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 | 456.0456.20 | I85.01 | ICD-9 and 10 Code Descriptions456.0 Esophageal varices with bleeding456.20 Esophageal varices in diseases classified elsewhere, with bleedingI85.01 Esophageal varices with bleeding |
| Esophageal varices, no bleeding | 456.1456.21 | I85.00 | ICD-9 and 10 Code Descriptions456.1 Esophageal varices without mention of bleeding456.21 Esophageal varices in diseases classified elsewhere, without mention of bleedingI85.00 Esophageal varices without bleeding*Used to capture cirrhosis, but not a clinical decompensation event* |
| Hepatic encephalopathy | 572.2 |  | ICD-9 Code Descriptions572.2 Hepatic encephalopathy |
| Hepatorenal syndrome | 572.4 | K76.7 | ICD-9 and 10 Code Descriptions572.4 Hepatorenal syndromeK76.7 Hepatorenal syndrome |
| Hepatopulmonary syndrome | 573.5 | K76.81 | ICD-9 and 10 Code Descriptions573.5 Hepatopulmonary syndromeK76.81 Hepatopulmonary syndrome |
| Spontaneous bacterial peritonitis | 567.2 | K65.2 | ICD-9 and 10 Code Descriptions567.2 Spontaneous bacterial peritonitisK65.2 Spontaneous bacterial peritonitis |
| Ascites | 789.5 | R18R18.8K71.51 | ICD-9 and 10 Code Descriptions789.5 AscitesR18 AscitesR18.8 Other ascitesK71.51 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 | K70.3K70.3[01]  | ICD-9 Code Descriptions571.2 Alcoholic cirrhosis of liver ICD-10 Code DescriptionsK70.3 Alcoholic cirrhosis of liverK70.3[01] Alcoholic cirrhosis of liver without/with ascites  |
| Cirrhosis: Autoimmune | 571.6 | K74.3K74.5 | ICD-9 Code Descriptions571.6 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 DescriptionsK74.4 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 | 571.5572.3456.0456.1456.2[01] 572.2572.4 573.5 567.2 789.5  | K71.7 K72.1[01] K74.6 K74.6[09] K76.6K65.2 K71.51 K72.9[01] K76.7 K76.81 I85.0 I85.0[01] R18 R18.8 | ICD-9 Code Descriptions571.5 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 bleeding456.1 Esophageal varices without mention of bleeding456.20 Esophageal varices in diseases classified elsewhere, with bleeding456.21 Esophageal varices in diseases classified elsewhere, without mention of bleeding572.2 Hepatic encephalopathy572.4 Hepatorenal syndrome573.5 Hepatopulmonary syndrome567.2 Spontaneous bacterial peritonitis789.5 Ascites *[only coded as cirrhosis when accompanied by another chronic liver disease or cirrhosis code (including portal hypertension)]*ICD-10 Code DescriptionsK71.7 Toxic liver disease with fibrosis and cirrhosis of liver K72.10 Chronic hepatic failure without comaK72.11 Chronic hepatic failure with comaK74.6 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 peritonitisK71.51 Toxic liver disease with chronic active hepatitis with ascitesK76.7 Hepatorenal syndromeK76.81 Hepatopulmonary syndromeI85.0 Esophageal varicesI85.0[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 hypertensionK76.6 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]070.6070.7[01]070.9V02.6[0129] | K71.3K71.4K71.5K71.50K73.[01289]K74.[012]B18.[01289]B19.[01]B19.1[01]B19.2B19.2[01]B19.9O98.41O98.41[1239]O98.42O98.43 | ICD-9 Code Descriptions571.4 Chronic hepatitis070.2x/070.3x Viral hepatitis B with/without hepatic coma070.42 Hepatitis delta without mention of active hepatitis B disease with hepatic coma, Hepatitis delta with hepatitis B carrier state070.44 Chronic hepatitis C with hepatic coma070.49 Other specified viral hepatitis with hepatic coma070.5 Other specified viral hepatitis without mention of hepatic coma070.52 Hepatitis delta without mention of active hepatitis B disease or hepatic coma070.54 Chronic hepatitis C without mention of hepatic coma070.59 Other specified viral hepatitis without mention of hepatic coma 070.6 Unspecified viral hepatitis with hepatic coma 070.7 Unspecified viral hepatitis C070.70 Unspecified viral hepatitis C without hepatic coma, Unspecified viral hepatitis C NOS070.71 Unspecified viral hepatitis C with hepatic coma 070.9 Unspecified viral hepatitis without mention of hepatic coma, Viral hepatitis NOSV02.6 Carrier or suspected carrier of viral hepatitisV02.60 Viral hepatitis carrier, unspecifiedV02.61 Hepatitis B carrierV02.62 Hepatitis C carrierV02.69 Other viral hepatitis carrierICD-10 Code DescriptionsK71.3 Toxic liver disease with chronic persistent hepatitis K71.4 Toxic liver disease with chronic lobular hepatitis K71.5 Toxic liver disease with chronic active hepatitisK71.50 Toxic liver disease with chronic active hepatitis without ascitesK73 Chronic hepatitis, not elsewhere classifiedK73.0 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 classifiedK73.9 Chronic hepatitis, unspecifiedK74.0 Hepatic fibrosis K74.1 Hepatic sclerosisK74.2 Hepatic fibrosis with hepatic sclerosisB18.0/1 Chronic viral hepatitis B with/without delta-agentB18.2 Chronic viral hepatitis C B18.8 Other chronic viral hepatitisB18.9 Chronic viral hepatitis, unspecified B19 Unspecified viral hepatitisB19.0 Unspecified viral hepatitis with hepatic coma B19.1 Unspecified viral hepatitis BB19.10 Unspecified viral hepatitis B without hepatic coma, Unspecified viral hepatitis B NOSB19.11 Unspecified viral hepatitis B with hepatic coma B19.2 Unspecified viral hepatitis CB19.20 Unspecified viral hepatitis C without hepatic coma, Viral hepatitis C NOSB19.21 Unspecified viral hepatitis C with hepatic coma B19.9 Unspecified viral hepatitis without hepatic coma, Viral hepatitis NOSO98.4x Viral hepatitis complicating pregnancy, childbirth and the puerperium |
| Non-cirrhotic CLD: Alcoholic liver disease | 571.0571.3291291.[01234589]291.8[129]303303.0303.0[0123]303.9303.9[0123]V11.3305.[0123]357.5425.5535.3535.3[01]760.71790.3980.[012389] | K70.[01]K70.2K70.4K70.4[01]K70.9F10.1F10.1[024589]F10.12[019]F10.15[019]F10.18[0128]F10.2F10.2[012]F10.22[019]F10.2[3456789]F10.23[0129]F10.25[019]F10.28[0128]F10.9F10.9[2456789]F10.92[019]F10.95[019]F10.98[0128]G62.1I42.6K29.2K29.2[01]G31.2G72.1Q86.0O35.4XX[0123459]K85.2K86.0 | ICD-9 Code Descriptions571.0 Alcoholic fatty liver571.3 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 disorders291.0 Alcohol withdrawal delirium291.1 Alcohol-induced persisting amnestic disorder291.2 Alcohol-induced persisting dementia291.3 Alcohol-induced psychotic disorder with hallucinations291.4 Idiosyncratic alcohol intoxication291.5 Alcohol-induced psychotic disorder with delusions291.8 Other specified alcohol-induced mental disorders291.81 Alcohol withdrawal291.82 Alcohol-induced sleep disorder291.89 Other alcohol-induced mental disorders291.9 Unspecified alcohol-induced mental disorders303 Alcohol dependence syndrome303.0 Acute alcoholic intoxication303.00 Acute alcoholic intoxication in alcoholism, unspecified303.01 Acute alcoholic intoxication in alcoholism, continuous303.02 Acute alcoholic intoxication in alcoholism, episodic303.03 Acute alcoholic intoxication in alcoholism, in remission303.9 Other and unspecified alcohol dependence303.90 Other and unspecified alcohol dependence, unspecified303.91 Other and unspecified alcohol dependence, continuous303.92 Other and unspecified alcohol dependence, episodic303.93 Other and unspecified alcohol dependence, in remissionV11.3 Personal history of alcoholism305.0 Nondependent alcohol abuse305.00 Alcohol abuse, unspecified305.01 Alcohol abuse, continuous305.02 Alcohol abuse, episodic305.03 Alcohol abuse, in remission357.5 Alcoholic polyneuropathy425.5 Alcoholic cardiomyopathy535.3 Alcoholic gastritis535.30 Alcoholic gastritis (without hemorrhage)535.31 Alcoholic gastritis with hemorrhage760.71 Alcohol affecting fetus or newborn via placenta or breast milk790.3 Excessive blood level of alcohol980.0 Toxic effect of ethyl alcohol/denatured alcohol/ethanol/grain alcohol980.1 Toxic effect of methyl alcohol/methanol/wood alcohol980.2 Toxic effect of isopropyl alcohol/dimethyl carbinol/isopropanol/rubbing alcohol980.3 Toxic effect of fusel oil, alcohol: amyl/butyl/propyl980.8 Toxic effect of other specified alcohols980.9 Toxic effect of unspecified alcoholICD-10 Code DescriptionsK70.0 Alcoholic fatty liver K70.2 Alcoholic fibrosis and sclerosis of liverK70.4 Alcoholic hepatic failureK70.4[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 abuseF10.10 Alcohol abuse, uncomplicatedF10.12 Alcohol abuse with intoxicationF10.120 Alcohol abuse with intoxication, uncomplicatedF10.121 Alcohol abuse with intoxication, delirium F10.29 Alcohol abuse with intoxication, unspecifiedF10.14 Alcohol abuse with alcohol-induced mood disorderF10.15 Alcohol abuse with alcohol-induced psychotic disorderF10.150 Alcohol abuse with alcohol-induced psychotic disorder, with delusionsF10.151 Alcohol abuse with alcohol-induced psychotic disorder, with hallucinationsF10.159 Alcohol abuse with alcohol-induced psychotic disorder, unspecifiedF10.18 Alcohol abuse with other alcohol-induced disordersF10.180 Alcohol abuse with alcohol-induced anxiety disorderF10.181 Alcohol abuse with alcohol-induced sexual dysfunctionF10.182 Alcohol abuse with alcohol-induced sleep disorderF10.188 Alcohol abuse with other alcohol-induced disorderF10.2 Alcohol dependenceF10.20 Alcohol dependence, uncomplicatedF10.21 Alcohol dependence, in remissionF10.22 Alcohol dependence with intoxicationF10.220 Alcohol dependence with intoxication, uncomplicatedF10.221 Alcohol dependence with intoxication, deliriumF10.229 Alcohol dependence with intoxication, unspecifiedF10.23 Alcohol dependence with withdrawalF10.230 Alcohol dependence with withdrawal, uncomplicatedF10.231 Alcohol dependence with withdrawal, deliriumF10.232 Alcohol dependence with withdrawal, with perceptual disturbanceF10.239 Alcohol dependence with withdrawal, unspecifiedF10.24 Alcohol dependence with alcohol-induced mood disorderF10.25 Alcohol dependence with alcohol-induced psychotic disorderF10.250 Alcohol dependence with alcohol-induced psychotic disorder, with delusionsF10.251 Alcohol dependence with alcohol-induced psychotic disorder, with hallucinationsF10.259 Alcohol dependence with alcohol-induced psychotic disorder, unspecifiedF10.26 Alcohol dependence with alcohol-induced persisting amnestic disorderF10.27 Alcohol dependence with alcohol-induced persisting dementiaF10.28 Alcohol dependence with other alcohol-induced disordersF10.280 Alcohol dependence with alcohol-induced anxiety disorderF10.281 Alcohol dependence with alcohol-induced sexual dysfunctionF10.282 Alcohol dependence with alcohol-induced sleep disorderF10.288 Alcohol dependence with other alcohol-induced disorderF10.29 Alcohol dependence with unspecified alcohol-induced disorderF10.9 Alcohol use, unspecifiedF10.92 Alcohol use, unspecified with intoxicationF10.920 Alcohol use, unspecified with intoxication, uncomplicatedF10.921 Alcohol use, unspecified with intoxication, deliriumF10.929 Alcohol use, unspecified with intoxication, unspecified F10.94 Alcohol use, unspecified, with alcohol-induced mood disorderF10.95 Alcohol use, unspecified with alcohol-induced psychotic disorderF10.950 Alcohol use, unspecified with alcohol-induced psychotic disorder, with delusionsF10.951 Alcohol use, unspecified with alcohol-induced psychotic disorder, with hallucinationsF10.959 Alcohol use, unspecified with alcohol-induced psychotic disorder, unspecifiedF10.96 Alcohol use, unspecified, with alcohol-induced persisting amnestic disorderF10.97 Alcohol use, unspecified, with persisting dementiaF10.98 Alcohol use, unspecified, with other alcohol-induced disordersF10.980 Alcohol use, unspecified, with alcohol-induced anxiety disorderF10.981 Alcohol use, unspecified, with alcohol-induced sexual dysfunctionF10.982 Alcohol use, unspecified, with alcohol-induced sleep disorderF10.988 Alcohol use, unspecified, with other alcohol-induced disorderF10.99 Alcohol use, unspecified with unspecified alcohol-induced disorderG62.1 Alcoholic polyneuropathyI42.6 Alcoholic cardiomyopathyK49.2 Alcoholic gastritisK49.20 Alcoholic gastritis without bleedingK49.21 Alcoholic gastritis with bleedingG31.2 Degeneration of nervous system due to alcoholG72.1 Alcoholic myopathyQ86.0 Fetal alcohol syndrome (dysmorphic)O35.4 Maternal care for (suspected) damage to fetus from alcoholO35.4XX0 Maternal care for (suspected) damage to fetus from alcohol, not applicable or unspecifiedO35.4XX1 Maternal care for (suspected) damage to fetus from alcohol, fetus 1O35.4XX2 Maternal care for (suspected) damage to fetus from alcohol, fetus 2O35.4XX3 Maternal care for (suspected) damage to fetus from alcohol, fetus 3O35.4XX4 Maternal care for (suspected) damage to fetus from alcohol, fetus 4O35.4XX5 Maternal care for (suspected) damage to fetus from alcohol, fetus 5O35.4XX9 Maternal care for (suspected) damage to fetus from alcohol, other fetusK85.2 Alcohol-induced acute pancreatitisK96.0 Alcohol-induced chronic pancreatitis |
| Non-cirrhotic CLD: NAFLD/NASH | 571.8 | K76.0K75.81 | ICD-9 Code Descriptions571.8 Other chronic nonalcoholic liver diseaseICD-10 Code DescriptionsK76.0 Fatty (change of) liver, not elsewhere classified, Nonalcoholic fatty liver disease (NAFLD)K75.81 Nonalcoholic steatohepatitis (NASH) |
| Non-cirrhotic CLD: Autoimmune | 571.42571.6576.1 | K74.3 K74.5 K75.3 K75.4 K75.8[9]K75.9 K83.0  | ICD-9 Code Descriptions571.42 Autoimmune hepatitis571.6 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 cholangitisK74.5 Biliary cirrhosis, unspecifiedK75.3 Granulomatous hepatitis, not elsewhere classifiedK75.4 Autoimmune hepatitis, Lupoid hepatitis NECK75.8 Other specified inflammatory liver diseasesK75.89 Other specified inflammatory liver diseasesK75.9 Inflammatory liver disease, unspecifiedK83.0 Cholangitis without liver abscess (captures primary sclerosing cholangitis) |
| Non-cirrhotic CLD: Copper/Iron Metabolism Disorders | 275.01275.03275.1 | E83.01E83.11E83.11[0189] | ICD-9 Code Descriptions275.01 Hereditary hemochromatosis 275.03 Other hemochromatosis275.1 Disorders of copper metabolism (captures Wilson’s disease)ICD-10 Code DescriptionsE83.01 Wilson's diseaseE83.11 HemochromatosisE83.110 Hereditary hemochromatosis: Bronzed diabetes, Pigmentary cirrhosis (of liver), Primary (hereditary) hemochromatosisE83.111 Hemochromatosis due to repeated red blood cell transfusions: Iron overload due to repeated red blood cell transfusions, Transfusion (red blood cell) associated hemochromatosisE83.118 Other hemochromatosisE83.119 Hemochromatosis, unspecified |
| Non-cirrhotic CLD: Other | 573.0273.4453.0277.3[09]120[.012389] | K74.4E88.01I82.0K76.1 K76.4 K76.5 K76.8 K76.9 E85[.0123489]E85.8[129]B65[.012389] | ICD-9 Code Descriptions573.0 Chronic passive congestion of liver 273.4 Alpha 1 antitrypsin deficiency 453.0 Budd-Chiari syndrome277.3 Amyloidosis277.30 Amyloidosis, unspecified277.39 Other amyloidosis120 Schistosomiasis120.0 Schistosomiasis due to Schistosoma haematobium120.1 Schistosomiasis due to Schistosoma mansoni120.2 Schistosomiasis due to Schistosoma japonicum120.3 Cutaneous schistosomiasis120.8 Other specified schistosomiasis120.9 Schistosomiasis, unspecifiedICD-10 Code DescriptionsK74.4 Secondary biliary cirrhosisE88.01 Alpha 1 antitrypsin deficiency I82.0 Budd-Chiari syndrome K76.1 Chronic passive congestion of liver, Cardiac cirrhosis Cardiac sclerosisK76.4 Peliosis hepatis, Hepatic angiomatosis – other K76.5 Hepatic veno-occlusive diseaseE85 AmyloidosisE85.0 Non-neuropathic heredofamilial amyloidosisE85.1 Neuropathic heredofamilial amyloidosisE85.2 Heredofamilial amyloidosis, unspecifiedE85.3 Secondary systemic amyloidosisE85.4 Organ-limited amyloidosisE85.8 Other amyloidosisE85.81 Light chain (AL) amyloidosisE85.82 Wild-type transthyretin-related (ATTR) amyloidosisE85.89 Other amyloidosisE85.9 Amyloidosis, unspecifiedB65 SchistosomiasisB65.0 Schistosomiasis due to Schistosoma haematobiumB65.1 Schistosomiasis due to Schistosoma mansoniB65.2 Schistosomiasis due to Schistosoma japonicumB65.3 Cercarial dermatitisB65.8 Other schistosomiasisB65.9 Schistosomiasis, unspecified  |
| Non-cirrhotic CLD: Unknown | 571.9573.9 | K76.8K76.9 | ICD-9 Code Descriptions571.9 Unspecified chronic liver disease without mention of alcohol 573.9 Unspecified disorder of liverICD-10 Code DescriptionsK76.8 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 | 573.1 573.2 573.3070.0 070.1070.41 070.43 070.51 070.53 | K71.0 K71.1[01] K71.2K71.6K71.8 K71.9K75.2B15 B15.0 B15.9B16 B16.0 B16.1 B16.2 B16.9B17 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 Descriptions573.1 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) hepatitis070.0, 070.1 Viral hepatitis A with/without mention of hepatic coma070.41 Acute hepatitis C with hepatic coma070.43 Hepatitis E with hepatic coma070.51 Acute hepatitis C without mention of hepatic coma070.53 Hepatitis E without mention of hepatic comaICD-10 Code DescriptionsK71.0 Toxic liver disease with cholestasis; Cholestasis with hepatocyte injury; 'Pure' cholestasisK71.1 Toxic liver disease with hepatic necrosisK71.10 Toxic liver disease with hepatic necrosis, without coma K71.11 Toxic liver disease with hepatic necrosis, with comaK71.2 Toxic liver disease with acute hepatitisK71.6 Toxic liver disease with hepatitis, not elsewhere classifiedK71.8 Toxic liver disease with other disorders of liver K71.9 Toxic liver disease, unspecifiedK72.0 Acute and subacute hepatic failureK72.00 Acute and subacute hepatic failure without coma K72.01 Acute and subacute hepatic failure with comaK75.2 Nonspecific reactive hepatitisB15 Acute hepatitis AB15.0 Hepatitis A with hepatic comaB15.9 Hepatitis A without hepatic coma; Hepatitis A (acute)(viral) NOSB16 Acute hepatitis BB16.0 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 comaB16.9 Acute hepatitis B without delta-agent and without hepatic coma; Hepatitis B (acute) (viral) NOSB17 Other acute viral hepatitisB17.0 Acute delta-(super) infection of hepatitis B carrier B17.1 Acute hepatitis CB17.10 Acute hepatitis C without hepatic coma; Acute hepatitis C NOSB17.11 Acute hepatitis C with hepatic coma B17.2 Acute hepatitis EB17.8 Other specified acute viral hepatitis; Hepatitis non-A non-B (acute) (viral) NECB17.9 Acute viral hepatitis, unspecified; Acute hepatitis NOS |
| Alcoholic hepatitis | 571.1 | K70.1[1] | ICD-9 and 10 Code Descriptions571.1 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  | 996.82V42.7 | T86.4[01239]Z48.23Z94.4 | ICD-9 Code Descriptions996.82 Complications of transplanted organ; Transplant failure or rejection: LiverV42.7 Organ or tissue replaced by transplant: LiverICD-10 Code DescriptionsT86.4 Complications of liver transplantT86.40 Unspecified complication of liver transplantT86.41 Liver transplant rejectionT86.42 Liver transplant failureT86.43 Liver transplant infectionUse additional code to identify infection, such as: Cytomegalovirus (CMV) infection (B25.-)T86.49 Other complications of liver transplantZ48.23 Encounter for aftercare following liver transplantZ94.4 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 Codes632634.[0-9][012]640.[09]1641.[012389]1642.[012345679][12]643.[01289]1644.21645.[12]1646.[0123456789]1646.[124568]2647.[012345689][12]648.[0123456789][12]649.[012345678]1649.[0123468]2650651.[0123456789]1652.[0123456789]1653.[0123456789]1654.[0123456789]1654.[013456789]2655.[0123456789]1656.[012356789]1656.4[013]657.01658.[0123489]1659.[0123456789]1660.[0123456789]1661.[012349]1662.[0123]1663.[012345689]1664.[012345689]1665.[013456789]1665.[2789]2666.[0123]2667.[01]2668.[01289][12]669.[012456789]1669.[0123489]2670.[01238]2671.[0123589]1671.[0124589]2672.02673.[01238]1673.[01238]2674.[05]1674.[01234589]2675.[01289]1675.[01289]2676.[012345689]1676.[012345689]2678.[01]1679.[01]1679.[01]2V27.[012345679]Procedure Codes72.[0123456789]72.2[19]72.3[19]72.5[1234]72.7[19]74.[01249]74.99 | Discharge CodesO60.10X[0123459]O60.12X[0123459]O60.13X[0123459]O60.14X[0123459]O60.2O60.20O60.20X[0123459]O60.22O60.22X[0123459]O60.23O60.23X[0123459]O80O82 (these two should be superfluous when Z37 is accounted for)Z37Z37.[012345679]Z37.5[012349]Z37.6[012349]Procedure Codes0W8NXZZ10D00Z[012]10D07Z[34568]10S07ZZ | Discharge CodesPreterm labor with preterm deliveryTerm delivery with preterm laborOutcome of delivery indicatorO80 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 CodesLow/Mid/High forceps operation, Outlet forceps operationForceps rotation of fetal head: DeLee maneuver, Key-in-lock rotation, Kielland rotation, Scanzoni's maneuver; Breech extractionPartial breech extraction with forceps to aftercoming headOther partial breech extractionTotal breech extraction with forceps to aftercoming headOther total breech extractionForceps application to aftercoming head, Piper forceps operationVacuum extractionOther instrumental deliveryCaesarean sectionOther caesarean section of unspecified type: Caesarean section NOS, Obstetrical abdominouterotomy, Obstetrical hysterotomy |
| Pregnancy Exclusion Codes | Discharge CodesPregnant with non-natural termination:630631631.[08]633633.0633.0[01]633.1633.1[01]633.2633.2[01]633.8633.8[01]633.9633.9[01]635.[012345679][012]636.[012345679][012]637.[012345679][012]638638.[0123456789]Miscarriage or spontaneous/missed abortion:632634.[0123456789][012]Procedure CodesNon-naturally terminated:69.0169.5174.374.9175.0 | Discharge CodesPregnant with non-natural termination:O00O00.[01289]O01O01.[019]O02O02[.089]O02.8O02.8[19]O02.9O04.8O04.8[09]O07Miscarriage or spontaneous/missed abortion:O02.1O03O03.[012]O03.3O03.3[0123456789]O03.[45678]O03.8[0123456789]O03.9Procedure CodesNon-naturally terminated:10A0[034]ZZ10A07Z610A07ZX10A07ZZ10A08ZZ10T2[034]ZZ | Discharge CodesEctopic pregnancyHydatidiform moleOther abnormal products of conception(Induced) termination of pregnancyFailed attempted termination of pregnancyMiscarriage or spontaneous/missed abortionProcedure CodesDilation and curettage for termination of pregnancyAspiration curettage of uterus for termination of pregnancy, Therapeutic abortion NOSRemoval of extratubal ectopic pregnancyHysterotomy to terminate pregnancy, Therapeutic abortion by hysterotomyIntra-amniotic injection for abortion |
| **Study Outcomes** |  |  |  |
| Hypertensive complication | 642.4x642.5x642.6x642.7x | O14.0[023]O14.1[023]O14.2[023]O14.9[023]O15.0[023]O15.1O15.2O15.9O11.[1239] | Includes pre-eclampsia, eclampsia, and hemolysis, elevated liver enzymes, low platelets (HELLP) syndromeICD-9 Code DescriptionsMild or unspecified pre-eclampsiaSevere pre-eclampsiaEclampsia complicating pregnancy, childbirth, or the puerperiumPre-eclampsia or eclampsia superimposed on pre-existing hypertensionICD-10 Code DescriptionsMild to moderate pre-eclampsiaSevere pre-eclampsiaHELLP syndromeUnspecified pre-eclampsiaEclampsia complicating pregnancyEclampsia complicating laborEclampsia complicating the puerperiumEclampsia, unspecified as to time periodPre-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 DescriptionsThird-stage postpartum hemorrhageOther immediate postpartum hemorrhageDelayed and secondary postpartum hemorrhagePostpartum coagulation defects |
| Preterm birth (<37 weeks) | 644.20644.21 | O60.10xx[0123459]O60.12xx[0123459]O60.13xx[0123459]O60.14xx[0123459] | ICD-9 Code DescriptionsCodes (644.20, 644.21) each include:Onset (spontaneous) of delivery before 37 completed weeks of gestationPremature labor with onset of delivery before 37 completed weeks of gestationICD-10 Code DescriptionsPreterm labor with preterm delivery |
| Fetal growth restriction | 656.5[013] | O36.59[1239] | ICD-9 Code DescriptionsPoor fetal growth affecting management of motherICD-10 Code DescriptionsMaternal 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 DescriptionsUnusually large fetus causing disproportionHydrocephalic fetus causing disproportionICD-10 Code DescriptionsMaternal care for excessive fetal growth |
| Fetal death | 656.4[013] | V27.1V27.3V27.4V27.6V27.7Z37.1Z37.3Z37.4Z37.6[012349]Z37.7O36.4XX[0123459] | ICD-9 Code DescriptionsIntrauterine death affecting management of motherICD-10 Code DescriptionsStillborn (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:249.00-249.31250.00-250.33648.00-648.04With chronic complications:249.40-249.91250.40-250.93 | Without chronic complications: E08.xxE09.xxE10.xxE11.xxE13.xxO24.[01389]xxWith chronic complications:E08.[234568]xxxE09.[234568]xxxE10.[234568]xxxE11.[234568]xxxE13.[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  | 401.0401.1 401.9 405405.0405.0[19]405.1[19]405.9405.9[19]642.0[0-4]642.1[0-4]642.2[0-4]642.7[0-4]642.9[0-4] | I10.I15.0I15.1I15.2I15.8I15.9O10.01[1239]O10.02O10.03O10.41[1239]O10.42O10.43O10.91[1239]O10.92O10.93O11.9O11.1O11.2O11.3 | ICD-9 Code DescriptionsEssential hypertension: Malignant, Benign, UnspecifiedSecondary hypertension: Malignant (Renovascular, Other), Benign (Renovascular, Other), Unspecified (Renovascular, Other)Benign essential hypertension complicating pregnancy, childbirth, and the puerperiumHypertension secondary to renal disease, complicating pregnancy, childbirth, and the puerperium Other pre-existing hypertension complicating pregnancy, childbirth, and the puerperiumPre-eclampsia or eclampsia superimposed on pre-existing hypertensionUnspecified hypertension complicating pregnancy, childbirth, or the puerperiumICD-10 Code DescriptionsEssential (primary) hypertensionPre-existing essential hypertension complicating pregnancy or childbirth or puerperiumUnspecified pre-existing hypertension complicating pregnancy or childbirth or puerperiumRenovascular hypertensionHypertension secondary to other renal disordersPre-existing secondary hypertension complicating pregnancy or childbirth or puerperiumPre-existing hypertension with pre-eclampsiaHypertension secondary to endocrine disordersOther secondary hypertensionSecondary hypertension, unspecified |
| Dyslipidemia, pre-existing  | 272.0272.1272.2272.4 | E78.0E78.1E78.2E78.4E78.5 | ICD-9 and 10 Code DescriptionsPure hypercholesterolemiaPure hyperglyceridemiaMixed hyperlipidemiaOther hyperlipidemiaHyperlipidemia, unspecified |
| Obesity, pre-existing  | 278.00278.01278.03649.1[01234]793.91V85.3[0123456789]V85.4[12345]V85.54 | E66.0[19]E66.[1289]O99.21[012345]R93.9Z68.3[0123456789]Z68.4[12345]Z68.54 | ICD-9 Code DescriptionsObesity, unspecifiedMorbid obesityObesity hyperventilation syndromeObesity complicating pregnancy, childbirth, or the puerperiumDiagnostic imaging inconclusive due to excess body fat of patientBody mass index (BMI) 30.0 or greater, adultBody mass index (BMI) pediatric, greater than or equal to 95th percentile for ageICD-10 Code DescriptionsObesity due to excess caloriesMorbid (severe) obesity due to excess caloriesOther obesity due to excess caloriesDrug-induced obesityMorbid (severe) obesity with alveolar hypoventilationOther obesityObesity, unspecifiedObesity complicating pregnancy, childbirth, and the puerperiumDiagnostic imaging inconclusive due to excess body fat of patientBody mass index (BMI) 30.0 or greater, adultBody mass index (BMI) pediatric, greater than or equal to 95th percentile for age |
| Multiple gestation | V27.2V27.3V27.4V27.5V27.6V27.7 | Z37.2Z37.3Z37.4Z37.50Z37.5[12349]Z37.6[012349]Z37.7 | ICD-9 and 10 Code DescriptionsTwins, both livebornTwins, one liveborn and one stillbornTwins, both stillbornMultiple births, unspecified, all livebornTriplets/Quadruplets/Quintuplets/Sextuplets/Other multiple births, all livebornTriplets/Quadruplets/Quintuplets/Sextuplets/Other multiple births, some livebornOther multiple births, all stillborn |
| Gestational diabetes mellitus | 648.8[01234] | O99.81[045]O24.4O24.41O24.41[049] O24.42O24.42[049]O24.43O24.43[049] | ICD-9 Code DescriptionsAbnormal glucose tolerance; Includes Gestational diabetesAbnormal glucose complicating pregnancy, childbirth and the puerperiumICD-10 Code DescriptionsAbnormal glucose complicating pregnancy, childbirth, and puerperiumGestational diabetes mellitus; in pregnancy, childbirth, puerperium |
| Mode of delivery:Caesarean sectionaVaginal birth | 765766[767/768, 774/775] | 783784785786787788[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.htmlCaesarean 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.htmlCaesarean 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*