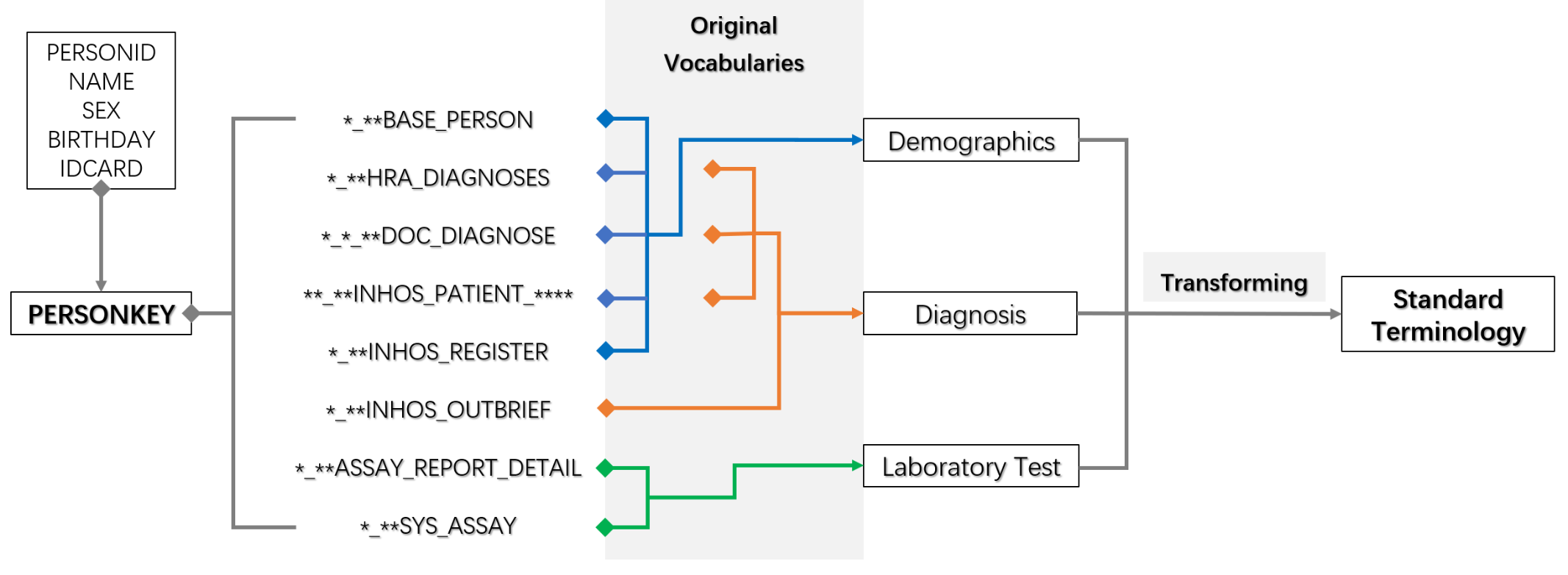
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**Supplementary Figure 1:** Form integration and data extraction for the Standard Terminology of CKD in the CDM. CKD: Chronic kidney disease; CDM: Common data model.

**Supplementary Table 1: ICD-10 codes and texts of CKD-related diagnosis in English and Chinese.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Disease** | **Code in English edition** | **Different code in Chinese edition** | **Disease of different code in Chinese edition** | **Disease of different code in Chinese edition (translation)** |
| **CKD and complications** |  |  |  |  |
| CKD, stage 1 | N18.1 | N18.801 | 慢性肾脏病1期 |  |
| CKD, stage 2 | N18.2 | N18.802 | 慢性肾脏病2期 |  |
| CKD, stage 3 | N18.3 | N18.803 | 慢性肾脏病3期 |  |
| CKD, stage 4 | N18.4 | N18.804 | 慢性肾脏病4期 |  |
| CKD, stage 5 | N18.5 | N18.001 | 慢性肾脏病5期 |  |
| CKD, stage 5 | N18.5 | N18.805+ | 尿毒症性肺病 | Uraemic pneumopathy |
| CKD, stage 5 | N18.5 | N18.806+ | 尿毒症性脑病 | Uraemic Apoplexia, Uraemic Dementia |
| CKD, stage 5 | N18.5 | N18.807+ | 尿毒症性神经病变 | Uraemic neuropathy, Uraemic paralysis |
| CKD, stage 5 | N18.5 | N18.808+ | 尿毒症性心包炎 | Uremia pericarditis |
| CKD, stage 5 | N18.5 | N18.809+ | 尿毒症性心肌病 | Uremia myocardiopathy |
| CKD, unspecified | N18.9 | N19.x01 | 尿毒症 | Chronic uremia |
| Disorders resulting from impaired renal tubular function | N25 |  | 肾小管功能损害所致的疾患 |  |
| **Primary cause** |  |  |  |  |
| Acute nephritic syndrome | N00 |  | 急性肾炎综合征 |  |
| Recurrent and persistent hematuria | N02 |  | 复发性和持续性血尿 |  |
| Chronic nephritic syndrome | N03 |  | 慢性肾炎综合征 |  |
| Nephrotic syndrome | N04 |  | 肾病综合征 |  |
| Unspecified nephritic syndrome | N05 |  | 未特指的肾炎综合征 |  |
| Persistent proteinuria, unspecified | N39.1 |  | 持续性蛋白尿 |  |
| Isolated proteinuria with specified morphological lesion | N06 |  | 孤立性蛋白尿伴有特指的形态学损害 |  |
| Unspecified contracted kidney | N26 |  | 未特指的肾挛缩 |  |
| Abnormal results of kidney function studies | R94.4 |  | 肾功能检查的异常结果 |  |
| **Secondary cause** |  |  |  |  |
| Type 1 diabetes mellitus – With renal complications | E10.2+ |  | 1型糖尿病肾的并发症 |  |
| Type 2 diabetes mellitus – With renal complications | E11.2+ |  | 2型糖尿病肾的并发症 |  |
| Malnutrition-related diabetes mellitus – With renal complications | E12.2+ | E12.200+; E12.200+N08.3\* | 营养不良相关性糖尿病肾病 |  |
| Other specified diabetes mellitus – With renal complications | E13.2+ | E13.200 | 其他特指的糖尿病，伴有肾的并发症 |  |
| Unspecified diabetes – With renal complications mellitus | E14.2+ |  | 未特指的糖尿病，伴有肾的并发症 |  |
| Hypertensive renal disease | I12 |  | 高血压肾病合并肾衰 |  |
| Hypertensive heart and renal disease | I13 |  | 高血压性心肾疾病伴充血性心力衰竭 |  |
| Pre-existing hypertensive renal disease complicating pregnancy, childbirth and the puerperium | O10.2 |  | 原有高血压肾脏病并发于妊娠、分娩和产褥期 |  |
| Pre-existing hypertensive heart and renal disease complicating pregnancy, childbirth and the puerperium | O10.3 |  | 原有高血压心脏和肾脏病并发于妊娠、分娩和产褥期 |  |
| Unspecified pre-existing hypertension complicating pregnancy, childbirth and the puerperium | O10.9 | O11 | 原有高血压性疾患,并发蛋白尿 | Pre-existing hypertension complicating proteinuria |
| Other specified pregnancy-related conditions | O26.8 | O28.801; O26.811 | 妊娠合并肾病综合征 | Pregnancy complicated with nephrotic syndrome |
| Polyarteritis with lung involvement [Churg-Strauss] | M30.1 | M30.101 | 变应性肉芽肿性血管炎 |  |
| Extrarenal uremia | R39.2 |  | 肾外性尿毒症 |  |
| Hypersensitivity angiitis | M31.0 | M31.001 | 古德帕斯丘综合征 | Goodpasture syndrome |
|  |  | M31.002+; M31.005+ | 抗肾小球基底膜抗体病 | Anti-GBM disease |
|  |  | M31.003+ | 肺出血肾炎综合征相关肾小球肾炎 | Pulmonary hemorrhage nephritis syndrome |
| Thrombotic microangiopathy | M31.1 | M31.102+ | 血栓性血小板减少性紫癜相关肾小球肾炎 | Thrombotic thrombocytopenic purpura-associated glomerulonephritis |
| Wegener granulomatosis | M31.3 | M31.303+ | 韦格纳肉芽肿病相关肾小球肾炎 | Wegener granulomatosis-associated glomerulonephritis |
| Microscopic polyangiitis | M31.7 | M31.703+ | 血管炎性肾小球肾炎 | Microscopic polyangiitis-associated glomerulonephritis |
| Necrotizing vasculopathy, unspecified | M31.9 | M31.802; M31.701+ | ANCA相关性肾炎 | ANCA associated vasculitis |
| Systemic lupus erythematosus with organ or system involvement | M32.1+ | M32.105+N08.5\*; M32.101+N08.5\*; M32.112+N08.5\*; M32.102+N16.4\*; M32.113+N16.4\* | 狼疮性肾炎；狼疮性肾损害 | Systemic lupus erythematosus-associated glomerulonephritis; Systemic lupus erythematosus-associated kidney damage |
| Sicca syndrome [Sjögren] | M35.0 | M35.006+N16.4\*; M35.005+N16.4\*; | 干燥综合征性肾小管间质疾患 | Sicca syndrome-associated tubulointerstitial disease |
| Hemolytic-uremic syndrome | D59.3 |  | 溶血-尿毒症综合征 |  |
| Allergic purpura | D69.0 | D69.005+ | 肾型过敏性紫癜 | Allergic purpura with kidney injury |
| Cryoglobulinemia | D89.1 | D89.101+ | 冷球蛋白血症性肾小球肾炎 | Cryoglobulinemia-associated glomerulonephritis |
| Organ-limited amyloidosis | E85.4 | E85.410+N08.4\*; E85.411+N29.8\* | 淀粉样变肾损害 | Amyloidosis-associated kidney damage |
| Other psoriasis | L40.8 | L40.803+; L40.802+N05.9\*; L40.800x002+N05.9\* | 银屑病性肾炎 | Psoriatic nephritis |
| Idiopathic gout | M10.0 | M10.001+N16.8\*; N28.905 | 尿酸性肾病 | Urate nephropathy |
| Gout due to impairment of renal function | M10.3 | M10.3; M10.300; M10.393; | 肾功能损害引起痛风 |  |
| Obesity, unspecified | E66.9 | E66.902+ | 肥胖相关性肾病 | Obesity-related nephropathy |
| Malignant neoplasm of kidney, except renal pelvis | C64 |  | 肾(除外肾盂)恶性肿瘤 |  |
| Glomerular disease in syphilis | A52.7+N08.0\* | A52.712+N08.0\*; A52.700x012+N08.0\* | 梅毒性肾炎 |  |
| Chronic viral hepatitis | B18+N08.0\* | B18.103+ | 乙型肝炎相关性肾炎 | Hepatitis B-related nephritis |
|  |  | B18.205+ | 丙型肝炎相关性肾炎 | Hepatitis C-related nephritis |
|  |  | B18.904+ | 病毒性肝炎相关性肾病 | Hepatitis-related nephritis |
| Glomerular disorders in infectious and parasitic diseases classified elsewhere | N08\* |  | 分类于他处的疾病引起的肾小球疾患 |  |
| Tubulointerstitial nephritis |  |  |  |  |
| Chronic tubulo-interstitial nephritis | N11 |  | 慢性肾小管-间质肾炎 |  |
| Tubulo-interstitial nephritis, not specified as acute or chronic | N12 |  | 肾小管-间质肾炎，未特指急性或慢性 |  |
| Acute renal failure with tubular necrosis | N17.0 | N17.002 | 缺血性肾病 | Ischemic renal disease |
| Drug- and heavy-metal-induced tubulo-interstitial and tubular conditions | N14 |  | 药物和重金属诱发的肾小管-间质和肾小管情况 |  |
| Other renal tubulo-interstitial diseases (except for N15.1) | N15 |  | 其他肾小管-间质疾病 |  |
| Disorders of amino-acid transport | E72.0 |  | 氨基酸转移紊乱 |  |
| Other specified disorders of carbohydrate metabolism | E74.8 |  | 其他特指的碳水化合物代谢紊乱：肾糖尿 |  |
| Renal tubulo-interstitial disorders in diseases classified elsewhere | N16\* |  | 分类于他处的疾病引起的肾小管-间质疾患 |  |
| Postprocedural renal failure | N99.0 |  | 操作后肾衰竭 |  |
| Ischemia and infarction of kidney | N28.0 |  | 肾缺血和肾梗死 |  |
| Atherosclerosis of renal artery | I70.1 | I70.102 | 移植肾动脉狭窄 | Artery stenosis of tranplanted kidney |
| Renovascular hypertension | I15.0 |  | 肾血管性高血压 |  |
| Hypertension secondary to other renal disorders | I15.1 | I15.103 | 肾萎缩伴有高血压 | Kidney atrophy with hypertension |
| Other obstructive and reflux uropathy | N13.8 |  | 梗阻性肾病 | Obstructive nephropathy |
| Hydronephrosis with ureteropelvic junction obstruction | N13.0 |  | 肾盂积水伴有输尿管肾盂连接处梗阻 |  |
| Hydronephrosis with ureteral stricture, not elsewhere classified | N13.1 |  | 肾盂积水伴有输尿管狭窄 |  |
| Hydronephrosis with renal and ureteral calculous obstruction | N13.2 |  | 肾盂积水伴有肾和输尿管结石梗阻 |  |
| Other specified disorders of kidney and ureter | N28.8 |  | 肾和输尿管其他特指的疾患 |  |
| Disorder of kidney and ureter, unspecified | N28.9 |  | 肾和输尿管未特指的疾患 |  |
| **Congenital cause** |  |  |  |  |
| Congenital renal failure | P96.0 |  | 先天性肾衰竭 |  |
| Congenital renal artery stenosis | Q27.1 |  | 先天性肾动脉狭窄 |  |
| Other congenital malformations of renal artery | Q27.2 |  | 肾动脉的其他先天性畸形 |  |
| Peripheral arteriovenous malformation | Q27.3 | Q27.305 | 先天性肾动静脉瘘 | Congenital renal arteriovenous fistula |
| Other specified congenital malformations of peripheral vascular system | Q27.8 | Q27.806 | 先天性肾血管畸形 | Congenital malformations of renal vascular |
| Renal agenesis and other reduction defects of kidney | Q60 |  | 肾缺如和肾的其他萎缩性缺陷 |  |
| Polycystic kidney, autosomal recessive | Q61.1 |  | 多囊肾，常染色体隐性 |  |
| Polycystic kidney, autosomal dominant | Q61.2 |  | 多囊肾，常染色体显性 |  |
| Polycystic kidney, unspecified | Q61.3 |  | 未特指的多囊肾 |  |
| Renal dysplasia | Q61.4 |  | 肾发育不良 |  |
| Medullary cystic kidney | Q61.5 |  | 髓部囊性肾 海绵肾NOS |  |
| Other cystic kidney diseases | Q61.8 |  | 其他囊性肾病 |  |
| Lobulated, fused and horseshoe kidney | Q63.1 |  | 分叶肾、融合肾和马蹄形肾 |  |
| Hyperplastic and giant kidney | Q63.3 |  | 增生性和巨大肾 |  |
| Other specified congenital malformations of kidney | Q63.8 |  | 肾的特指先天性畸形 |  |
| Congenital malformation of kidney, unspecified | Q63.9 |  | 肾未特指的先天性畸形 |  |
| Non-neuropathic heredofamilial amyloidosis-Hereditary amyloid nephropathy | E85.0 |  | 遗传性淀粉样肾病 |  |
| **Maintenance dialysis or transplantation** |  |  |  |  |
| Care involving dialysis | Z49 |  | 肾透析 |  |
| Dependence on renal dialysis | Z99.2 |  | 依赖肾透析 |  |
| Other complications following infusion, transfusion and therapeutic injection | T80.8 | T80.801 | 透析失衡综合征 | Dialysis imbalance syndrome |
| Unspecified complication following infusion, transfusion and therapeutic injection | T80.9 | T80.902 | 血液透析并发症 | Hemodialysis complication |
| Mechanical complication of vascular dialysis catheter | T82.4 |  | 血管透析导管的机械性并发症 |  |
| Unintentional cut, puncture, perforation or hemorrhage during surgical and medical care – During kidney dialysis or other perfusion | Y60.2 |  | 在肾透析或其他灌注中非故意的切割、针刺、穿孔或出血 |  |
| Foreign object accidentally left in body during surgical and medical care – During kidney dialysis or other perfusion | Y61.2 |  | 在肾透析或其他灌注中异物意外地遗留在体内 |  |
| Failure of sterile precautions during surgical and medical care – During kidney dialysis or other perfusion | Y62.2 |  | 在肾透析或其他灌注中无菌预防措施的失败 |  |
| Mechanical complication of other specified internal prosthetic devices, implants and grafts | T85.6 | T85.609 | 腹膜透析管移位 | Peritoneal dialysis catheter translocation |
|  |  | T85.610 | 腹膜透析管阻塞 | Peritoneal dialysis catheter obstruction |
|  |  | T85.611 | 腹膜透析管并发症 | Peritoneal dialysis catheter complication |
| Infection and inflammatory reaction due to other internal prosthetic devices, implants and grafts | T85.7 | T85.710 | 腹膜透析中腹腔感染 | Peritoneal dialysis related abdominal infection |
|  |  | T85.711 | 腹膜透析后腹膜炎 | Peritoneal dialysis related peritonitis |
| Other complications of internal prosthetic devices, implants and grafts, not elsewhere classified | T85.8 | T85.801 | 腹膜透析管内血栓 | Peritoneal dialysis catheter thrombosis |
| Unspecified complication of internal prosthetic device, implant and graft | T85.9 | T85.901 | 腹膜透析装置并发症 | Peritoneal dialysis device complication |
| Kidney transplant status | Z94.0 |  | 肾移植状态 |  |
| Kidney transplant failure and rejection | T86.1 | T86.102 | 移植肾功能不全 |  |
| Other complications of genitourinary prosthetic devices, implants and grafts | T83.8 | T83.804 | 移植肾输尿管瘘 | Transplanted kidney ureteral fistula |

CKD: Chronic kidney disease; ICD: International Classification of Diseases.

**Supplementary Table 2: Standard terminology for CKD characterization in English and in Chinese.**

|  |  |  |
| --- | --- | --- |
| **Standardized terminology** – **English** | **Standard terminology** – **Chinese** | **Original vocabularies and units (examples)-**  **English and Chinese** |
| Date of birth | 出生日期 | Jan-1, 1990; 1990/1/1; 1990/01/01 |
| Sex | 性别 | Male/Female; 1 = male/2 = female; 男/女; 男性/女性 |
| Serum creatinine | 血肌酐 | SCr; CREA; B\_CR; CREA(J); 肌酐测定；肌酐（氧化酶法）；肌酐（急） |
| Date of serum creatinine | 血肌酐检验日期 | As above |
| Unit of serum creatinine | 血肌酐单位 | umol/L; umol/L; mg/dL |
| eGFR | eGFR | estimated\_GFR; glomerular filtration rate; 估算肾小球滤过率；肾小球滤过率 |
| Date of eGFR | eGFR检验日期 | As above |
| Unit of eGFR | eGFR单位 | mL/min; mL/(min·1.73 m2) |
| Urine albumin-to-creatinine ratio | 尿白蛋白肌酐比 | UACR; Malb/nCR; MA/Cr; albumin to creatinine ratio; 尿微量白蛋白肌酐比；尿微量白蛋白/尿肌酐 |
| Date of urine albumin-to-creatinine ratio | 尿白蛋白肌酐比检验日期 | As above |
| Unit of urine albumin-to-creatinine ratio | 尿白蛋白肌酐比单位 | mg/g; mg/mmol |
| Urine albumin concentration | 尿白蛋白浓度 | mALB; UMA; UALB; U\_albumin; 尿微量白蛋白测定；微量白蛋白；微白蛋白 |
| Date of urine albumin concentration | 尿白蛋白浓度检验日期 | As above |
| Unit of urine albumin concentration | 尿白蛋白浓度单位 | mg/L; mg/L |
| Urine protein-to-creatinine ratio | 尿蛋白肌酐比 | UPCR; PRU/UCr; protein to creatinine ratio; 尿蛋白/肌酐；尿蛋白肌酐比值 |
| Date of urine protein-to-creatinine ratio | 尿蛋白肌酐比检验日期 | As above |
| Unit of urine protein-to-creatinine ratio | 尿蛋白肌酐比单位 | mg/g; mg/mmol |
| 24 h proteinuria | 24小时尿蛋白定量 | 24 h UTP; U-TP/24 h; 24 h\_U\_TP; 24小时尿蛋白定量；24 h尿总蛋白 |
| Date of 24 h proteinuria | 24小时尿蛋白定量检验日期 | As above |
| Unit of 24 h proteinuria | 24小时尿蛋白定量单位 | mg/24 h; mg/24 h\_U |
| Urinalysis protein | 尿常规尿蛋白定性 | PRO; PRO\_U; urine protein; 尿蛋白质；尿蛋白（定性） |
| Date of urinalysis protein | 尿常规尿蛋白定性检验日期 | As above |
| Unit of urinalysis protein | 尿常规尿蛋白定性单位 | −/(−/+)/+/++/+++/++++; (−)/±/1+/2+/3+/4+ |
| Urine red blood cell | 尿红细胞计数 | NRBC; RBC-INFO; BLO; 红细胞计数；红细胞（镜检）；沉渣\_红细胞 |
| Date of urine red blood cell | 尿红细胞计数检验日期 | As above |
| Unit of urine red blood cell | 尿红细胞计数单位 | /HP; /µL |
| Urinalysis occult blood | 尿常规潜血 | BLD; U\_BLD; 尿潜血；潜血 (BLO) |
| Date of urinalysis occult blood | 尿常规潜血检验日期 | As above |
| Unit of urinalysis occult blood | 尿常规潜血单位 | (−)/±/1+/2+/3+/4+; −/(−/+)/+/++/+++/++++ |

CKD: Chronic kidney disease; eGFR: Estimated glomerular filtration rate.

**Supplementary Table 3: Characteristics of patients with CKD identified by computable phenotype.**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Item** | **Overall** | **G1\*** | **G2** | **G3** | **G4** | **G5** |
| In total (*n*, %) | 64,036 (11.5)**†** | 33,315 (59.8) | 12,980 (23.3) | 7410 (13.3) | 1162 (2.1) | 813 (1.5) | |
| Age (mean ± SD) (year) | 59.9 ± 17.2 | 53.7 ± 14.0 | 70.4 ± 14.4 | 81.0 ± 13.1 | 82.3 ± 14.6 | 69.1 ± 17.5 | |
| Sex (*n*, %) |  |  |  |  |  |  | |
| Male | 27,593 (43.1) | 11,970 (35.9) | 6904 (53.2) | 3893 (52.5) | 602 (51.8) | 444 (54.6) | |
| Female | 36,443 (56.9) | 21,345 (64.1) | 6076 (46.8) | 3517 (47.5) | 560 (48.2) | 369 (45.4) | |
| Serum creatinine (IQR) (μmol/L) | 66.0 (54.0, 86.0) | 56.0 (49.0, 65.0) | 79.0 (69.0, 91.0) | 112.0 (97.7, 129.0) | 206.0 (176.0, 238.0) | 572.0 (391.0, 992.0) | |
| eGFR (IQR) (mL · min-1· 1.73 m-2]) | 95.8 (75.4, 109.1) | 106.3 (98.5, 116.3) | 79.8 (71.7, 85.6) | 50.3 (42.7, 55.7) | 23.9 (20.0, 27.3) | 7.5 (4.2, 11.1) | |
| Albuminuria/Proteinuria (*n*, %) | 19,143 (29.9) | 10,315 (31.0) | 4680 (36.1) | 2369 (32.0) | 530 (45.6) | 417 (51.3) | |
| Hematuria (*n*, %) | 27,041 (42.2) | 17,187 (51.6) | 5535 (42.6) | 1478 (19.9) | 246 (21.2) | 215 (26.4) | |
| Labelled with CKD-related ICD code (*n*, %) | 36,953 (57.7) | 16,795 (50.4) | 8115 (62.5) | 4330 (58.4) | 931 (80.1) | 737 (90.7) | |

\*In total, 55,682 patients received serum creatinine tests and were staged in G1–G5. †CKD patients were identified from 557,719 individuals. Percentage of CKD patients overall = (64,036/557,719) × 100% CKD: Chronic kidney disease; eGFR: Estimated glomerular filtration rate; ICD: International Classification of Diseases; IQR: Interquartile range.

**Supplementary Table 4: Performance of computable phenotype for CKD identification.**

|  |  |
| --- | --- |
| **Item** | **Value** |
| In total (*n*) | 100 |
| True positive case (*n*) | 50 |
| True negative case (*n*) | 47 |
| False positive case (*n*) | 0 |
| False negative case (*n*) | 3 |
| Sensitivity (%, 95% CI) | 94.3 (84.3–98.8) |
| Specificity (%, 95% CI) | 100.0 (92.5–100.0) |
| Accuracy (%) | 97.0 |

CI: Confidence interval; CKD: Chronic kidney disease.