**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 disease571.9 unspecified chronic liver disease without alcohol571.5 cirrhosis without alcohol | 05710421 fatty liver05710431 steatohepatitis, nonalcoholic (NASH)05710420 fatty liver changes05710422 fatty liver hypertrophy05710423 fatty liver cirrhosis05710424 steatohepatitis05710430 fatty liver infiltrate |
| **EXCLUSION** |
| **HEPATITIS (VIRAL AND AUTOIMMUNE)** |
| 070.0 viral hepatitis A with hepatic coma070.1 viral hepatitis A without hepatic coma070.20 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 delta070.23 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 delta070.41 acute hepatitis C with hepatic coma 070.42 hepatitis delta without active hepatitis B with hepatic coma hepatitis delta with hepatitis B carrier state070.43 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 comaV02.60 carrier or suspected carrier of viral hepatitis unspecified V02.61 carrier or suspected carrier of hepatitis BV02.62 carrier or suspected carrier of hepatitis CV02.69 carrier or suspected carrier of other viral hepatitis571.40 chronic hepatitis unspecified 571.41 chronic persistent hepatitis 571.42 autoimmune hepatitis 571.49 chronic hepatitis573.1 hepatitis in viral diseases classified elsewhere573.2 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 virus00700117 hepatitis, viral, infectious 00701000 hepatitis, serum 00701110 hepatitis, sh antigen 00701111 hepatitis, viral, type B00701112 hepatitis, B antigen 00701113 hepatitis, Australian antigen-serum 00701114 hepatitis, serum00701118 hepatitis, transfusion 00701150 test, hepatitis B antigen positive00709000 hepatitis, viral NOS 00709111 hepatitis C 00709112 hepatitis, viral, non-A/non-B 00709113 hepatitis, non-A/non-B 00709120 hepatitis, cholestatic00709130 hepatitis, anicteric 00709140 hepatitis, fulminant 00795113 hepatitis, cytomegalic00849115 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 B05730314 hepatitis, chronic, active, type C05731110 hepatitis, toxic (drug induced) 05731120 necrosis, hepatic 05732210 hepatitis, NOS 05732230 hepatitis, granulomatous 05732250 hepatitis, autoimmune 05732260 hepatitis, surgical 34039113 hepatitis, contact/exposure34048110 carrier, hepatitis 34728123 abnormal hepatitis B serology34728124 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 disease571.1 acute alcoholic hepatitis571.2 alcoholic cirrhosis of liver571.3 alcoholic liver damage | 05710120 hepatitis, alcoholic 05710110 cirrhosis, Laennec’s 05710111 alcoholic liver disease 05710113 cirrhosis, alcoholic 05710116 cirrhosis, cardiac, alcoholic05710410 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, NOS05711160 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** |
| acarbosemiglitolalogliptin / Metformincanagliflozin / Metforminchlorpropamide / Metformindapagliflozin / Metforminempagliflozin / Metforminglipizide / Metforminglyburide / Metforminlinagliptin / Metforminmetforminmetformin / pioglitazonemetformin / repaglinidemetformin / ropinirolemetformin / rosiglitazonemetformin / saxagliptinmetformin / sitagliptinglimepirideglimepiride / pioglitazonepioglitazoneglimepiride / rosiglitazonerosiglitazoneglipizideglyburiderepaglinidesitagliptininsulin, Aspart Protamine, human / Insulin, Aspart, insulin detemirinsulin Glargineinsulin Glargine / Lixisenatideinsulin Lisproinsulin Lispro / Insulin, Protamine Lispro, Humanexenatidesimvastatin / sitagliptindapagliflozin / saxagliptinsaxagliptinacetohexamidechlorpropamidechlorpropamide / Phenforminglyburide / Phenformintolazamidetolbutamidealogliptin / pioglitazone | amilorideamlodipineatenololbenazeprilbendroflumethiazidebumetanidecandesartancaptoprilcarvedilolchlorthalidoneclonidinediltiazemdoxazosinenalaprileplerenoneeprosartanethacrynic acidfelodipinefosinoprilfurosemideguanabenzguanfacineindapamideindoraminirbesartanisradipinelabetalollercanidipinelisinoprillosartanmethyldopametolazonemetoprololmoxonidinenadololnebivololnicardipinenifedipinenimodipinenitrendipineolmesartanoxprenololperindoprilphenoxybenzaminephentolaminepindololprazosinpropranololquinaprilramiprilspironolactonetelmisartanterazosintimololtolazolinetorsemidetrandolapriltriamterenevalsartanverapamil | atorvastatinbezafibratecerivastatincholestyramineciprofibrateclofibrateezetimibefenofibratefenofibratefish oilfluvastatingemfibrozillovastatinniacinpitavastatinpravastatinrosuvastatinsimvastatin |

**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 |