Table, Supplemental Digital Content 1. Study definitions by ICD Ninth Revision Clinical Modification (ICD-9-CM) and Tenth Revision Clinical Modification (ICD-10-CM) codes

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| **Variable** | **ICD-9-CM** | **ICD-10-CM** | **Comment** |
| **Decompensation and Portal Hypertension Variables** | | | |
| Decompensation |  |  | Clinical decompensation defined as presence of any of these: esophageal varices with bleeding, hepatic encephalopathy, hepatorenal syndrome, hepatopulmonary syndrome, spontaneous bacterial peritonitis. See below for coding for ascites and non-bleeding varices.  Records showing a decompensation event were categorized as having cirrhosis. Biliary cirrhosis was counted as cirrhosis only when decompensation or portal hypertension also occurred (see autoimmune section for further details).  Presence of ascites and non-bleeding varices were coded in the following manner:   * Ascites *and* code for cirrhosis, other specific chronic liver disease, or portal hypertension = cirrhosis and decompensation event * Ascites alone = not counted as clinical decompensation, placed in no chronic liver disease (CLD) group * Non-bleeding varices *and* code for cirrhosis, other specific chronic liver disease, or portal hypertension = cirrhosis. Not counted as clinical decompensation. * Non-bleeding varices alone = not counted as clinical decompensation, placed in no CLD group |
| Esophageal varices, bleeding | 456.0  456.20 | I85.01 | ICD-9 and 10 Code Descriptions  456.0 Esophageal varices with bleeding  456.20 Esophageal varices in diseases classified elsewhere, with bleeding  I85.01 Esophageal varices with bleeding |
| Esophageal varices, no bleeding | 456.1  456.21 | I85.00 | ICD-9 and 10 Code Descriptions  456.1 Esophageal varices without mention of bleeding  456.21 Esophageal varices in diseases classified elsewhere, without mention of bleeding  I85.00 Esophageal varices without bleeding  *Used to capture cirrhosis, but not a clinical decompensation event* |
| Hepatic encephalopathy | 572.2 |  | ICD-9 Code Descriptions  572.2 Hepatic encephalopathy |
| Hepatorenal syndrome | 572.4 | K76.7 | ICD-9 and 10 Code Descriptions  572.4 Hepatorenal syndrome  K76.7 Hepatorenal syndrome |
| Hepatopulmonary syndrome | 573.5 | K76.81 | ICD-9 and 10 Code Descriptions  573.5 Hepatopulmonary syndrome  K76.81 Hepatopulmonary syndrome |
| Spontaneous bacterial peritonitis | 567.2 | K65.2 | ICD-9 and 10 Code Descriptions  567.2 Spontaneous bacterial peritonitis  K65.2 Spontaneous bacterial peritonitis |
| Ascites | 789.5 | R18  R18.8  K71.51 | ICD-9 and 10 Code Descriptions  789.5 Ascites  R18 Ascites  R18.8 Other ascites  K71.51 Toxic liver disease with chronic active hepatitis with ascites  *Requires concurrent code for cirrhosis, other specific chronic liver disease, or portal hypertension to capture both cirrhosis and decompensation event* |
| **Cirrhosis Variables** | | | |
| Cirrhosis group definition |  |  | Cirrhosis was defined by the following codes:   * Presence of at least one cirrhosis code (can occur concurrently with codes in the chronic liver disease category) * Etiology of cirrhosis described below |
| Cirrhosis: Alcohol liver disease | 571.2 | K70.3  K70.3[01] | ICD-9 Code Descriptions  571.2 Alcoholic cirrhosis of liver  ICD-10 Code Descriptions  K70.3 Alcoholic cirrhosis of liver  K70.3[01] Alcoholic cirrhosis of liver without/with ascites |
| Cirrhosis: Autoimmune | 571.6 | K74.3  K74.5 | ICD-9 Code Descriptions  571.6 Biliary cirrhosis *[only coded as cirrhosis if record also shows a portal hypertensive decompensation event (including non-bleeding varices) or portal hypertension, otherwise it is coded as “other chronic liver disease without cirrhosis”]*  ICD-10 Code Descriptions  *The following group of codes are only coded as cirrhosis if record also shows a portal hypertensive decompensation event (including non-bleeding varices) or portal hypertension, otherwise it is coded as “other chronic liver disease without cirrhosis”*  K74.3 Primary biliary cirrhosis, Chronic nonsuppurative destructive cholangitis  K74.5 Biliary cirrhosis, unspecified |
| Cirrhosis: Other |  | K74.4 | ICD-10 Code Descriptions  K74.4 Secondary biliary cirrhosis *[only coded as cirrhosis if record also shows a portal hypertensive decompensation event (including non-bleeding varices) or portal hypertension, otherwise it is coded as “other chronic liver disease without cirrhosis”]* |
| Cirrhosis: Unknown | 571.5  572.3  456.0  456.1  456.2[01]  572.2  572.4  573.5  567.2  789.5 | K71.7  K72.1[01]  K74.6  K74.6[09]  K76.6  K65.2  K71.51  K72.9[01]  K76.7  K76.81  I85.0  I85.0[01]  R18  R18.8 | ICD-9 Code Descriptions  571.5 Cirrhosis of liver without mention of alcohol  572.3 Portal hypertension *[only coded as cirrhosis when accompanied by another chronic liver disease or cirrhosis code, or non-bleeding varices or any decompensation event]*  456.0 Esophageal varices with bleeding  456.1 Esophageal varices without mention of bleeding  456.20 Esophageal varices in diseases classified elsewhere, with bleeding  456.21 Esophageal varices in diseases classified elsewhere, without mention of bleeding  572.2 Hepatic encephalopathy  572.4 Hepatorenal syndrome  573.5 Hepatopulmonary syndrome  567.2 Spontaneous bacterial peritonitis  789.5 Ascites *[only coded as cirrhosis when accompanied by another chronic liver disease or cirrhosis code (including portal hypertension)]*  ICD-10 Code Descriptions  K71.7 Toxic liver disease with fibrosis and cirrhosis of liver  K72.10 Chronic hepatic failure without coma  K72.11 Chronic hepatic failure with coma  K74.6 Other and unspecified cirrhosis of liver  K74.60 Unspecified cirrhosis of liver  K74.69 Other cirrhosis of liver, including Cryptogenic, Macronodular, Micronodular, Mixed type, Portal, Post-necrotic  K76.6 Portal hypertension *[only coded as cirrhosis when accompanied by another chronic liver disease or cirrhosis code, or non-bleeding varices or any decompensation event]*  K65.2 Spontaneous bacterial peritonitis  K71.51 Toxic liver disease with chronic active hepatitis with ascites  K76.7 Hepatorenal syndrome  K76.81 Hepatopulmonary syndrome  I85.0 Esophageal varices  I85.0[01] Esophageal varices without bleeding/with bleeding  *This next group of codes are used to define cirrhosis ONLY when accompanied by another chronic liver disease or cirrhosis code (including portal hypertension).*  K72.9 Hepatic failure, unspecified  K72.90 Hepatic failure without coma  K72.91 Hepatic failure with coma  R18 Ascites  R18.8 Other ascites |
| Portal hypertension | 572.3 | K76.6 | ICD-9 and 10 Code Descriptions  *Only coded as cirrhosis when accompanied by another chronic liver disease or cirrhosis code, or non-bleeding varices or any decompensation event*  572.3 Portal hypertension  K76.6 Portal hypertension |
| **Chronic Liver Disease Variables** | | | |
| Non-cirrhotic CLD group definition |  |  | Non-cirrhotic CLD was defined by the following codes:   * Presence of at least one chronic liver disease code * If concurrent cirrhosis code, then would be categorized as cirrhosis * Etiology of chronic liver disease described below |
| Non-cirrhotic CLD without cirrhosis: Chronic viral hepatitis | 571.4[0129]  070.2[0123]  070.3[0123]  070.4[249]  070.5[249]  070.6  070.7[01]  070.9  V02.6[0129] | K71.3  K71.4  K71.5  K71.50  K73.[01289]  K74.[012]  B18.[01289]  B19.[01]  B19.1[01]  B19.2  B19.2[01]  B19.9  O98.41  O98.41[1239]  O98.42  O98.43 | ICD-9 Code Descriptions  571.4 Chronic hepatitis  070.2x/070.3x Viral hepatitis B with/without hepatic coma  070.42 Hepatitis delta without mention of active hepatitis B disease with hepatic coma, Hepatitis delta with hepatitis B carrier state  070.44 Chronic hepatitis C with hepatic coma  070.49 Other specified viral hepatitis with hepatic coma  070.5 Other specified viral hepatitis without mention of hepatic coma  070.52 Hepatitis delta without mention of active hepatitis B disease or hepatic coma  070.54 Chronic hepatitis C without mention of hepatic coma  070.59 Other specified viral hepatitis without mention of hepatic coma  070.6 Unspecified viral hepatitis with hepatic coma  070.7 Unspecified viral hepatitis C  070.70 Unspecified viral hepatitis C without hepatic coma, Unspecified viral hepatitis C NOS  070.71 Unspecified viral hepatitis C with hepatic coma  070.9 Unspecified viral hepatitis without mention of hepatic coma, Viral hepatitis NOS  V02.6 Carrier or suspected carrier of viral hepatitis  V02.60 Viral hepatitis carrier, unspecified  V02.61 Hepatitis B carrier  V02.62 Hepatitis C carrier  V02.69 Other viral hepatitis carrier  ICD-10 Code Descriptions  K71.3 Toxic liver disease with chronic persistent hepatitis  K71.4 Toxic liver disease with chronic lobular hepatitis  K71.5 Toxic liver disease with chronic active hepatitis  K71.50 Toxic liver disease with chronic active hepatitis without ascites  K73 Chronic hepatitis, not elsewhere classified  K73.0 Chronic persistent hepatitis, not elsewhere classified  K73.1 Chronic lobular hepatitis, not elsewhere classified  K73.2 Chronic active hepatitis, not elsewhere classified  K73.8 Other chronic hepatitis, not elsewhere classified  K73.9 Chronic hepatitis, unspecified  K74.0 Hepatic fibrosis  K74.1 Hepatic sclerosis  K74.2 Hepatic fibrosis with hepatic sclerosis  B18.0/1 Chronic viral hepatitis B with/without delta-agent  B18.2 Chronic viral hepatitis C  B18.8 Other chronic viral hepatitis  B18.9 Chronic viral hepatitis, unspecified  B19 Unspecified viral hepatitis  B19.0 Unspecified viral hepatitis with hepatic coma  B19.1 Unspecified viral hepatitis B  B19.10 Unspecified viral hepatitis B without hepatic coma, Unspecified viral hepatitis B NOS  B19.11 Unspecified viral hepatitis B with hepatic coma  B19.2 Unspecified viral hepatitis C  B19.20 Unspecified viral hepatitis C without hepatic coma, Viral hepatitis C NOS  B19.21 Unspecified viral hepatitis C with hepatic coma  B19.9 Unspecified viral hepatitis without hepatic coma, Viral hepatitis NOS  O98.4x Viral hepatitis complicating pregnancy, childbirth and the puerperium |
| Non-cirrhotic CLD: Alcoholic liver disease | 571.0  571.3  291  291.[01234589]  291.8[129]  303  303.0  303.0[0123]  303.9  303.9[0123]  V11.3  305.[0123]  357.5  425.5  535.3  535.3[01]  760.71  790.3  980.[012389] | K70.[01]  K70.2  K70.4  K70.4[01]  K70.9  F10.1  F10.1[024589]  F10.12[019]  F10.15[019]  F10.18[0128]  F10.2  F10.2[012]  F10.22[019]  F10.2[3456789]  F10.23[0129]  F10.25[019]  F10.28[0128]  F10.9  F10.9[2456789]  F10.92[019]  F10.95[019]  F10.98[0128]  G62.1  I42.6  K29.2  K29.2[01]  G31.2  G72.1  Q86.0  O35.4XX[0123459]  K85.2  K86.0 | ICD-9 Code Descriptions  571.0 Alcoholic fatty liver  571.3 Alcoholic liver damage, unspecified  *The next group of codes for non-liver related alcohol use or disorders are used to define alcoholic liver disease if used in combination with a CLD code with unknown etiology.*  291 Alcohol-induced mental disorders  291.0 Alcohol withdrawal delirium  291.1 Alcohol-induced persisting amnestic disorder  291.2 Alcohol-induced persisting dementia  291.3 Alcohol-induced psychotic disorder with hallucinations  291.4 Idiosyncratic alcohol intoxication  291.5 Alcohol-induced psychotic disorder with delusions  291.8 Other specified alcohol-induced mental disorders  291.81 Alcohol withdrawal  291.82 Alcohol-induced sleep disorder  291.89 Other alcohol-induced mental disorders  291.9 Unspecified alcohol-induced mental disorders  303 Alcohol dependence syndrome  303.0 Acute alcoholic intoxication  303.00 Acute alcoholic intoxication in alcoholism, unspecified  303.01 Acute alcoholic intoxication in alcoholism, continuous  303.02 Acute alcoholic intoxication in alcoholism, episodic  303.03 Acute alcoholic intoxication in alcoholism, in remission  303.9 Other and unspecified alcohol dependence  303.90 Other and unspecified alcohol dependence, unspecified  303.91 Other and unspecified alcohol dependence, continuous  303.92 Other and unspecified alcohol dependence, episodic  303.93 Other and unspecified alcohol dependence, in remission  V11.3 Personal history of alcoholism  305.0 Nondependent alcohol abuse  305.00 Alcohol abuse, unspecified  305.01 Alcohol abuse, continuous  305.02 Alcohol abuse, episodic  305.03 Alcohol abuse, in remission  357.5 Alcoholic polyneuropathy  425.5 Alcoholic cardiomyopathy  535.3 Alcoholic gastritis  535.30 Alcoholic gastritis (without hemorrhage)  535.31 Alcoholic gastritis with hemorrhage  760.71 Alcohol affecting fetus or newborn via placenta or breast milk  790.3 Excessive blood level of alcohol  980.0 Toxic effect of ethyl alcohol/denatured alcohol/ethanol/grain alcohol  980.1 Toxic effect of methyl alcohol/methanol/wood alcohol  980.2 Toxic effect of isopropyl alcohol/dimethyl carbinol/isopropanol/rubbing alcohol  980.3 Toxic effect of fusel oil, alcohol: amyl/butyl/propyl  980.8 Toxic effect of other specified alcohols  980.9 Toxic effect of unspecified alcohol  ICD-10 Code Descriptions  K70.0 Alcoholic fatty liver  K70.2 Alcoholic fibrosis and sclerosis of liver  K70.4 Alcoholic hepatic failure  K70.4[01] Alcoholic hepatic failure without/with coma  K70.9 Alcoholic liver disease, unspecified  *The next group of codes for non-liver related alcohol use or disorders are used to define alcoholic liver disease if used in combination with a CLD code with unknown etiology.*  F10.1 Alcohol abuse  F10.10 Alcohol abuse, uncomplicated  F10.12 Alcohol abuse with intoxication  F10.120 Alcohol abuse with intoxication, uncomplicated  F10.121 Alcohol abuse with intoxication, delirium  F10.29 Alcohol abuse with intoxication, unspecified  F10.14 Alcohol abuse with alcohol-induced mood disorder  F10.15 Alcohol abuse with alcohol-induced psychotic disorder  F10.150 Alcohol abuse with alcohol-induced psychotic disorder, with delusions  F10.151 Alcohol abuse with alcohol-induced psychotic disorder, with hallucinations  F10.159 Alcohol abuse with alcohol-induced psychotic disorder, unspecified  F10.18 Alcohol abuse with other alcohol-induced disorders  F10.180 Alcohol abuse with alcohol-induced anxiety disorder  F10.181 Alcohol abuse with alcohol-induced sexual dysfunction  F10.182 Alcohol abuse with alcohol-induced sleep disorder  F10.188 Alcohol abuse with other alcohol-induced disorder  F10.2 Alcohol dependence  F10.20 Alcohol dependence, uncomplicated  F10.21 Alcohol dependence, in remission  F10.22 Alcohol dependence with intoxication  F10.220 Alcohol dependence with intoxication, uncomplicated  F10.221 Alcohol dependence with intoxication, delirium  F10.229 Alcohol dependence with intoxication, unspecified  F10.23 Alcohol dependence with withdrawal  F10.230 Alcohol dependence with withdrawal, uncomplicated  F10.231 Alcohol dependence with withdrawal, delirium  F10.232 Alcohol dependence with withdrawal, with perceptual disturbance  F10.239 Alcohol dependence with withdrawal, unspecified  F10.24 Alcohol dependence with alcohol-induced mood disorder  F10.25 Alcohol dependence with alcohol-induced psychotic disorder  F10.250 Alcohol dependence with alcohol-induced psychotic disorder, with delusions  F10.251 Alcohol dependence with alcohol-induced psychotic disorder, with hallucinations  F10.259 Alcohol dependence with alcohol-induced psychotic disorder, unspecified  F10.26 Alcohol dependence with alcohol-induced persisting amnestic disorder  F10.27 Alcohol dependence with alcohol-induced persisting dementia  F10.28 Alcohol dependence with other alcohol-induced disorders  F10.280 Alcohol dependence with alcohol-induced anxiety disorder  F10.281 Alcohol dependence with alcohol-induced sexual dysfunction  F10.282 Alcohol dependence with alcohol-induced sleep disorder  F10.288 Alcohol dependence with other alcohol-induced disorder  F10.29 Alcohol dependence with unspecified alcohol-induced disorder  F10.9 Alcohol use, unspecified  F10.92 Alcohol use, unspecified with intoxication  F10.920 Alcohol use, unspecified with intoxication, uncomplicated  F10.921 Alcohol use, unspecified with intoxication, delirium  F10.929 Alcohol use, unspecified with intoxication, unspecified  F10.94 Alcohol use, unspecified, with alcohol-induced mood disorder  F10.95 Alcohol use, unspecified with alcohol-induced psychotic disorder  F10.950 Alcohol use, unspecified with alcohol-induced psychotic disorder, with delusions  F10.951 Alcohol use, unspecified with alcohol-induced psychotic disorder, with hallucinations  F10.959 Alcohol use, unspecified with alcohol-induced psychotic disorder, unspecified  F10.96 Alcohol use, unspecified, with alcohol-induced persisting amnestic disorder  F10.97 Alcohol use, unspecified, with persisting dementia  F10.98 Alcohol use, unspecified, with other alcohol-induced disorders  F10.980 Alcohol use, unspecified, with alcohol-induced anxiety disorder  F10.981 Alcohol use, unspecified, with alcohol-induced sexual dysfunction  F10.982 Alcohol use, unspecified, with alcohol-induced sleep disorder  F10.988 Alcohol use, unspecified, with other alcohol-induced disorder  F10.99 Alcohol use, unspecified with unspecified alcohol-induced disorder  G62.1 Alcoholic polyneuropathy  I42.6 Alcoholic cardiomyopathy  K49.2 Alcoholic gastritis  K49.20 Alcoholic gastritis without bleeding  K49.21 Alcoholic gastritis with bleeding  G31.2 Degeneration of nervous system due to alcohol  G72.1 Alcoholic myopathy  Q86.0 Fetal alcohol syndrome (dysmorphic)  O35.4 Maternal care for (suspected) damage to fetus from alcohol  O35.4XX0 Maternal care for (suspected) damage to fetus from alcohol, not applicable or unspecified  O35.4XX1 Maternal care for (suspected) damage to fetus from alcohol, fetus 1  O35.4XX2 Maternal care for (suspected) damage to fetus from alcohol, fetus 2  O35.4XX3 Maternal care for (suspected) damage to fetus from alcohol, fetus 3  O35.4XX4 Maternal care for (suspected) damage to fetus from alcohol, fetus 4  O35.4XX5 Maternal care for (suspected) damage to fetus from alcohol, fetus 5  O35.4XX9 Maternal care for (suspected) damage to fetus from alcohol, other fetus  K85.2 Alcohol-induced acute pancreatitis  K96.0 Alcohol-induced chronic pancreatitis |
| Non-cirrhotic CLD: NAFLD/NASH | 571.8 | K76.0  K75.81 | ICD-9 Code Descriptions  571.8 Other chronic nonalcoholic liver disease  ICD-10 Code Descriptions  K76.0 Fatty (change of) liver, not elsewhere classified, Nonalcoholic fatty liver disease (NAFLD)  K75.81 Nonalcoholic steatohepatitis (NASH) |
| Non-cirrhotic CLD: Autoimmune | 571.42  571.6  576.1 | K74.3  K74.5  K75.3  K75.4  K75.8[9]  K75.9  K83.0 | ICD-9 Code Descriptions  571.42 Autoimmune hepatitis  571.6 Biliary cirrhosis *[counts as “other chronic liver disease without cirrhosis” if there is no portal hypertensive decompensation event (including non-bleeding varices) or portal hypertension associated with it]*  576.1 Cholangitis (captures primary sclerosing cholangitis)  ICD-10 Code Descriptions  *The following group of codes are coded as “other chronic liver disease without cirrhosis” if there is no portal hypertensive decompensation event (including non-bleeding varices) or portal hypertension associated with it.*  K74.3 Primary biliary cirrhosis, Chronic nonsuppurative destructive cholangitis  K74.5 Biliary cirrhosis, unspecified  K75.3 Granulomatous hepatitis, not elsewhere classified  K75.4 Autoimmune hepatitis, Lupoid hepatitis NEC  K75.8 Other specified inflammatory liver diseases  K75.89 Other specified inflammatory liver diseases  K75.9 Inflammatory liver disease, unspecified  K83.0 Cholangitis without liver abscess (captures primary sclerosing cholangitis) |
| Non-cirrhotic CLD: Copper/Iron Metabolism Disorders | 275.01  275.03  275.1 | E83.01  E83.11  E83.11[0189] | ICD-9 Code Descriptions  275.01 Hereditary hemochromatosis  275.03 Other hemochromatosis  275.1 Disorders of copper metabolism (captures Wilson’s disease)  ICD-10 Code Descriptions  E83.01 Wilson's disease  E83.11 Hemochromatosis  E83.110 Hereditary hemochromatosis: Bronzed diabetes, Pigmentary cirrhosis (of liver), Primary (hereditary) hemochromatosis  E83.111 Hemochromatosis due to repeated red blood cell transfusions: Iron overload due to repeated red blood cell transfusions, Transfusion (red blood cell) associated hemochromatosis  E83.118 Other hemochromatosis  E83.119 Hemochromatosis, unspecified |
| Non-cirrhotic CLD: Other | 573.0  273.4  453.0  277.3[09]  120[.012389] | K74.4  E88.01  I82.0  K76.1  K76.4  K76.5  K76.8  K76.9  E85[.0123489]  E85.8[129]  B65[.012389] | ICD-9 Code Descriptions  573.0 Chronic passive congestion of liver  273.4 Alpha 1 antitrypsin deficiency  453.0 Budd-Chiari syndrome  277.3 Amyloidosis  277.30 Amyloidosis, unspecified  277.39 Other amyloidosis  120 Schistosomiasis  120.0 Schistosomiasis due to Schistosoma haematobium  120.1 Schistosomiasis due to Schistosoma mansoni  120.2 Schistosomiasis due to Schistosoma japonicum  120.3 Cutaneous schistosomiasis  120.8 Other specified schistosomiasis  120.9 Schistosomiasis, unspecified  ICD-10 Code Descriptions  K74.4 Secondary biliary cirrhosis  E88.01 Alpha 1 antitrypsin deficiency  I82.0 Budd-Chiari syndrome  K76.1 Chronic passive congestion of liver, Cardiac cirrhosis Cardiac sclerosis  K76.4 Peliosis hepatis, Hepatic angiomatosis – other  K76.5 Hepatic veno-occlusive disease  E85 Amyloidosis  E85.0 Non-neuropathic heredofamilial amyloidosis  E85.1 Neuropathic heredofamilial amyloidosis  E85.2 Heredofamilial amyloidosis, unspecified  E85.3 Secondary systemic amyloidosis  E85.4 Organ-limited amyloidosis  E85.8 Other amyloidosis  E85.81 Light chain (AL) amyloidosis  E85.82 Wild-type transthyretin-related (ATTR) amyloidosis  E85.89 Other amyloidosis  E85.9 Amyloidosis, unspecified  B65 Schistosomiasis  B65.0 Schistosomiasis due to Schistosoma haematobium  B65.1 Schistosomiasis due to Schistosoma mansoni  B65.2 Schistosomiasis due to Schistosoma japonicum  B65.3 Cercarial dermatitis  B65.8 Other schistosomiasis  B65.9 Schistosomiasis, unspecified |
| Non-cirrhotic CLD: Unknown | 571.9  573.9 | K76.8  K76.9 | ICD-9 Code Descriptions  571.9 Unspecified chronic liver disease without mention of alcohol  573.9 Unspecified disorder of liver  ICD-10 Code Descriptions  K76.8 Other specified diseases of liver  K76.9 Liver disease, unspecified |
| **Etiology Definitions** | | | |
| Chronic viral hepatitis |  |  | Etiology of cirrhosis or CLD determined if presence of code for chronic viral hepatitis (listed under CLD: chronic viral hepatitis). |
| Alcoholic liver disease |  |  | Etiology of cirrhosis or CLD determined if presence of code for alcoholic liver disease (listed under cirrhosis: alcoholic liver disease and CLD: alcoholic liver disease).  In addition, also considered alcoholic liver disease if code for non-liver related alcohol use or disorders are used in combination with a cirrhosis or CLD code with unknown etiology. |
| NAFLD/NASH |  |  | Etiology of cirrhosis or CLD determined if presence of code for NAFLD/NASH (listed under CLD: NAFLD/NASH). |
| Autoimmune |  |  | Etiology of cirrhosis or CLD determined if presence of code for autoimmune disorders (listed under cirrhosis: autoimmune and CLD: autoimmune). |
| Copper/Iron Metabolism Disorders |  |  | Etiology of cirrhosis or CLD determined if presence of code for copper/iron metabolism disorders (listed under CLD: copper/iron metabolism disorders). |
| Other |  |  | Etiology of cirrhosis or CLD determined if presence of code for other (listed under cirrhosis: other and CLD: other). |
| Unknown |  |  | Etiology of cirrhosis or CLD determined if presence of code for unknown (listed under cirrhosis: unknown and CLD: unknown) and no other etiologies can be determined by codes.  If code for unknown etiology is used in combination with code that defines another etiology, the etiology of cirrhosis or CLD is considered that alternative, defined etiology (rather than unknown or mixed). |
| Mixed |  |  | Defined by presence of codes for two or more etiologies (excluding unknown etiology).  Mixed etiology also includes combination of non-liver related alcohol use/disorder code and a cirrhosis or CLD code indicating another etiology. |
| **Exclusions** | | | |
| Acute Liver Diseases | 573.1  573.2  573.3  070.0  070.1  070.41  070.43  070.51  070.53 | K71.0  K71.1[01]  K71.2  K71.6  K71.8  K71.9  K75.2  B15  B15.0  B15.9  B16  B16.0  B16.1  B16.2  B16.9  B17  B17.0  B17.1  B17.1[01]  B17.2  B17.8  B17.9 | *Excluded from analysis, unless a concomitant chronic liver disease or cirrhosis existed, then included with cirrhosis group or CLD without cirrhosis group.*  ICD-9 Code Descriptions  573.1 Hepatitis in viral diseases classified elsewhere  [Coxsackie virus disease (074.8), cytomegalic inclusion virus disease (078.5), infectious mononucleosis (075), but does not include hepatitis (in): mumps (072.71), viral (070.0-070.9), yellow fever (060.0-060.9)]  573.2 Hepatitis in other infectious diseases classified elsewhere  [Does not include hepatitis in: late syphilis (095.3), secondary syphilis (091.62), toxoplasmosis (130.5)]  573.3 Hepatitis, unspecified; Toxic (noninfectious) hepatitis  070.0, 070.1 Viral hepatitis A with/without mention of hepatic coma  070.41 Acute hepatitis C with hepatic coma  070.43 Hepatitis E with hepatic coma  070.51 Acute hepatitis C without mention of hepatic coma  070.53 Hepatitis E without mention of hepatic coma  ICD-10 Code Descriptions  K71.0 Toxic liver disease with cholestasis; Cholestasis with hepatocyte injury; 'Pure' cholestasis  K71.1 Toxic liver disease with hepatic necrosis  K71.10 Toxic liver disease with hepatic necrosis, without coma  K71.11 Toxic liver disease with hepatic necrosis, with coma  K71.2 Toxic liver disease with acute hepatitis  K71.6 Toxic liver disease with hepatitis, not elsewhere classified  K71.8 Toxic liver disease with other disorders of liver  K71.9 Toxic liver disease, unspecified  K72.0 Acute and subacute hepatic failure  K72.00 Acute and subacute hepatic failure without coma  K72.01 Acute and subacute hepatic failure with coma  K75.2 Nonspecific reactive hepatitis  B15 Acute hepatitis A  B15.0 Hepatitis A with hepatic coma  B15.9 Hepatitis A without hepatic coma; Hepatitis A (acute)(viral) NOS  B16 Acute hepatitis B  B16.0 Acute hepatitis B with delta-agent with hepatic coma  B16.1 Acute hepatitis B with delta-agent without hepatic coma  B16.2 Acute hepatitis B without delta-agent with hepatic coma  B16.9 Acute hepatitis B without delta-agent and without hepatic coma; Hepatitis B (acute) (viral) NOS  B17 Other acute viral hepatitis  B17.0 Acute delta-(super) infection of hepatitis B carrier  B17.1 Acute hepatitis C  B17.10 Acute hepatitis C without hepatic coma; Acute hepatitis C NOS  B17.11 Acute hepatitis C with hepatic coma  B17.2 Acute hepatitis E  B17.8 Other specified acute viral hepatitis; Hepatitis non-A non-B (acute) (viral) NEC  B17.9 Acute viral hepatitis, unspecified; Acute hepatitis NOS |
| Alcoholic hepatitis | 571.1 | K70.1[1] | ICD-9 and 10 Code Descriptions  571.1 Acute alcoholic hepatitis (included as chronic liver disease as majority of patients have chronic liver damage)  K70.1 Alcoholic hepatitis  K70.11 Alcoholic hepatitis with ascites |
| Prior Liver Transplant | 996.82  V42.7 | T86.4[01239]  Z48.23  Z94.4 | ICD-9 Code Descriptions  996.82 Complications of transplanted organ; Transplant failure or rejection: Liver  V42.7 Organ or tissue replaced by transplant: Liver  ICD-10 Code Descriptions  T86.4 Complications of liver transplant  T86.40 Unspecified complication of liver transplant  T86.41 Liver transplant rejection  T86.42 Liver transplant failure  T86.43 Liver transplant infection  Use additional code to identify infection, such as: Cytomegalovirus (CMV) infection (B25.-)  T86.49 Other complications of liver transplant  Z48.23 Encounter for aftercare following liver transplant  Z94.4 Liver transplant status |
| **Pregnancy Codes** | | | |
| Pregnancy Definitions |  |  | Discharge codes and procedure codes were considered for identifying pregnancy records. To avoid counting multiple records for the same pregnancy, codes that indicated an end of pregnancy event were searched. Non-natural causes of termination events were excluded from analysis, as were miscarriages and spontaneous or missed abortions. |
| Pregnancy Inclusion Codes | Discharge Codes  632  634.[0-9][012]  640.[09]1  641.[012389]1  642.[012345679][12]  643.[01289]1  644.21  645.[12]1  646.[0123456789]1  646.[124568]2  647.[012345689][12]  648.[0123456789][12]  649.[012345678]1  649.[0123468]2  650  651.[0123456789]1  652.[0123456789]1  653.[0123456789]1  654.[0123456789]1  654.[013456789]2  655.[0123456789]1  656.[012356789]1  656.4[013]  657.01  658.[0123489]1  659.[0123456789]1  660.[0123456789]1  661.[012349]1  662.[0123]1  663.[012345689]1  664.[012345689]1  665.[013456789]1  665.[2789]2  666.[0123]2  667.[01]2  668.[01289][12]  669.[012456789]1  669.[0123489]2  670.[01238]2  671.[0123589]1  671.[0124589]2  672.02  673.[01238]1  673.[01238]2  674.[05]1  674.[01234589]2  675.[01289]1  675.[01289]2  676.[012345689]1  676.[012345689]2  678.[01]1  679.[01]1  679.[01]2  V27.[012345679]  Procedure Codes  72.[0123456789]  72.2[19]  72.3[19]  72.5[1234]  72.7[19]  74.[01249]  74.99 | Discharge Codes  O60.10X[0123459]  O60.12X[0123459]  O60.13X[0123459]  O60.14X[0123459]  O60.2  O60.20  O60.20X[0123459]  O60.22  O60.22X[0123459]  O60.23  O60.23X[0123459]  O80  O82 (these two should be superfluous when Z37 is accounted for)  Z37  Z37.[012345679]  Z37.5[012349]  Z37.6[012349]  Procedure Codes  0W8NXZZ  10D00Z[012]  10D07Z[34568]  10S07ZZ | Discharge Codes  Preterm labor with preterm delivery  Term delivery with preterm labor  Outcome of delivery indicator  O80 Encounter for full-term uncomplicated delivery  *Delivery requiring minimal or no assistance, with or without episiotomy, without fetal manipulation [e.g., rotation version] or instrumentation [forceps] of a spontaneous, cephalic, vaginal, full-term, single, live-born infant. This code is for use as a single diagnosis code and is not to be used with any other code from chapter 15.*  *Use additional code to indicate outcome of delivery (Z37.0)*  O82 Encounter for caesarean delivery without indication  *Use additional code to indicate outcome of delivery (Z37.0)*  Procedure Codes  Low/Mid/High forceps operation, Outlet forceps operation  Forceps rotation of fetal head: DeLee maneuver, Key-in-lock rotation, Kielland rotation, Scanzoni's maneuver;  Breech extraction  Partial breech extraction with forceps to aftercoming head  Other partial breech extraction  Total breech extraction with forceps to aftercoming head  Other total breech extraction  Forceps application to aftercoming head, Piper forceps operation  Vacuum extraction  Other instrumental delivery  Caesarean section  Other caesarean section of unspecified type: Caesarean section NOS, Obstetrical abdominouterotomy, Obstetrical hysterotomy |
| Pregnancy Exclusion Codes | Discharge Codes  Pregnant with non-natural termination:  630  631  631.[08]  633  633.0  633.0[01]  633.1  633.1[01]  633.2  633.2[01]  633.8  633.8[01]  633.9  633.9[01]  635.[012345679][012]  636.[012345679][012]  637.[012345679][012]  638  638.[0123456789]  Miscarriage or spontaneous/missed abortion:  632  634.[0123456789][012]  Procedure Codes  Non-naturally terminated:  69.01  69.51  74.3  74.91  75.0 | Discharge Codes  Pregnant with non-natural termination:  O00  O00.[01289]  O01  O01.[019]  O02  O02[.089]  O02.8  O02.8[19]  O02.9  O04.8  O04.8[09]  O07  Miscarriage or spontaneous/missed abortion:  O02.1  O03  O03.[012]  O03.3  O03.3[0123456789]  O03.[45678]  O03.8[0123456789]  O03.9  Procedure Codes  Non-naturally terminated:  10A0[034]ZZ  10A07Z6  10A07ZX  10A07ZZ  10A08ZZ  10T2[034]ZZ | Discharge Codes  Ectopic pregnancy  Hydatidiform mole  Other abnormal products of conception  (Induced) termination of pregnancy  Failed attempted termination of pregnancy  Miscarriage or spontaneous/missed abortion  Procedure Codes  Dilation and curettage for termination of pregnancy  Aspiration curettage of uterus for termination of pregnancy, Therapeutic abortion NOS  Removal of extratubal ectopic pregnancy  Hysterotomy to terminate pregnancy, Therapeutic abortion by hysterotomy  Intra-amniotic injection for abortion |
| **Study Outcomes** |  |  |  |
| Hypertensive complication | 642.4x  642.5x  642.6x  642.7x | O14.0[023]  O14.1[023]  O14.2[023]  O14.9[023]  O15.0[023]  O15.1  O15.2  O15.9  O11.[1239] | Includes pre-eclampsia, eclampsia, and hemolysis, elevated liver enzymes, low platelets (HELLP) syndrome  ICD-9 Code Descriptions  Mild or unspecified pre-eclampsia  Severe pre-eclampsia  Eclampsia complicating pregnancy, childbirth, or the puerperium  Pre-eclampsia or eclampsia superimposed on pre-existing hypertension  ICD-10 Code Descriptions  Mild to moderate pre-eclampsia  Severe pre-eclampsia  HELLP syndrome  Unspecified pre-eclampsia  Eclampsia complicating pregnancy  Eclampsia complicating labor  Eclampsia complicating the puerperium  Eclampsia, unspecified as to time period  Pre-existing hypertension with pre-eclampsia |
| Postpartum hemorrhage | 666.0[024]  666.1[024]  666.2[024]  666.3[024] | O72.[0123] | ICD-9 and 10 Code Descriptions  Third-stage postpartum hemorrhage  Other immediate postpartum hemorrhage  Delayed and secondary postpartum hemorrhage  Postpartum coagulation defects |
| Preterm birth (<37 weeks) | 644.20  644.21 | O60.10xx[0123459]  O60.12xx[0123459]  O60.13xx[0123459]  O60.14xx[0123459] | ICD-9 Code Descriptions  Codes (644.20, 644.21) each include:  Onset (spontaneous) of delivery before 37 completed weeks of gestation  Premature labor with onset of delivery before 37 completed weeks of gestation  ICD-10 Code Descriptions  Preterm labor with preterm delivery |
| Fetal growth restriction | 656.5[013] | O36.59[1239] | ICD-9 Code Descriptions  Poor fetal growth affecting management of mother  ICD-10 Code Descriptions  Maternal care for other known or suspected poor fetal growth |
| Large for gestational age | 653.5[013]  656.6[013] | O36.60X[0123459]  O36.61X[0123459]  O36.62X[0123459]  O36.63X[0123459] | ICD-9 Code Descriptions  Unusually large fetus causing disproportion  Hydrocephalic fetus causing disproportion  ICD-10 Code Descriptions  Maternal care for excessive fetal growth |
| Fetal death | 656.4[013] | V27.1  V27.3  V27.4  V27.6  V27.7  Z37.1  Z37.3  Z37.4  Z37.6[012349]  Z37.7  O36.4XX[0123459] | ICD-9 Code Descriptions  Intrauterine death affecting management of mother  ICD-10 Code Descriptions  Stillborn (at least one, if multiple gestation)  Maternal care for intrauterine death (NOS, after completion of 20 weeks of gestation, late fetal death, missed delivery) |
| **Additional Variables** | | | |
| Diabetes, pre-existing | Without chronic complications:  249.00-249.31  250.00-250.33  648.00-648.04  With chronic complications:  249.40-249.91  250.40-250.93 | Without chronic complications:  E08.xx  E09.xx  E10.xx  E11.xx  E13.xx  O24.[01389]xx  With chronic complications:  E08.[234568]xxx  E09.[234568]xxx  E10.[234568]xxx  E11.[234568]xxx  E13.[234568]xxx | ICD-9 Codes based on this source, with minor modification to remove codes specifically for fetal records: <https://www.hcup-us.ahrq.gov/toolssoftware/comorbidity/Table2-FY12-V3_7.pdf>  ICD-10 Codes based on this source, with minor modification to remove codes specifically for fetal records: <https://www.hcup-us.ahrq.gov/toolssoftware/comorbidityicd10/comformat_icd10cm_2019_1.txt> |
| Hypertension, pre-existing | 401.0  401.1  401.9  405 405.0 405.0[19] 405.1[19] 405.9 405.9[19]  642.0[0-4]  642.1[0-4]  642.2[0-4]  642.7[0-4]  642.9[0-4] | I10.  I15.0 I15.1  I15.2 I15.8 I15.9  O10.01[1239]  O10.02 O10.03  O10.41[1239] O10.42 O10.43  O10.91[1239] O10.92 O10.93  O11.9 O11.1 O11.2 O11.3 | ICD-9 Code Descriptions  Essential hypertension: Malignant, Benign, Unspecified  Secondary hypertension: Malignant (Renovascular, Other), Benign (Renovascular, Other), Unspecified (Renovascular, Other)  Benign essential hypertension complicating pregnancy, childbirth, and the puerperium  Hypertension secondary to renal disease, complicating pregnancy, childbirth, and the puerperium  Other pre-existing hypertension complicating pregnancy, childbirth, and the puerperium  Pre-eclampsia or eclampsia superimposed on pre-existing hypertension  Unspecified hypertension complicating pregnancy, childbirth, or the puerperium  ICD-10 Code Descriptions  Essential (primary) hypertension  Pre-existing essential hypertension complicating pregnancy or childbirth or puerperium  Unspecified pre-existing hypertension complicating pregnancy or childbirth or puerperium  Renovascular hypertension  Hypertension secondary to other renal disorders  Pre-existing secondary hypertension complicating pregnancy or childbirth or puerperium  Pre-existing hypertension with pre-eclampsia  Hypertension secondary to endocrine disorders  Other secondary hypertension  Secondary hypertension, unspecified |
| Dyslipidemia, pre-existing | 272.0  272.1  272.2  272.4 | E78.0  E78.1  E78.2  E78.4  E78.5 | ICD-9 and 10 Code Descriptions  Pure hypercholesterolemia  Pure hyperglyceridemia  Mixed hyperlipidemia  Other hyperlipidemia  Hyperlipidemia, unspecified |
| Obesity, pre-existing | 278.00  278.01  278.03  649.1[01234]  793.91  V85.3[0123456789]  V85.4[12345]  V85.54 | E66.0[19]  E66.[1289]  O99.21[012345]  R93.9  Z68.3[0123456789]  Z68.4[12345]  Z68.54 | ICD-9 Code Descriptions  Obesity, unspecified  Morbid obesity  Obesity hyperventilation syndrome  Obesity complicating pregnancy, childbirth, or the puerperium  Diagnostic imaging inconclusive due to excess body fat of patient  Body mass index (BMI) 30.0 or greater, adult  Body mass index (BMI) pediatric, greater than or equal to 95th percentile for age  ICD-10 Code Descriptions  Obesity due to excess calories  Morbid (severe) obesity due to excess calories  Other obesity due to excess calories  Drug-induced obesity  Morbid (severe) obesity with alveolar hypoventilation  Other obesity  Obesity, unspecified  Obesity complicating pregnancy, childbirth, and the puerperium  Diagnostic imaging inconclusive due to excess body fat of patient  Body mass index (BMI) 30.0 or greater, adult  Body mass index (BMI) pediatric, greater than or equal to 95th percentile for age |
| Multiple gestation | V27.2  V27.3  V27.4  V27.5  V27.6  V27.7 | Z37.2  Z37.3  Z37.4  Z37.50  Z37.5[12349]  Z37.6[012349]  Z37.7 | ICD-9 and 10 Code Descriptions  Twins, both liveborn  Twins, one liveborn and one stillborn  Twins, both stillborn  Multiple births, unspecified, all liveborn  Triplets/Quadruplets/Quintuplets/Sextuplets/Other multiple births, all liveborn  Triplets/Quadruplets/Quintuplets/Sextuplets/Other multiple births, some liveborn  Other multiple births, all stillborn |
| Gestational diabetes mellitus | 648.8[01234] | O99.81[045]  O24.4  O24.41  O24.41[049]  O24.42  O24.42[049]  O24.43  O24.43[049] | ICD-9 Code Descriptions  Abnormal glucose tolerance; Includes Gestational diabetes  Abnormal glucose complicating pregnancy, childbirth and the puerperium  ICD-10 Code Descriptions  Abnormal glucose complicating pregnancy, childbirth, and puerperium  Gestational diabetes mellitus; in pregnancy, childbirth, puerperium |
| Mode of delivery:  Caesarean sectiona  Vaginal birth | 765  766  [767/768, 774/775] | 783  784  785  786  787  788  [768, 796, 797, 798,  805, 806, 807] | ICD-9 Diagnosis Related Group (DRG) Codes, Version 34, https://www.cms.gov/ICD10M/version34-fullcode-cms/fullcode\_cms/P0017.html  Caesarean section with/without complication or comorbidity (CC)/major complication or comorbidity (MCC) [vaginal delivery with sterilization and/or dilation and curettage (D&C), vaginal delivery with operating room (OR) procedure except sterilization and/or D&C, vaginal delivery with/without complicating diagnoses]  ICD-10 DRG Codes, Version 36, https://www.cms.gov/icd10m/version36-fullcode-cms/fullcode\_cms/P0017.html  Caesarean section with/without sterilization with/without CC/MCC [vaginal delivery with OR procedure except sterilization and/or D&C, vaginal delivery with sterilization/D&C with/without CC/MCC, vaginal delivery without sterilization/D&C with/without CC/MCC] |

*aDiagnosis Related Group (DRG) comprise a patient classification system that categorizes patients into groups that are clinically coherent and homogeneous with respect to resource use. DRGs group patients according to diagnosis, type of treatment (procedures), age, and other relevant criteria. Each hospital stay has one DRG assigned to it. Reference: Wier L, Witt E, Burgess J, et al. Hospitalizations related to diabetes in pregnancy, 2008: Statistical Brief #102. In: Healthcare Cost and Utilization Project (HCUP) Statistical Briefs. Rockville (MD): Agency for Healthcare Research and Quality; 2010.*

*CC, complication or comorbidity; CLD, chronic liver disease; D&C, dilation and curettage; DRG, diagnosis related group; HELLP, hemolysis, elevated liver enzymes, low platelets syndrome; ICD-9-CM, ICD Ninth Revision Clinical Modification; ICD-10-CM, ICD Tenth Revision Clinical Modification; MCC, major complication or comorbidity; OR, operating room*