bacterial diseases classified elsewhere	Central nervous system
G04.2	Bacterial meningoencephalitis and meningomyelitis, not elsewhere classified	Central nervous system
G06.0	Intracranial abscess and granuloma	Central nervous system
G06.1	Intraspinal abscess and granuloma	Central nervous system
G06.2	Extradural and subdural abscess, unspecified	Central nervous system
H05.01*	Cellulitis of orbit	Skin/soft tissue
H05.02*	Osteomyelitis of orbit	Bone/joint
H60.0*	Abscess of external ear	Skin/soft tissue
H60.1*	Cellulitis of external ear	Skin/soft tissue
H60.2*	Malignant otitis externa	Skin/soft tissue
H66.0*	Acute suppurative otitis media	Pneumonia/respiratory
H70.0*	Acute mastoiditis	Pneumonia/respiratory
H70.2*	Acute petrositis	Pneumonia/respiratory
I33.0	Acute and subacute infective endocarditis	
I33.9	Acute and subacute endocarditis, unspecified	
I76	Septic arterial embolism	
J02.0	Streptococcal pharyngitis	Pneumonia/respiratory
J03.00	Acute streptococcal tonsillitis, unspecified	Pneumonia/respiratory
J03.01	Acute recurrent streptococcal tonsillitis	Pneumonia/respiratory
J13	Pneumonia due to Streptococcus pneumoniae	Pneumonia/respiratory
J14	Pneumonia due to Hemophilus influenzae	Pneumonia/respiratory
J15.*	Bacterial pneumonia	Pneumonia/respiratory
J16.0	Chlamydial pneumonia	Pneumonia/respiratory
J18.1	Lobar pneumonia, unspecified organism	Pneumonia/respiratory
J20.0	Acute bronchitis due to Mycoplasma pneumoniae	Pneumonia/respiratory
J20.1	Acute bronchitis due to Hemophilus influenzae	Pneumonia/respiratory
J20.2	Acute bronchitis due to streptococcus	Pneumonia/respiratory
J36	Peritonsillar abscess	Pneumonia/respiratory
J39.0	Retropharyngeal and parapharyngeal abscess	Pneumonia/respiratory
J39.1	Other abscess of pharynx	Pneumonia/respiratory
J85.1	Abscess of lung with pneumonia	Pneumonia/respiratory
J85.2	Abscess of lung without pneumonia	Pneumonia/respiratory
J85.3	Abscess of mediastinum	
J86.*	Pyothorax	
J95.851	Ventilator associated pneumonia	Pneumonia/respiratory
K12.2	Cellulitis and abscess of mouth	
K22.3	Perforation of esophagus	
K25.1	Acute gastric ulcer with perforation	Intra-abdominal
K25.2	Acute gastric ulcer with both hemorrhage and perforation	Intra-abdominal
K26.1	Acute duodenal ulcer with perforation	Intra-abdominal
K26.2	Acute duodenal ulcer with both hemorrhage and perforation	Intra-abdominal
K27.1	Acute peptic ulcer, site unspecified, with perforation	Intra-abdominal
K27.2	Acute peptic ulcer, site unspecified, w both hemorrhage and perf	Intra-abdominal
K28.1	Acute gastrojejunal ulcer with perforation	Intra-abdominal
K28.2	Acute gastrojejunal ulcer w both hemorrhage and perforation	Intra-abdominal
K35*	Acute appendicitis	Intra-abdominal
K50.014	Crohns disease of small intestine with abscess	Intra-abdominal
K50.114	Crohns disease of large intestine with abscess	Intra-abdominal
K50.814	Crohns disease of both small and large intestine with abscess	Intra-abdominal
K50.914	Crohns disease, unspecified, with abscess	Intra-abdominal
K51.014	Ulcerative (chronic) pancolitis with abscess	Intra-abdominal
K51.214	Ulcerative (chronic) proctitis with abscess	Intra-abdominal
K51.314	Ulcerative (chronic) rectosigmoiditis with abscess	Intra-abdominal
K51.414	Inflammatory polyps of colon with abscess	Intra-abdominal
K51.514	Left sided colitis with abscess	Intra-abdominal
K51.814	Other ulcerative colitis with abscess	Intra-abdominal
K51.914	Ulcerative colitis, unspecified with abscess	Intra-abdominal
K57.00	Diverticulitis of small intestine with perforation and abscess without bleeding	Intra-abdominal
K57.01	Diverticulitis of small intestine with perforation and abscess with bleeding	Intra-abdominal
K57.13	Diverticulitis of small intestine without perforation or abscess with bleeding	Intra-abdominal
K57.20	Diverticulitis of large intestine with perforation and abscess without bleeding	Intra-abdominal
K57.21	Diverticulitis of large intestine with perforation and abscess with bleeding	Intra-abdominal
K57.33	Diverticulitis of large intestine without perforation or abscess with bleeding	Intra-abdominal

K57.40	Diverticulitis of both small and large intestine with perforation and abscess without bleeding	Intra-abdominal
K57.41	Diverticulitis of both small and large intestine with perforation and abscess with bleeding	Intra-abdominal
K57.53	Diverticulitis of both small and large intestine without perforation or abscess with bleeding	Intra-abdominal
K57.80	Diverticulitis of intestine, part unspecified, with perforation and abscess without bleeding	Intra-abdominal
K57.81	Diverticulitis of intestine, part unspecified, with perforation and abscess with bleeding	Intra-abdominal
K57.93	Diverticulitis of intestine, part unspecified, without perforation or abscess with bleeding	Intra-abdominal
K61.*	Ischiorectal abscess	Intra-abdominal
K63.0	Abscess of intestine	Intra-abdominal
K65.0	Generalized (acute) peritonitis	Intra-abdominal
K65.1	Peritoneal abscess	Intra-abdominal
K65.2	Spontaneous bacterial peritonitis	Intra-abdominal
K65.3	Choleperitonitis	Intra-abdominal
K68.11	Postprocedural retroperitoneal abscess	Skin/soft tissue
K68.12	Psoas muscle abscess	Skin/soft tissue
K68.19	Other retroperitoneal abscess	Skin/soft tissue
K75.0	Abscess of liver	Intra-abdominal
K80.00	Calculus of gallbladder w acute cholecystitis w/o obstruction	Intra-abdominal
K80.01	Calculus of gallbladder w acute cholecystitis w obstruction	Intra-abdominal
K80.12	Calculus of GB w acute and chronic cholecystitis w/o obstruction	Intra-abdominal
K80.13	Calculus of GB w acute and chronic cholecystitis w obstruction	Intra-abdominal
K80.32	Calculus of bile duct with acute cholangitis w/o obstruction	Intra-abdominal
K80.33	Calculus of bile duct w acute cholangitis with obstruction	Intra-abdominal
K80.36	Calculus of bile duct w acute and chronic cholangitis w/o obstruction	Intra-abdominal
K80.37	Calculus of bile duct w acute and chronic cholangitis w obstruction	Intra-abdominal
K80.42	Calculus of bile duct w acute cholecystitis w/o obstruction	Intra-abdominal
K80.43	Calculus of bile duct w acute cholecystitis with obstruction	Intra-abdominal
K80.46	Calculus of bile duct w acute and chronic cholecystitis w/o obstruction	Intra-abdominal
K80.47	Calculus of bile duct w acute and chronic cholecystitis w obstruction	Intra-abdominal
K80.62	Calculus of GB and bile duct w acute cholecystitis w/o obstruction	Intra-abdominal
K80.63	Calculus of GB and bile duct w acute cholecystitis w obstruction	Intra-abdominal
K80.66	Calculus of GB and bile duct w ac and chronic cholecystitis w/o obstruction	Intra-abdominal
K80.67	Calculus of GB and bile duct w ac and chronic cholecystitis w obstruction	Intra-abdominal
K81.0	Acute cholecystitis	Intra-abdominal
K81.2	Acute cholecystitis with chronic cholecystitis	Intra-abdominal
K82.2	Perforation of gallbladder	Intra-abdominal
K82.A1	Gangrene of gallbladder in cholecystitis	Intra-abdominal
K82.A2	Perforation of gallbladder in cholecystitis	Intra-abdominal
K83.0	Cholangitis	Intra-abdominal
K83.2	Perforation of bile duct	Intra-abdominal
L00	Staphylococcal scalded skin syndrome	Skin/soft tissue
L01.0*	Impetigo	Skin/soft tissue
L01.1	Impetiginization of other dermatoses	Skin/soft tissue
L02.*	Cutaneous abscess / furuncle / carbuncle	Skin/soft tissue
L03.*	Cellulitis / acute lymphangitis	Skin/soft tissue
L04.*	Acute lymphadenitis	Skin/soft tissue
L05.01	Pilonidal cyst with abscess	Skin/soft tissue
L05.02	Pilonidal sinus with abscess	Skin/soft tissue
M00.0*	Staphylococcal arthritis	Bone/joint
M00.1*	Pneumococcal arthritis	Bone/joint
M00.2*	Other streptococcal arthritis, unspecified joint	Bone/joint
M00.8*	Arthritis due to other bacteria, unspecified joint	Bone/joint
M00.9	Pyogenic arthritis, unspecified	Bone/joint
M46.2*	Osteomyelitis of vertebra	Bone/joint
M46.3*	Infection of intervertebral disc (pyogenic)	Bone/joint
M65.0*	Abscess of tendon sheath	Skin/soft tissue
M71.0*	Abscess of bursa	Skin/soft tissue
M72.6	Necrotizing fasciitis	Skin/soft tissue
M86.0*	Acute hematogenous osteomyelitis	Bone/joint
M86.1*	Other acute osteomyelitis	Bone/joint
M86.2*	Subacute osteomyelitis	Bone/joint
N10	Acute pyelonephritis	Genitourinary
N13.6	Pyonephrosis	Genitourinary
N15.1	Renal and perinephric abscess	Genitourinary
N30.00	Acute cystitis without hematuria	Genitourinary
N30.01	Acute cystitis with hematuria	Genitourinary

N34.0	Urethral abscess	Genitourinary
N39.0	Urinary tract infection, site not specified	Genitourinary
N41.0	Acute prostatitis	Genitourinary
N41.2	Abscess of prostate	Genitourinary
N41.3	Prostatocystitis	Genitourinary
N43.1	Infected hydrocele	Genitourinary
N45.1	Epididymitis	Genitourinary
N45.4	Abscess of epididymis or testis	Genitourinary
N48.21	Abscess of corpus cavernosum and penis	Genitourinary
N48.22	Cellulitis of corpus cavernosum and penis	Genitourinary
N49.3	Fournier gangrene	Genitourinary
N61.0	Mastitis without abscess	Skin/soft tissue
N61.1	Abscess of the breast and nipple	Skin/soft tissue
N70.01	Acute salpingitis	Genitourinary
N70.02	Acute oophoritis	Genitourinary
N70.03	Acute salpingitis and oophoritis	Genitourinary
N73.0	Acute parametritis and pelvic cellulitis	Skin/soft tissue
N73.3	Female acute pelvic peritonitis	Intra-abdominal
N75.1	Abscess of Bartholins gland	Genitourinary
N76.4	Abscess of vulva	Genitourinary
N99.511	Cystostomy infection	Genitourinary
N99.521	Infection of incontinent external stoma of urinary tract	Genitourinary
O03.37	Sepsis following incomplete spontaneous abortion	Sepsis
O03.38	Urinary tract infection following incomplete spontaneous abortion	Genitourinary
O03.87	Sepsis following complete or unspecified spontaneous abortion	Sepsis
O03.88	Urinary tract infection following complete or unspecified spontaneous abortion	Genitourinary
O04.87	Sepsis following (induced) termination of pregnancy	Sepsis
O04.88	Urinary tract infection following (induced) term of pregnancy	Genitourinary
O07.0	Genital tract and pelvic infection following failed attempt term of pregnancy	Genitourinary
O07.37	Sepsis following failed attempted termination of pregnancy	Sepsis
O07.38	Urinary tract infection following failed attempt term of pregnancy	Genitourinary
O08.0	Genital tract and pelvic infection following ectopic and molar pregnancy	Genitourinary
O08.82	Sepsis following ectopic and molar pregnancy	Sepsis
O08.83	Urinary tract infection following an ectopic and molar pregnancy	Genitourinary
O23.0*	Infections of kidney in pregnancy	Genitourinary
O23.1*	Infections of bladder in pregnancy	Genitourinary
O23.2*	Infections of urethra in pregnancy	Genitourinary
O23.3*	Infections of other parts of urinary tract in pregnancy	Genitourinary
O23.52*	Salpingo-oophoritis in pregnancy	Genitourinary
O23.59*	Infection of other part of genital tract in pregnancy, first trimester	Genitourinary
O41.112*	Chorioamnionitis	Intra-abdominal
O85	Puerperal sepsis	Sepsis
O86.00-2	Infection of obstetric surgical wound	Skin/soft tissue
O86.03	Infection of obstetric surgical wound, organ and space site	Intra-abdominal
O86.04	Sepsis following an obstetrical procedure	Sepsis
O86.12	Endometritis following delivery	Genitourinary
O86.2	Urinary tract infection following delivery	Genitourinary
O86.81	Puerperal septic thrombophlebitis	
O88.3	Pyemic and septic embolism in pregnancy	
O91.11*	Abscess of breast associated with pregnancy, first trimester	Skin/soft tissue
O98.1*	Syphilis complicating pregnancy or childbirth	
O98.2	Gonorrhea complicating pregnancy or childbirth	
T81.41*	Infection following a procedure, superficial incisional surgical site	Skin/soft tissue
T81.42*	Infection following a procedure, deep incisional surgical site	Skin/soft tissue
T81.43*	Infection following a procedure, organ and space incisional surgical site	Skin/soft tissue

Supplemental Table 2. Non-Specific Diagnosis Codes for Sepsis or Pneumonia

ICD 10 Code	Description
A41.89	Other specified sepsis
A41.9	Sepsis, unspecified organism
J16.8	Pneumonia due to other specified infectious organisms
J17	Pneumonia in diseases classified elsewhere
J18.8	Other pneumonia, unspecified organism
J18.9	Pneumonia, unspecified organism
R65.20	Severe sepsis without septic shock
R65.21	Severe sepsis with septic shock
T81.44XA	Sepsis following a procedure, initial encounter

Supplemental Table 3. Patient and Hospital Variables Associated with Bacterial Co-Infection POA

	aRR*	95% CI		p-value
		LL	UL	
Age	1.01	1.01	1.01	< 0.001
Male	0.82	0.79	0.85	< 0.001
Hospital Transfer	1.18	1.10	1.26	< 0.001
Admission from long-term care	1.40	1.31	1.49	< 0.001
Black race	0.92	0.88	0.96	< 0.001
Hispanic ethnicity	0.89	0.84	0.94	< 0.001
Urban hospital	0.96	0.87	1.05	0.359
Bed size category	1.01	0.99	1.03	0.333
Northeast region	0.98	0.91	1.06	0.621
% COVID-19 admissions	0.99	0.99	1.00	< 0.001
% Admissions with mechanical ventilation	1.01	1.00	1.01	0.043
<i>Elixhauser Comorbidities:</i>				
- Valvular heart disease	0.93	0.85	1.01	0.077
- Pulmonary circulation disease	1.12	0.99	1.26	0.082
- Peripheral vascular disease	1.16	1.08	1.25	< 0.001
- Hypertension, uncomplicated	0.91	0.88	0.95	< 0.001
- Hypertension, complicated	1.12	1.07	1.18	< 0.001
- Paralysis	1.51	1.38	1.64	< 0.001
- Neurologic disorders	1.24	1.19	1.30	< 0.001
- Chronic lung disease	0.98	0.94	1.02	0.310
- Diabetes mellitus, uncomplicated	1.01	0.96	1.06	0.667
- Diabetes mellitus, complicated	1.14	1.09	1.19	< 0.001
- Hypothyroidism	1.06	1.01	1.11	0.016
- Renal failure	1.05	0.99	1.11	0.081
- Liver disease	1.17	1.08	1.26	< 0.001
- Peptic ulcer disease	1.19	1.03	1.37	0.019
- HIV / AIDS	0.97	0.70	1.34	0.848
- Lymphoma	1.05	0.86	1.27	0.659
- Metastatic malignancy	1.13	0.95	1.34	0.163
- Solid tumor	1.02	0.91	1.15	0.682
- Rheumatoid arthritis / collagen-vascular	1.11	1.02	1.21	0.014
- Coagulopathy	1.17	1.11	1.24	< 0.001
- Obesity	1.05	1.00	1.09	0.053
- Weight loss	1.35	1.28	1.41	< 0.001
- Fluid and electrolyte disorders	1.31	1.26	1.36	< 0.001
- Blood loss anemia	1.03	0.87	1.23	0.704
- Deficiency anemia	1.27	1.22	1.32	0.000
- Alcohol abuse	1.05	0.94	1.17	0.387
- Substance use disorder	1.22	1.08	1.38	0.001
- Psychoses	1.17	1.11	1.24	< 0.001
- Depression	1.07	1.02	1.13	0.004

* All covariates included in the model are included in this table. Risk ratios are adjusted based on listed covariates.

Supplemental Table 4. Patient and Hospital Variables Associated with Bacterial Secondary Infection not POA

	aRR*	95% CI		p-value
		LL	UL	
Age	1.00	1.00	1.01	0.026
Male	1.18	1.09	1.28	< 0.001
Hospital Transfer	1.68	1.40	2.01	< 0.001
Admission from long-term care	0.75	0.60	0.95	0.016
Black race	0.88	0.79	0.97	0.014
Hispanic ethnicity	1.12	1.00	1.25	0.049
Urban hospital	0.83	0.66	1.05	0.130
Bed size category	1.11	1.06	1.16	< 0.001
Northeast region	1.06	0.89	1.26	0.529
% COVID-19 admissions	1.00	0.99	1.00	0.132
% Admissions with mechanical ventilation	1.06	1.05	1.07	< 0.001
<i>Elixhauser Comorbidities:</i>				
- Valvular heart disease	1.11	0.90	1.38	0.317
- Pulmonary circulation disease	0.98	0.76	1.27	0.893
- Peripheral vascular disease	0.83	0.66	1.03	0.093
- Hypertension, uncomplicated	1.13	1.02	1.25	0.016
- Hypertension, complicated	1.00	0.89	1.14	0.942
- Paralysis	1.59	1.27	2.00	< 0.001
- Neurologic disorders	0.96	0.85	1.08	0.513
- Chronic lung disease	1.10	0.99	1.21	0.072
- Diabetes mellitus, uncomplicated	0.82	0.72	0.93	0.003
- Diabetes mellitus, complicated	1.30	1.17	1.44	< 0.001
- Hypothyroidism	0.98	0.87	1.10	0.757
- Renal failure	0.86	0.75	0.98	0.026
- Liver disease	1.30	1.11	1.51	0.001
- Peptic ulcer disease	1.64	1.15	2.32	0.006
- HIV / AIDS	1.04	0.60	1.80	0.899
- Lymphoma	1.07	0.74	1.56	0.703
- Metastatic malignancy	1.06	0.76	1.47	0.727
- Solid tumor	1.32	1.00	1.74	0.049
- Rheumatoid arthritis / collagen-vascular	1.22	0.98	1.52	0.068
- Coagulopathy	1.29	1.14	1.46	< 0.001
- Obesity	1.85	1.70	2.02	< 0.001
- Weight loss	1.94	1.72	2.20	< 0.001
- Fluid and electrolyte disorders	1.34	1.24	1.44	< 0.001
- Blood loss anemia	0.90	0.58	1.38	0.620
- Deficiency anemia	1.49	1.36	1.64	0.000
- Alcohol abuse	0.93	0.70	1.24	0.627
- Substance use disorder	1.27	1.01	1.61	0.041
- Psychoses	1.06	0.89	1.26	0.515
- Depression	1.00	0.87	1.14	0.985

* All covariates included in the model are included in this table. Risk ratios are adjusted based on listed covariates.

Supplemental Table 5. Patient and Hospital Characteristics Associated with In-Hospital Death or Discharge to Hospice

	Model Evaluating Bacterial Co-infection				Model Evaluating Bacterial Secondary Infection			
	aRR	95% CI		p-value	aRR	95% CI		p-value
		LL	UL			LL	UL	
Bacterial co-infection	1.15	1.11	1.20	< 0.001	1.15	1.11	1.20	< 0.001
Bacterial secondary infection					1.93	1.82	2.04	< 0.001
Age	1.05	1.04	1.05	< 0.001	1.05	1.04	1.05	< 0.001
Male	1.26	1.22	1.30	< 0.001	1.26	1.22	1.30	< 0.001
Hospital Transfer	1.39	1.25	1.54	< 0.001	1.37	1.24	1.51	< 0.001
Admission from long-term care	1.20	1.14	1.27	< 0.001	1.21	1.15	1.28	< 0.001
Black race	0.86	0.83	0.90	< 0.001	0.87	0.83	0.90	< 0.001
Hispanic ethnicity	0.92	0.85	1.00	0.044	0.92	0.85	1.00	0.041
Urban hospital	1.03	0.91	1.17	0.616	1.04	0.91	1.18	0.549
Bed size category	1.03	1.01	1.06	0.013	1.03	1.00	1.06	0.022
Northeast region	0.94	0.86	1.02	0.152	0.94	0.86	1.02	0.156
% COVID-19 admissions	1.01	1.00	1.01	< 0.001	1.01	1.00	1.01	< 0.001
% Admissions with mechanical ventilation	1.01	1.01	1.02	< 0.001	1.01	1.01	1.02	< 0.001
<i>Elixhauser Comorbidities:</i>								
- Valvular heart disease	0.97	0.91	1.03	0.367	0.97	0.91	1.03	0.301
- Pulmonary circulation disease	1.09	0.99	1.20	0.088	1.07	0.97	1.18	0.163
- Peripheral vascular disease	1.02	0.96	1.08	0.526	1.02	0.97	1.08	0.429
- Hypertension, uncomplicated	0.90	0.86	0.93	< 0.001	0.89	0.86	0.93	< 0.001
- Hypertension, complicated	1.15	1.10	1.20	< 0.001	1.14	1.10	1.19	< 0.001
- Paralysis	1.49	1.38	1.60	< 0.001	1.46	1.35	1.58	< 0.001
- Neurologic disorders	1.20	1.16	1.25	< 0.001	1.21	1.16	1.25	< 0.001
- Chronic lung disease	1.05	1.02	1.09	0.002	1.05	1.02	1.09	0.002
- Diabetes mellitus, uncomplicated	0.99	0.94	1.04	0.734	1.00	0.95	1.05	0.999
- Diabetes mellitus, complicated	1.15	1.12	1.19	< 0.001	1.15	1.11	1.18	< 0.001
- Hypothyroidism	1.03	0.99	1.06	0.121	1.03	0.99	1.06	0.100
- Renal failure	1.10	1.05	1.15	< 0.001	1.10	1.05	1.15	< 0.001
- Liver disease	1.15	1.08	1.24	< 0.001	1.15	1.07	1.23	< 0.001
- Peptic ulcer disease	0.83	0.68	1.02	0.081	0.80	0.65	0.99	0.039
- HIV / AIDS	1.14	0.90	1.45	0.279	1.13	0.89	1.45	0.317
- Lymphoma	1.35	1.18	1.54	< 0.001	1.35	1.19	1.54	< 0.001
- Metastatic malignancy	1.68	1.54	1.83	< 0.001	1.66	1.52	1.80	< 0.001
- Solid tumor	1.14	1.05	1.25	0.003	1.14	1.04	1.24	0.005
- Rheumatoid arthritis / collagen-vascular	1.10	1.01	1.18	0.022	1.08	1.00	1.17	0.045
- Coagulopathy	1.23	1.18	1.29	< 0.001	1.21	1.16	1.27	< 0.001
- Obesity	1.22	1.15	1.29	< 0.001	1.19	1.13	1.26	< 0.001
- Weight loss	1.16	1.09	1.25	< 0.001	1.13	1.06	1.21	< 0.001
- Fluid and electrolyte disorders	1.41	1.34	1.48	< 0.001	1.40	1.33	1.47	< 0.001
- Blood loss anemia	0.87	0.70	1.09	0.230	0.87	0.70	1.08	0.218
- Deficiency anemia	1.01	0.97	1.05	0.743	0.99	0.96	1.03	0.766
- Alcohol abuse	1.00	0.90	1.11	0.987	1.01	0.91	1.12	0.879
- Substance use disorder	0.76	0.66	0.88	< 0.001	0.75	0.65	0.86	< 0.001
- Psychoses	1.14	1.07	1.21	< 0.001	1.14	1.07	1.21	< 0.001
- Depression	0.95	0.90	1.00	0.031	0.95	0.91	1.00	0.036

* All covariates included in the model are included in this table. Risk ratios are adjusted listed covariates.

Supplemental Table 6. Factors Associated with Bacterial Secondary Infection after Immunosuppression on or Before Hospital Day 2

	Model with Steroids Only				Model with Tocilizumab Only			
	aRR*	95% CI		p-value	aRR*	95% CI		p-value
		LL	UL			LL	UL	
Corticosteroids by Hospital Day 2	1.65	1.48	1.85	< 0.001				
Tocilizumab by Hospital Day 2					2.66	2.14	3.33	< 0.001
Age	1.00	1.48	1.84	0.010	1.00	1.00	1.01	0.016
Male	1.16	1.00	1.01	< 0.001	1.16	1.07	1.26	< 0.001
Hospital Transfer	1.63	1.07	1.25	< 0.001	1.64	1.37	1.96	< 0.001
Admission from long-term care	0.76	1.37	1.94	0.017	0.76	0.60	0.95	0.018
Black race	0.89	0.60	0.95	0.031	0.88	0.80	0.98	0.017
Hispanic ethnicity	1.11	0.81	0.99	0.063	1.11	0.99	1.23	0.067
Urban hospital	0.84	0.99	1.24	0.125	0.85	0.67	1.08	0.178
Bed size category	1.11	0.66	1.05	< 0.001	1.10	1.06	1.15	< 0.001
Northeast region	1.06	1.07	1.16	0.559	1.06	0.88	1.26	0.542
% COVID-19 admissions	1.00	0.88	1.26	0.089	1.00	0.99	1.00	0.124
% Admissions w. mechanical ventilation	1.06	0.99	1.00	< 0.001	1.06	1.05	1.07	< 0.001
<i>Elixhauser Comorbidities:</i>								
- Valvular heart disease	1.12	0.90	1.38	0.306	1.12	0.91	1.38	0.298
- Pulmonary circulation disease	0.98	0.76	1.27	0.879	0.97	0.75	1.25	0.808
- Peripheral vascular disease	0.83	0.66	1.04	0.107	0.84	0.67	1.04	0.113
- Hypertension, uncomplicated	1.13	1.02	1.24	0.018	1.13	1.02	1.24	0.019
- Hypertension, complicated	1.00	0.88	1.13	0.992	1.01	0.89	1.14	0.891
- Paralysis	1.59	1.27	2.00	0.000	1.59	1.27	2.00	< 0.001
- Neurologic disorders	0.98	0.87	1.11	0.759	0.97	0.86	1.10	0.639
- Chronic lung disease	1.02	0.92	1.12	0.719	1.10	0.99	1.21	0.071
- Diabetes mellitus, uncomplicated	0.83	0.73	0.95	0.007	0.82	0.72	0.93	0.003
- Diabetes mellitus, complicated	1.29	1.16	1.43	< 0.001	1.30	1.17	1.44	< 0.001
- Hypothyroidism	0.97	0.87	1.10	0.667	0.98	0.87	1.11	0.785
- Renal failure	0.87	0.76	0.99	0.038	0.86	0.75	0.98	0.028
- Liver disease	1.30	1.11	1.52	0.001	1.30	1.12	1.52	0.001
- Peptic ulcer disease	1.67	1.17	2.39	0.005	1.62	1.15	2.30	0.006
- HIV / AIDS	1.03	0.59	1.79	0.911	1.03	0.60	1.78	0.921
- Lymphoma	1.07	0.74	1.53	0.734	1.07	0.74	1.54	0.734
- Metastatic malignancy	1.05	0.75	1.45	0.783	1.09	0.78	1.51	0.622
- Solid tumor	1.31	0.99	1.73	0.063	1.32	1.00	1.74	0.048
- Rheumatoid arthritis / collagen-vascular	1.10	0.88	1.37	0.425	1.22	0.98	1.52	0.071
- Coagulopathy	1.27	1.13	1.44	< 0.001	1.28	1.14	1.45	< 0.001
- Obesity	1.82	1.67	1.99	< 0.001	1.83	1.67	2.00	< 0.001
- Weight loss	1.95	1.72	2.20	< 0.001	1.96	1.73	2.21	< 0.001
- Fluid and electrolyte disorders	1.31	1.22	1.41	< 0.001	1.33	1.23	1.43	< 0.001
- Blood loss anemia	0.91	0.59	1.40	0.680	0.93	0.60	1.42	0.726
- Deficiency anemia	1.49	1.36	1.64	< 0.001	1.49	1.36	1.64	< 0.001
- Alcohol abuse	0.95	0.71	1.26	0.717	0.93	0.71	1.24	0.640
- Substance use disorder	1.29	1.02	1.63	0.031	1.30	1.03	1.65	0.025
- Psychoses	1.07	0.91	1.27	0.401	1.06	0.90	1.26	0.490
- Depression	1.00	0.88	1.14	0.996	1.01	0.88	1.15	0.919

* All covariates included in the model are included in this table. Risk ratios are adjusted based on listed covariates.

Supplemental Table 7. Factors Associated with Bacterial Secondary Infection after Immunosuppression by Hospital Day 2, including both Steroids and Tocilizumab

	aRR*	95% CI		p-value
		LL	UL	
Corticosteroids by Hospital Day 2	1.60	1.42	1.81	< 0.001
Tocilizumab by Hospital Day 2	2.74	2.11	3.57	< 0.001
Interaction Early Steroids * Early Tocilizumab	0.74	0.54	1.02	0.069
Age	1.00	1.00	1.01	0.007
Male	1.14	1.06	1.24	0.001
Hospital Transfer	1.61	1.35	1.90	< 0.001
Admission from long-term care	0.76	0.60	0.95	0.018
Black race	0.90	0.81	0.99	0.033
Hispanic ethnicity	1.10	0.98	1.23	0.080
Urban hospital	0.85	0.67	1.07	0.166
Bed size category	1.11	1.06	1.16	< 0.001
Northeast region	1.05	0.87	1.25	0.572
% COVID-19 admissions	1.00	0.99	1.00	0.091
% Admissions with mechanical ventilation	1.06	1.05	1.07	< 0.001
<i>Elixhauser Comorbidities:</i>				
- Valvular heart disease	1.12	0.91	1.38	0.288
- Pulmonary circulation disease	0.97	0.75	1.25	0.802
- Peripheral vascular disease	0.84	0.67	1.05	0.125
- Hypertension, uncomplicated	1.12	1.02	1.24	0.021
- Hypertension, complicated	1.00	0.89	1.14	0.943
- Paralysis	1.59	1.27	2.00	< 0.001
- Neurologic disorders	0.99	0.88	1.12	0.865
- Chronic lung disease	1.03	0.93	1.13	0.628
- Diabetes mellitus, uncomplicated	0.83	0.73	0.95	0.005
- Diabetes mellitus, complicated	1.29	1.16	1.43	< 0.001
- Hypothyroidism	0.98	0.87	1.10	0.697
- Renal failure	0.87	0.76	0.99	0.039
- Liver disease	1.30	1.12	1.53	0.001
- Peptic ulcer disease	1.66	1.16	2.37	0.005
- HIV / AIDS	1.03	0.59	1.77	0.928
- Lymphoma	1.06	0.74	1.52	0.755
- Metastatic malignancy	1.07	0.77	1.48	0.680
- Solid tumor	1.31	0.99	1.73	0.063
- Rheumatoid arthritis / collagen-vascular	1.11	0.88	1.38	0.382
- Coagulopathy	1.27	1.12	1.43	< 0.001
- Obesity	1.80	1.65	1.97	< 0.001
- Weight loss	1.96	1.74	2.21	< 0.001
- Fluid and electrolyte disorders	1.30	1.21	1.40	< 0.001
- Blood loss anemia	0.94	0.61	1.44	0.774
- Deficiency anemia	1.49	1.36	1.64	< 0.001
- Alcohol abuse	0.95	0.72	1.26	0.722
- Substance use disorder	1.32	1.04	1.66	0.020
- Psychoses	1.08	0.91	1.27	0.390
- Depression	1.01	0.88	1.15	0.913

* All covariates included in the model are included in this table. Risk ratios are adjusted based on listed covariates.

