**Supplementary Table 1.** Inclusion and exclusion codes used in the algorithm of NAFLD cases identification

|  |  |
| --- | --- |
| **International Classification of Diseases-9 Codes (ICD-9)** | **Hospital International Classification of Diseases Adapted Codes (HICDA)** |
| **INCLUSION** | |
| 571.8 other chronic nonalcoholic liver disease  571.9 unspecified chronic liver disease without alcohol  571.5 cirrhosis without alcohol | 05710421 fatty liver  05710431 steatohepatitis, nonalcoholic (NASH)  05710420 fatty liver changes  05710422 fatty liver hypertrophy  05710423 fatty liver cirrhosis  05710424 steatohepatitis  05710430 fatty liver infiltrate |
| **EXCLUSION** | |
| **HEPATITIS (VIRAL AND AUTOIMMUNE)** | |
| 070.0 viral hepatitis A with hepatic coma  070.1 viral hepatitis A without hepatic coma  070.20 viral hepatitis B with hepatic coma acute or unspecified without hepatitis delta  070.21 viral hepatitis B with hepatic coma acute or unspecified with hepatitis delta  070.22 chronic viral hepatitis B with hepatic coma without hepatitis delta  070.23 chronic viral hepatitis B with hepatic coma with hepatitis delta  070.30 viral hepatitis B without hepatic coma acute or unspecified without hepatitis delta  070.31 viral hepatitis B with hepatic coma acute or unspecified with hepatitis delta  070.32 chronic viral hepatitis B without hepatic coma without hepatitis delta  070.33 chronic viral hepatitis B without hepatic coma with hepatitis delta  070.41 acute hepatitis C with hepatic coma  070.42 hepatitis delta without active hepatitis B with hepatic coma hepatitis delta with hepatitis B carrier state  070.43 hepatitis E with hepatic coma  070.44 chronic hepatitis C with hepatic coma  070.49 other specified viral hepatitis with hepatic coma  070.51 acute hepatitis C without mention of hepatic coma  070.52 hepatitis delta without active hepatitis B disease or hepatic coma  070.53 hepatitis E without hepatic coma  070.54 chronic hepatitis C without hepatic coma  070.59 other specified viral hepatitis without hepatic coma  070.6 unspecified viral hepatitis with hepatic coma  070.70 unspecified viral hepatitis C without hepatic coma  070.71 unspecified viral hepatitis C with hepatic coma  070.9 unspecified viral hepatitis without hepatic coma  V02.60 carrier or suspected carrier of viral hepatitis unspecified  V02.61 carrier or suspected carrier of hepatitis B  V02.62 carrier or suspected carrier of hepatitis C  V02.69 carrier or suspected carrier of other viral hepatitis  571.40 chronic hepatitis unspecified  571.41 chronic persistent hepatitis  571.42 autoimmune hepatitis  571.49 chronic hepatitis  573.1 hepatitis in viral diseases classified elsewhere  573.2 hepatitis in other infectious diseases classified elsewhere | 00700111 hepatitis, viral, type A  00700112 jaundice, epidemic  00700113 hepatitis, infectious  00700114 jaundice, infectious, acute  00700116 hepatitis, homologous serum, IH virus  00700117 hepatitis, viral, infectious  00701000 hepatitis, serum  00701110 hepatitis, sh antigen  00701111 hepatitis, viral, type B  00701112 hepatitis, B antigen  00701113 hepatitis, Australian antigen-serum  00701114 hepatitis, serum  00701118 hepatitis, transfusion  00701150 test, hepatitis B antigen positive  00709000 hepatitis, viral NOS  00709111 hepatitis C  00709112 hepatitis, viral, non-A/non-B  00709113 hepatitis, non-A/non-B  00709120 hepatitis, cholestatic  00709130 hepatitis, anicteric  00709140 hepatitis, fulminant  00795113 hepatitis, cytomegalic  00849115 hepatitis, malarial  05700130 hepatitis, acute  05712120 hepatitis, chronic  05730210 hepatitis, lupoid  05730311 hepatitis, chronic, active  05730312 hepatitis, chronic, active, type A  05730313 hepatitis, chronic, active, type B  05730314 hepatitis, chronic, active, type C  05731110 hepatitis, toxic (drug induced)  05731120 necrosis, hepatic  05732210 hepatitis, NOS  05732230 hepatitis, granulomatous  05732250 hepatitis, autoimmune  05732260 hepatitis, surgical  34039113 hepatitis, contact/exposure  34048110 carrier, hepatitis  34728123 abnormal hepatitis B serology  34728124 abnormal hepatitis C serology  34728125 abnormal hepatitis A serology  34728126 abnormal hepatitis D serology  34728127 abnormal hepatitis E serology |
| **ALCOHOLIC LIVER DISEASE** | |
| 571.0 alcoholic fatty liver disease  571.1 acute alcoholic hepatitis  571.2 alcoholic cirrhosis of liver  571.3 alcoholic liver damage | 05710120 hepatitis, alcoholic  05710110 cirrhosis, Laennec’s  05710111 alcoholic liver disease  05710113 cirrhosis, alcoholic  05710116 cirrhosis, cardiac, alcoholic  05710410 fatty liver, alcoholic  05710411 hypertrophy, liver, alcoholic |
| **OTHER** | |
| 571.6 biliary cirrhosis  576.1 cholangitis (includes sclerosing) | 05711110 cirrhosis, biliary, primary- PBC  05711120 cirrhosis, biliary, secondary  05711130 cirrhosis, biliary, NOS  05711160 cirrhosis, infectious, cholangitic  05718210 cirrhosis, cardiac  05718310 cirrhosis, hepatic, congenital  05718420 cirrhosis, congestive |

**Supplementary Table 2**. Diagnostic codes and medications used in the definition of metabolic comorbidities and cardiovascular events.

|  |  |
| --- | --- |
| **International Classification of Diseases-9 Codes (ICD-9)** | **Hospital International Classification of Diseases Adapted Codes (HICDA)** |
| **DIABETES MELLITUS** | |
| 250.0-92 Diabetes mellitus | 02500110-120 Diabetes mellitus NOS |
| 357.2 Neuropathy in diabetes | 02501110 Ketoacidosis, diabetic NOS |
| 362.0-07 Diabetic retinopathy | 02502110 Diabetes mellitus, neuro complication |
| E932.3 Insulins and antidiabetic agents causing adverse effects in therapeutic use | 02502111 Neuropathy, diabetic |
| V58.67 Long-term insulin use | 02502210 Diabetes mellitus, ophthalmic complication |
| 249.00-90 Diabetes uncomplicated | 02502310 Diabetes mellitus, ulcer complication |
|  | 02502610 Diabetes mellitus, complication NEC |
|  | 02506140 Nephropathy, diabetic |
|  | 03670110 Retinitis, diabetic, proliferative |
|  | 03670150 Retinitis, diabetic |
|  | 03774410 Retinopathy, diabetic, proliferative |
|  | 03774420 Retinopathy, diabetic |
|  | 05379670 Gastroparesis, diabetic |
|  | 07079180 Ulcer, diabetic |
|  | 07821120 Diarrhea, diabetic |
| **HYPERTENSION** | |
| 401.0-9 Essential hypertension | 04000110-130 Hypertension, malignant |
| 402.0-91 Hypertensive heart disease | 04010110-320 Hypertension, arterial (systemic) |
| 403.00-91 Hypertensive chronic kidney disease | 04020110-120 Hypertensive heart disease |
| 404.00-93 Hypertensive heart and kidney disease |  |
| **DYSLIPIDEMIA** | |
| 272 (0-9) Disorders of lipid metabolism | 02720111-113 Hyperlipidemia |
|  | 02720210-230 Hypercholesterolemia |
|  | 02721110-113 Lipoproteinemia |
|  | 02721210-213 Hypertriglyceridemia |
|  | 02722110-150 Dyslipidemia |
|  | 02722110-113 Abnormal lipids, blood |
| **CARDIOVASCULAR EVENTS** | |
| ATRIAL FIBRILLATION AND FLUTTER | |
| 427.3(31-32) Atrial fibrillation and flutter | 04163110-240 Fibrillation, atrial |
|  | 04164110-110 Flutter, atrial |
| ANGINA | |
| 411.1 Intermediate coronary syndrome | 04110110-150 Acute coronary syndrome |
| 413 (0-9) Angina pectoris | 04130110-150 Angina, pectoris |
| MYOCARDIAL INFARCTION | |
| 410.0-92 Acute myocardial infarction | 0410(0110-9150) Infarction, myocardial |
|  | 0412(0110-0120) Occlusion coronary |
| CARDIAC ARREST | |
| 427.5 Cardiac arrest | 0415(8110-8120) Arrest, cardiac |
| HEART FAILURE | |
| 428 (.0-9) Heart failure | 04020120 Failure, heart, hypertensive |
|  | 04169434 Dysfunction, diastolic |
|  | 04169435 Dysfunction, systolic |
|  | 04270110-1 Failure, right heart |
|  | 04271(110-120) Failure, heart, with acute pulmonary edema |
|  | 04271(210-212) Asthma, cardiac |
|  | 04279(100-213) Failure, congestive, heart |
| STROKE | |
| 433.0-01 Occlusion basilar artery | 04320(110-181) Occlusion, precerebral artery |
| 433.1-11 Carotid artery occlusion | 04320(200-202) Embolism, cerebellar |
| 433.20-21 Vertebral artery occlusion | 04320(220-240) Stenosis, artery, basilar, carotid, cerebral |
| 433.3-91 Occlusion and stenosis of multiple precerebral arteries | 04320(310-341) Thrombosis, artery, basilar, carotid, cerebral |
| 434.0-91 Cerebral thrombosis | 04320(510-520) Infarction, brainstem |
| 435.0-9 Transient cerebral ischemia | 04330(110-310) Infarction, brain |
| 436 CVA | 04340(110-120) Embolism, cerebral |
|  | 04350(110-135) Attack, transient, ischemic |
|  | 04360(110-120) Stroke |
|  | 04370(110-130) Atherosclerosis, brain |
|  | 04380(110-270) Stroke, residual |

**Supplementary Table 3.** Medications used to define metabolic comorbidities.

|  |  |  |
| --- | --- | --- |
| **DIABETES** | **HYPERTENSION** | **DYSLIPIDEMIA** |
| acarbose  miglitol  alogliptin / Metformin  canagliflozin / Metformin  chlorpropamide / Metformin  dapagliflozin / Metformin  empagliflozin / Metformin  glipizide / Metformin  glyburide / Metformin  linagliptin / Metformin  metformin  metformin / pioglitazone  metformin / repaglinide  metformin / ropinirole  metformin / rosiglitazone  metformin / saxagliptin  metformin / sitagliptin  glimepiride  glimepiride / pioglitazone  pioglitazone  glimepiride / rosiglitazone  rosiglitazone  glipizide  glyburide  repaglinide  sitagliptin  insulin, Aspart Protamine, human / Insulin, Aspart,  insulin detemir  insulin Glargine  insulin Glargine / Lixisenatide  insulin Lispro  insulin Lispro / Insulin, Protamine Lispro, Human  exenatide  simvastatin / sitagliptin  dapagliflozin / saxagliptin  saxagliptin  acetohexamide  chlorpropamide  chlorpropamide / Phenformin  glyburide / Phenformin  tolazamide  tolbutamide  alogliptin / pioglitazone | amiloride  amlodipine  atenolol  benazepril  bendroflumethiazide  bumetanide  candesartan  captopril  carvedilol  chlorthalidone  clonidine  diltiazem  doxazosin  enalapril  eplerenone  eprosartan  ethacrynic acid  felodipine  fosinopril  furosemide  guanabenz  guanfacine  indapamide  indoramin  irbesartan  isradipine  labetalol  lercanidipine  lisinopril  losartan  methyldopa  metolazone  metoprolol  moxonidine  nadolol  nebivolol  nicardipine  nifedipine  nimodipine  nitrendipine  olmesartan  oxprenolol  perindopril  phenoxybenzamine  phentolamine  pindolol  prazosin  propranolol  quinapril  ramipril  spironolactone  telmisartan  terazosin  timolol  tolazoline  torsemide  trandolapril  triamterene  valsartan  verapamil | atorvastatin  bezafibrate  cerivastatin  cholestyramine  ciprofibrate  clofibrate  ezetimibe  fenofibrate  fenofibrate  fish oil  fluvastatin  gemfibrozil  lovastatin  niacin  pitavastatin  pravastatin  rosuvastatin  simvastatin |

**Supplementary** **Table 4.** Performance of the code-based algorithm of NAFLD identification after exclusion of codes for liver disease of other etiologies (codes are shown in Supplementary Table 1).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **NAFLD Status Via Manual Review** | |  |
|  |  | NAFLD | Non-NAFLD | Total |
| **NAFLD Status Via Diagnosis Codes** | NAFLD | 350 | 62 | 412 |
| Non-NAFLD | 17 | 114 | 131 |
|  | Total | 367 | 176 | 543 |

350 / 412 = 85% of NAFLD codes were true NAFLD after manual review.

141 / 131 = 87% of non-NAFLD liver disease codes were true non-NAFLD liver disease after manual review.

Summary statistics:

Sensitivity = 350 / 367 = 95%

Specificity = 114 / 176 = 65%

PPV = 350 / 412 = 85%

NPV = 114 / 131 = 87%

Accuracy = 464 / 543 = 85%

**Supplementary Table 5.** The performance of the ASCVD risk-estimator in discriminating subjects at high versus low 10-year risk of myocardial infarction or stroke.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Number of predicted events | Number of observed events | c-statistic | Standard error |
| Entire cohort | 322.3 | 249 | 0.69 | 0.02 |
| NAFLD women | 42.1 | 40 | 0.71 | 0.04 |
| NAFLD men | 43 | 36 | 0.76 | 0.05 |
| Control women | 116.1 | 89 | 0.71 | 0.03 |
| Control men | 121.1 | 84 | 0.70 | 0.04 |