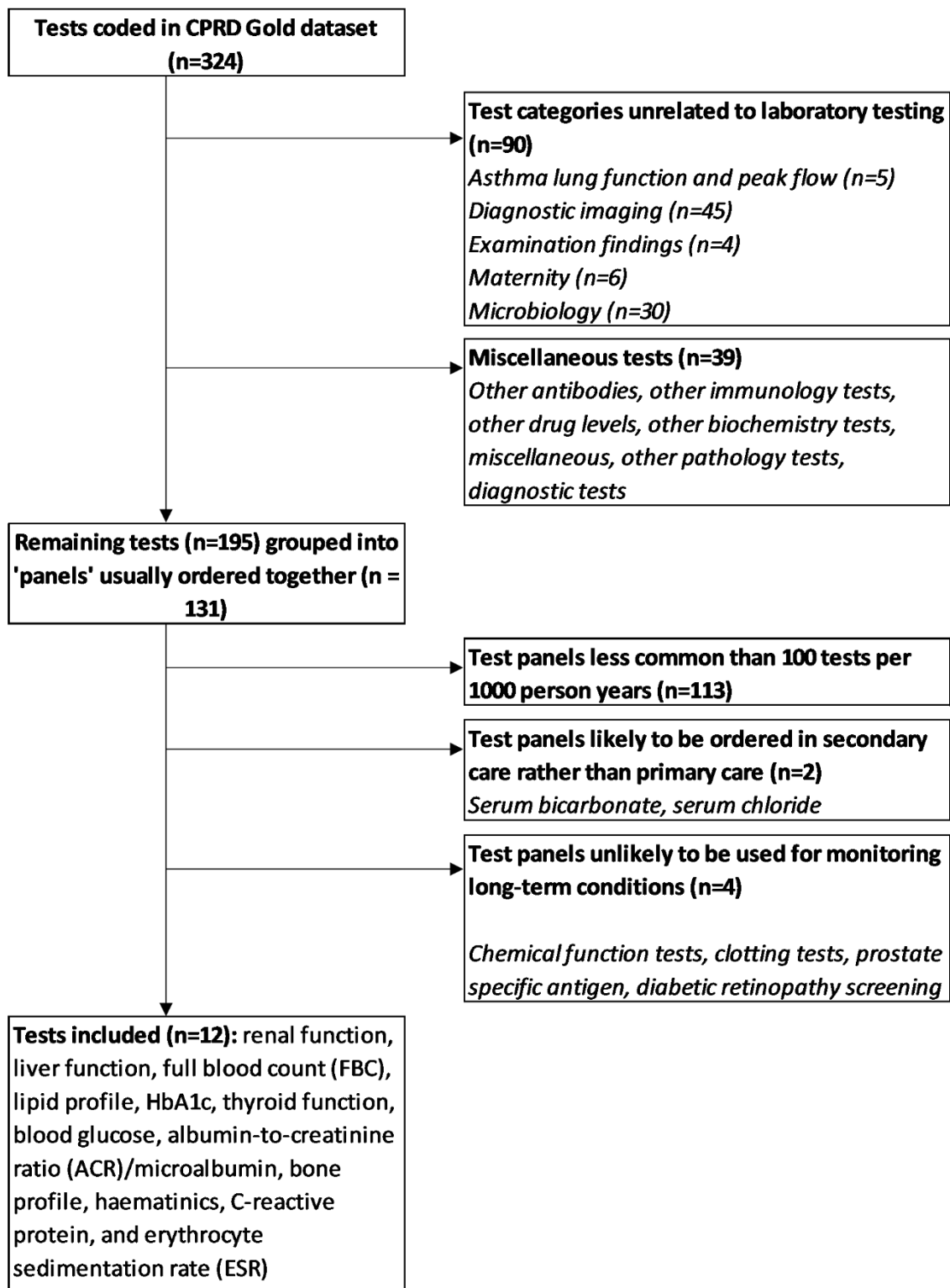


Supplementary Figure S1. Flow chart showing exclusions of tests and test panels from our analysis



Supplementary Table S1. Code list for hypertension

CPRD medical code	Read code	Description
30776	6629	Hypertension:follow-up default
103690	38G3.00	Hyperten, abnorm renal/liver funct, stroke, BLED score
109611	661M600	Hypertension self-management plan agreed
4444	662..12	Hypertension monitoring
18482	662c.00	Hypertension six month review
19070	662d.00	Hypertension annual review
21826	662F.00	Hypertension treatm. started
13188	662G.00	Hypertensive treatm.changed
3425	662O.00	On treatment for hypertension
13186	662P.00	Hypertension monitoring
102406	662P000	Hypertension 9 month review
71433	66b2.00	Hypertension monitoring not required
85944	7Q01.00	High cost hypertension drugs
101649	7Q01y00	Other specified high cost hypertension drugs
12680	8CR4.00	Hypertension clinical management plan
22333	8I3N.00	Hypertension treatment refused
15423	9OD..00	Hypertension screen admin.
16477	9ODZ.00	Hypertension screen admin. NOS
5215	9OI..00	Hypertension monitoring admin.
27525	9OI..11	Hypertension clinic admin.
28828	9OI3.00	Hyperten.monitor offer default
31117	9OI4.00	Hypertens.monitor.1st letter
31127	9OI5.00	Hypertens.monitor 2nd letter
31175	9OI6.00	Hypertens.monitor 3rd letter
66645	9OI9.00	Hypertens.monitor deleted
36305	9OIA.00	Hypertension monitor.chk done
24127	9OIA.11	Hypertension monitored
34192	9OIZ.00	Hypertens.monitoring admin.NOS

6702	F421300	Hypertensive retinopathy
204	G2...00	Hypertensive disease
799	G20..00	Essential hypertension
351	G20..11	High blood pressure
107704	G20..12	Primary hypertension
15377	G200.00	Malignant essential hypertension
1894	G201.00	Benign essential hypertension
4372	G202.00	Systolic hypertension
83473	G203.00	Diastolic hypertension
10818	G20z.00	Essential hypertension NOS
3712	G20z.11	Hypertension NOS
16292	G21..00	Hypertensive heart disease
31464	G21z.00	Hypertensive heart disease NOS
61166	G21z000	Hypertensive heart disease NOS without CCF
62718	G21z100	Hypertensive heart disease NOS with CCF
16173	G21zz00	Hypertensive heart disease NOS
4668	G22..00	Hypertensive renal disease
32423	G222.00	Hypertensive renal disease with renal failure
15106	G22z.00	Hypertensive renal disease NOS
63466	G23..00	Hypertensive heart and renal disease
21837	G232.00	Hypertensive heart&renal dis wth (congestive) heart failure
28684	G233.00	Hypertensive heart and renal disease with renal failure
57987	G234.00	Hyperten heart&renal dis+both(congestv)heart and renal fail
68659	G23z.00	Hypertensive heart and renal disease NOS
34744	G244.00	Hypertension secondary to endocrine disorders
105371	G25..00	Stage 1 hypertension (NICE - Nat Ins for Hth Clin Excl 2011)
105316	G25..11	Stage 1 hypertension
105989	G26..00	Severe hypertension (Nat Inst for Health Clinical Ex 2011)
105487	G26..11	Severe hypertension
105480	G27..00	Hypertension resistant to drug therapy

105274	G28..00	Stage 2 hypertension (NICE - Nat Ins for Hth Clin Excl 2011)
7057	G2z..00	Hypertensive disease NOS
3979	G672.00	Hypertensive encephalopathy
31816	G672.11	Hypertensive crisis
18057	8B26.00	Antihypertensive therapy
8732	G2...11	BP - hypertensive disease
63000	G231.00	Benign hypertensive heart and renal disease
52427	G211.00	Benign hypertensive heart disease
105938	G211z00	Benign hypertensive heart disease NOS
52127	G211100	Benign hypertensive heart disease with CCF
61660	G211000	Benign hypertensive heart disease without CCF
43935	G221.00	Benign hypertensive renal disease
8857	G21z011	Cardiomegaly - hypertensive
34281	9N4L.00	DNA - Did not attend hypertension clinic
10976	9h32.00	Excepted from hypertension qual indicators: Informed dissent
10961	9h31.00	Excepted from hypertension qual indicators: Patient unsuit
34108	9h3..00	Exception reporting: hypertension quality indicators
16565	6627	Good hypertension control
110631	661N600	Hypertension self-management plan review
67232	G230.00	Malignant hypertensive heart and renal disease
50157	G210.00	Malignant hypertensive heart disease
103046	G210z00	Malignant hypertensive heart disease NOS
72668	G210100	Malignant hypertensive heart disease with CCF
95334	G210000	Malignant hypertensive heart disease without CCF
39649	G220.00	Malignant hypertensive renal disease
18590	662b.00	Moderate hypertension control
96743	L122300	Other pre-exist hypertension in preg/childb/puerp-not deliv
72030	L122100	Other pre-existing hypertension in preg/childb/puerp - deliv
62432	L122z00	Other pre-existing hypertension in preg/childb/puerp NOS
73586	L122000	Other pre-existing hypertension in preg/childb/puerp unspec

66567	L122.00	Other pre-existing hypertension in preg/childbirth/puerp
18765	G2y..00	Other specified hypertensive disease
11056	8BL0.00	Patient on maximal tolerated antihypertensive therapy
27511	6628	Poor hypertension control
44549	L128.00	Pre-exist hypertension compl preg childbirth and puerperium
5513	8HT5.00	Referral to hypertension clinic
29310	G22z.11	Renal hypertension
57288	G241.00	Secondary benign hypertension
51635	G241z00	Secondary benign hypertension NOS
25371	G241000	Secondary benign renovascular hypertension
7329	G24..00	Secondary hypertension
16059	G24z.00	Secondary hypertension NOS
42229	G24zz00	Secondary hypertension NOS
31755	G240.00	Secondary malignant hypertension
73293	G240z00	Secondary malignant hypertension NOS
59383	G240000	Secondary malignant renovascular hypertension
31387	G24z000	Secondary renovascular hypertension NOS
4344	9N03.00	Seen in hypertension clinic
27634	9N1y200	Seen in hypertension clinic
109771	662P100	Telehealth hypertension monitoring
99259	662q.00	Trial reduction of antihypertensive therapy
95359	662r.00	Trial withdrawal of antihypertensive therapy
106279	8IA5.00	Trial withdrawal of antihypertensive therapy declined
97533	Gyu2100	[X]Hypertension secondary to other renal disorders
69753	Gyu2.00	[X]Hypertensive diseases
102458	Gyu2000	[X]Other secondary hypertension

Supplementary Table S2. Code list for type 2 diabetes

CPRD medical code	Read code	Description
22967	2BBF.00	Retinal abnormality - diabetes related
101881	2BBr.00	Impaired vision due to diabetic retinopathy
27921	2G51000	Foot abnormality - diabetes related
18056	2G5C.00	Foot abnormality - diabetes related
32770	44V3.00	Glucose tol. test diabetic
13071	66AI.00	Diabetic - good control
2378	66AJ.00	Diabetic - poor control
9013	66AJ.11	Unstable diabetes
22023	66AJz00	Diabetic - poor control NOS
24363	8A13.00	Diabetic stabilisation
12213	8BL2.00	Patient on maximal tolerated therapy for diabetes
711	C10..00	Diabetes mellitus
38986	C100.00	Diabetes mellitus with no mention of complication
14803	C100100	Diabetes mellitus, adult onset, no mention of complication
506	C100112	Non-insulin dependent diabetes mellitus
50972	C100z00	Diabetes mellitus NOS with no mention of complication
1682	C101.00	Diabetes mellitus with ketoacidosis
54856	C101100	Diabetes mellitus, adult onset, with ketoacidosis
38617	C101y00	Other specified diabetes mellitus with ketoacidosis
42505	C101z00	Diabetes mellitus NOS with ketoacidosis
21482	C102.00	Diabetes mellitus with hyperosmolar coma
43139	C102100	Diabetes mellitus, adult onset, with hyperosmolar coma
72345	C102z00	Diabetes mellitus NOS with hyperosmolar coma
15690	C103.00	Diabetes mellitus with ketoacidotic coma
68843	C103100	Diabetes mellitus, adult onset, with ketoacidotic coma
59288	C103y00	Other specified diabetes mellitus with coma
65062	C103z00	Diabetes mellitus NOS with ketoacidotic coma
16502	C104.00	Diabetes mellitus with renal manifestation

2475	C104.11	Diabetic nephropathy
35105	C104100	Diabetes mellitus, adult onset, with renal manifestation
13279	C104y00	Other specified diabetes mellitus with renal complications
35107	C104z00	Diabetes mellitus with nephropathy NOS
33254	C105.00	Diabetes mellitus with ophthalmic manifestation
41389	C105100	Diabetes mellitus, adult onset, + ophthalmic manifestation
47377	C105y00	Other specified diabetes mellitus with ophthalmic complicatn
34283	C105z00	Diabetes mellitus NOS with ophthalmic manifestation
16230	C106.00	Diabetes mellitus with neurological manifestation
59903	C106.11	Diabetic amyotrophy
7795	C106.12	Diabetes mellitus with neuropathy
16491	C106.13	Diabetes mellitus with polyneuropathy
39317	C106100	Diabetes mellitus, adult onset, + neurological manifestation
61523	C106y00	Other specified diabetes mellitus with neurological comps
22573	C106z00	Diabetes mellitus NOS with neurological manifestation
35399	C107.00	Diabetes mellitus with peripheral circulatory disorder
32403	C107.11	Diabetes mellitus with gangrene
32556	C107.12	Diabetes with gangrene
63357	C107100	Diabetes mellitus, adult, + peripheral circulatory disorder
33807	C107200	Diabetes mellitus, adult with gangrene
65025	C107z00	Diabetes mellitus NOS with peripheral circulatory disorder
46290	C108y00	Other specified diabetes mellitus with multiple comps
64449	C108z00	Unspecified diabetes mellitus with multiple complications
4513	C109.00	Non-insulin dependent diabetes mellitus
5884	C109.11	NIDDM - Non-insulin dependent diabetes mellitus
17859	C109.12	Type 2 diabetes mellitus
18219	C109.13	Type II diabetes mellitus
52303	C109000	Non-insulin-dependent diabetes mellitus with renal comps
50225	C109011	Type II diabetes mellitus with renal complications
18209	C109012	Type 2 diabetes mellitus with renal complications

50429	C109100	Non-insulin-dependent diabetes mellitus with ophthalm comps
59725	C109111	Type II diabetes mellitus with ophthalmic complications
70316	C109112	Type 2 diabetes mellitus with ophthalmic complications
55842	C109200	Non-insulin-dependent diabetes mellitus with neuro comps
67905	C109211	Type II diabetes mellitus with neurological complications
45919	C109212	Type 2 diabetes mellitus with neurological complications
62146	C109300	Non-insulin-dependent diabetes mellitus with multiple comps
108005	C109312	Type 2 diabetes mellitus with multiple complications
34912	C109400	Non-insulin dependent diabetes mellitus with ulcer
55075	C109411	Type II diabetes mellitus with ulcer
65704	C109412	Type 2 diabetes mellitus with ulcer
40401	C109500	Non-insulin dependent diabetes mellitus with gangrene
62107	C109511	Type II diabetes mellitus with gangrene
46150	C109512	Type 2 diabetes mellitus with gangrene
17262	C109600	Non-insulin-dependent diabetes mellitus with retinopathy
58604	C109611	Type II diabetes mellitus with retinopathy
42762	C109612	Type 2 diabetes mellitus with retinopathy
8403	C109700	Non-insulin dependent diabetes mellitus - poor control
24458	C109711	Type II diabetes mellitus - poor control
45913	C109712	Type 2 diabetes mellitus - poor control
29979	C109900	Non-insulin-dependent diabetes mellitus without complication
109103	C109911	Type II diabetes mellitus without complication
105784	C109912	Type 2 diabetes mellitus without complication
72320	C109A00	Non-insulin dependent diabetes mellitus with mononeuropathy
50813	C109A11	Type II diabetes mellitus with mononeuropathy
45467	C109B00	Non-insulin dependent diabetes mellitus with polyneuropathy
47409	C109B11	Type II diabetes mellitus with polyneuropathy
59365	C109C00	Non-insulin dependent diabetes mellitus with nephropathy
64571	C109C11	Type II diabetes mellitus with nephropathy
24836	C109C12	Type 2 diabetes mellitus with nephropathy

43785	C109D00	Non-insulin dependent diabetes mellitus with hypoglyca coma
56268	C109D11	Type II diabetes mellitus with hypoglycaemic coma
61071	C109D12	Type 2 diabetes mellitus with hypoglycaemic coma
69278	C109E00	Non-insulin depend diabetes mellitus with diabetic cataract
48192	C109E11	Type II diabetes mellitus with diabetic cataract
44779	C109E12	Type 2 diabetes mellitus with diabetic cataract
54899	C109F11	Type II diabetes mellitus with peripheral angiopathy
60699	C109F12	Type 2 diabetes mellitus with peripheral angiopathy
24693	C109G00	Non-insulin dependent diabetes mellitus with arthropathy
18143	C109G11	Type II diabetes mellitus with arthropathy
49869	C109G12	Type 2 diabetes mellitus with arthropathy
47816	C109H11	Type II diabetes mellitus with neuropathic arthropathy
66965	C109H12	Type 2 diabetes mellitus with neuropathic arthropathy
18278	C109J00	Insulin treated Type 2 diabetes mellitus
37648	C109J11	Insulin treated non-insulin dependent diabetes mellitus
18264	C109J12	Insulin treated Type II diabetes mellitus
36633	C109K00	Hyperosmolar non-ketotic state in type 2 diabetes mellitus
758	C10F.00	Type 2 diabetes mellitus
22884	C10F.11	Type II diabetes mellitus
18777	C10F000	Type 2 diabetes mellitus with renal complications
57278	C10F011	Type II diabetes mellitus with renal complications
47321	C10F100	Type 2 diabetes mellitus with ophthalmic complications
100964	C10F111	Type II diabetes mellitus with ophthalmic complications
34268	C10F200	Type 2 diabetes mellitus with neurological complications
98616	C10F211	Type II diabetes mellitus with neurological complications
65267	C10F300	Type 2 diabetes mellitus with multiple complications
43227	C10F311	Type II diabetes mellitus with multiple complications
49074	C10F400	Type 2 diabetes mellitus with ulcer
91646	C10F411	Type II diabetes mellitus with ulcer
12736	C10F500	Type 2 diabetes mellitus with gangrene

104323	C10F511	Type II diabetes mellitus with gangrene
18496	C10F600	Type 2 diabetes mellitus with retinopathy
49655	C10F611	Type II diabetes mellitus with retinopathy
25627	C10F700	Type 2 diabetes mellitus - poor control
47315	C10F711	Type II diabetes mellitus - poor control
47954	C10F900	Type 2 diabetes mellitus without complication
53392	C10F911	Type II diabetes mellitus without complication
62674	C10FA00	Type 2 diabetes mellitus with mononeuropathy
95351	C10FA11	Type II diabetes mellitus with mononeuropathy
18425	C10FB00	Type 2 diabetes mellitus with polyneuropathy
50527	C10FB11	Type II diabetes mellitus with polyneuropathy
12640	C10FC00	Type 2 diabetes mellitus with nephropathy
102201	C10FC11	Type II diabetes mellitus with nephropathy
46917	C10FD00	Type 2 diabetes mellitus with hypoglycaemic coma
98723	C10FD11	Type II diabetes mellitus with hypoglycaemic coma
44982	C10FE00	Type 2 diabetes mellitus with diabetic cataract
93727	C10FE11	Type II diabetes mellitus with diabetic cataract
37806	C10FF00	Type 2 diabetes mellitus with peripheral angiopathy
104639	C10FF11	Type II diabetes mellitus with peripheral angiopathy
59253	C10FG00	Type 2 diabetes mellitus with arthropathy
103902	C10FG11	Type II diabetes mellitus with arthropathy
35385	C10FH00	Type 2 diabetes mellitus with neuropathic arthropathy
109197	C10FH11	Type II diabetes mellitus with neuropathic arthropathy
1407	C10FJ00	Insulin treated Type 2 diabetes mellitus
64668	C10FJ11	Insulin treated Type II diabetes mellitus
34450	C10FK00	Hyperosmolar non-ketotic state in type 2 diabetes mellitus
107701	C10FK11	Hyperosmolar non-ketotic state in type II diabetes mellitus
26054	C10FL00	Type 2 diabetes mellitus with persistent proteinuria
60796	C10FL11	Type II diabetes mellitus with persistent proteinuria
18390	C10FM00	Type 2 diabetes mellitus with persistent microalbuminuria

85991	C10FM11	Type II diabetes mellitus with persistent microalbuminuria
32627	C10FN00	Type 2 diabetes mellitus with ketoacidosis
106528	C10FN11	Type II diabetes mellitus with ketoacidosis
51756	C10FP00	Type 2 diabetes mellitus with ketoacidotic coma
106061	C10FP11	Type II diabetes mellitus with ketoacidotic coma
25591	C10FQ00	Type 2 diabetes mellitus with exudative maculopathy
63690	C10FR00	Type 2 diabetes mellitus with gastroparesis
43857	C10M.00	Lipoatrophic diabetes mellitus
107603	C10P.00	Diabetes mellitus in remission
108360	C10P000	Type I diabetes mellitus in remission
33343	C10y.00	Diabetes mellitus with other specified manifestation
63371	C10y100	Diabetes mellitus, adult, + other specified manifestation
10098	C10yy00	Other specified diabetes mellitus with other spec comps
70821	C10yz00	Diabetes mellitus NOS with other specified manifestation
45491	C10z.00	Diabetes mellitus with unspecified complication
63762	C10z100	Diabetes mellitus, adult onset, + unspecified complication
64283	C10zy00	Other specified diabetes mellitus with unspecified comps
64357	C10zz00	Diabetes mellitus NOS with unspecified complication
52212	Cyu2.00	[X]Diabetes mellitus
41686	Cyu2000	[X]Other specified diabetes mellitus
100292	Cyu2300	[X]Unspecified diabetes mellitus with renal complications
17067	F171100	Autonomic neuropathy due to diabetes
44033	F345000	Diabetic mononeuritis multiplex
17247	F35z000	Diabetic mononeuritis NOS
31790	F372.00	Polyneuropathy in diabetes
5002	F372.11	Diabetic polyneuropathy
2342	F372.12	Diabetic neuropathy
48078	F372000	Acute painful diabetic neuropathy
35785	F372100	Chronic painful diabetic neuropathy
24571	F372200	Asymptomatic diabetic neuropathy

39420	F381300	Myasthenic syndrome due to diabetic amyotrophy
2340	F381311	Diabetic amyotrophy
37315	F3y0.00	Diabetic mononeuropathy
1323	F420.00	Diabetic retinopathy
7069	F420000	Background diabetic retinopathy
3286	F420100	Proliferative diabetic retinopathy
2986	F420200	Preproliferative diabetic retinopathy
10099	F420300	Advanced diabetic maculopathy
3837	F420400	Diabetic maculopathy
47584	F420500	Advanced diabetic retinal disease
10755	F420600	Non proliferative diabetic retinopathy
30477	F420700	High risk proliferative diabetic retinopathy
65463	F420800	High risk non proliferative diabetic retinopathy
11626	F420z00	Diabetic retinopathy NOS
17313	F440700	Diabetic iritis
10659	F464000	Diabetic cataract
34152	G73y000	Diabetic peripheral angiopathy
2471	K01x100	Nephrotic syndrome in diabetes mellitus
105302	K08yA00	Proteinuric diabetic nephropathy
107881	K08yA11	Clinical diabetic nephropathy
106360	K27y700	Erectile dysfunction due to diabetes mellitus
99628	Kyu0300	[X]Glomerular disorders in diabetes mellitus
50609	L180600	Pre-existing diabetes mellitus, non-insulin-dependent
55431	L180X00	Pre-existing diabetes mellitus, unspecified
7328	M037200	Cellulitis in diabetic foot
24327	M271000	Ischaemic ulcer diabetic foot
11663	M271100	Neuropathic diabetic ulcer - foot
9881	M271200	Mixed diabetic ulcer - foot
18142	N030000	Diabetic cheiroarthropathy
57333	N030011	Diabetic cheiropathy

27891	N030100	Diabetic Charcot arthropathy
53634	R054200	[D]Gangrene of toe in diabetic
31053	R054300	[D]Widespread diabetic foot gangrene
11848	C314.11	Renal diabetes
1684	66A4.00	Diabetic on oral treatment
7563	66A3.00	Diabetic on diet only
11551	C10B.00	Diabetes mellitus induced by steroids
14889	C100111	Maturity onset diabetes
22487	C10N.00	Secondary diabetes mellitus
25041	ZC2CA00	Dietary advice for type II diabetes
26108	C10B000	Steroid induced diabetes mellitus without complication
28769	66AV.00	Diabetic on insulin and oral treatment
31310	C108900	Insulin dependent diabetes maturity onset
32193	C11y000	Steroid induced diabetes
46624	C10C.11	Maturity onset diabetes in youth
51697	C10G.00	Secondary pancreatic diabetes mellitus
56803	C107400	NIDDM with peripheral circulatory disorder
59991	C10D.11	Maturity onset diabetes in youth type 2
61122	C10H.00	Diabetes mellitus induced by non-steroid drugs
67212	C10H000	DM induced by non-steroid drugs without complication
83532	66Ao.00	Diabetes type 2 review
93529	9OLK.00	DESMOND diabetes structured education programme completed
93657	8Hj4.00	Referral to DESMOND diabetes structured education programme
94383	C10N000	Secondary diabetes mellitus without complication
95093	8I83.00	Did not complete DESMOND diabetes structured educat program
95159	9NiD.00	Did not attend DESMOND diabetes structured education program
96506	C10G000	Secondary pancreatic diabetes mellitus without complication
97849	C10E912	Insulin dependent diabetes maturity onset
101801	66At100	Type II diabetic dietary review
102611	66At111	Type 2 diabetic dietary review

109865	C109B12	Type 2 diabetes mellitus with polyneuropathy
110344	66o2.00	Diabetic on non-insulin injectable medication
110379	66o5.00	Diabetic on oral treatment and glucagon-like peptide 1
111483	66o6.00	Diabetic on insulin and glucagon-like peptide 1

Supplementary Table S3. Code list for chronic kidney disease (CKD) stage 3 or above

CPRD medical code	Read code	Description
12720	1Z1..00	Chronic renal impairment
12566	1Z12.00	Chronic kidney disease stage 3
12479	1Z13.00	Chronic kidney disease stage 4
12585	1Z14.00	Chronic kidney disease stage 5
94965	1Z15.00	Chronic kidney disease stage 3A
95179	1Z16.00	Chronic kidney disease stage 3B
94793	1Z1B.00	Chronic kidney disease stage 3 with proteinuria
95123	1Z1C.00	Chronic kidney disease stage 3 without proteinuria
95408	1Z1D.00	Chronic kidney disease stage 3A with proteinuria
95175	1Z1E.00	Chronic kidney disease stage 3A without proteinuria
95178	1Z1F.00	Chronic kidney disease stage 3B with proteinuria
95177	1Z1G.00	Chronic kidney disease stage 3B without proteinuria
95122	1Z1H.00	Chronic kidney disease stage 4 with proteinuria
95406	1Z1J.00	Chronic kidney disease stage 4 without proteinuria
95508	1Z1K.00	Chronic kidney disease stage 5 with proteinuria
95405	1Z1L.00	Chronic kidney disease stage 5 without proteinuria
108766	661M200	Chronic kidney disease self-management plan agreed
19473	66i..00	Chronic kidney disease monitoring
30735	6AA..00	Chronic kidney disease annual review
40100	9hE1.00	Exc chronic kidney disease quality indicators: Inform dissen
71271	90t..00	Chronic kidney disease monitoring administration
30739	90t0.00	Chronic kidney disease monitoring first letter
72962	90t1.00	Chronic kidney disease monitoring second letter
72964	90t2.00	Chronic kidney disease monitoring third letter
88494	90t3.00	Chronic kidney disease monitoring verbal invite
69679	90t4.00	Chronic kidney disease monitoring telephone invite
25394	D215000	Anaemia secondary to chronic renal failure

512	K05..00	Chronic renal failure
104981	K05..13	Chronic kidney disease
104619	K053.00	Chronic kidney disease stage 3
104963	K054.00	Chronic kidney disease stage 4
105151	K055.00	Chronic kidney disease stage 5
100205	K0E..00	Acute-on-chronic renal failure
53940	Kyu2100	[X]Other chronic renal failure
89332	90t5.00	Predicted stage chronic kidney disease
95145	1Z1B.11	CKD stage 3 with proteinuria
95188	1Z1C.11	CKD stage 3 without proteinuria
95571	1Z1D.11	CKD stage 3A with proteinuria
95176	1Z1E.11	CKD stage 3A without proteinuria
95180	1Z1F.11	CKD stage 3B with proteinuria
100633	1Z1G.11	CKD stage 3B without proteinuria
99312	1Z1H.11	CKD stage 4 with proteinuria
97587	1Z1J.11	CKD stage 4 without proteinuria
99160	1Z1K.11	CKD stage 5 with proteinuria
97683	1Z1L.11	CKD stage 5 without proteinuria
109804	1Z1T.00	CKD with GFR category G3a & albuminuria category A1
109805	1Z1V.00	CKD with GFR category G3a & albuminuria category A2
109905	1Z1W.00	CKD with GFR category G3a & albuminuria category A3
109963	1Z1X.00	CKD with GFR category G3b & albuminuria category A1
109657	1Z1Y.00	CKD with GFR category G3b & albuminuria category A2
109990	1Z1Z.00	CKD with GFR category G3b & albuminuria category A3
109980	1Z1a.00	CKD with GFR category G4 & albuminuria category A1
109904	1Z1b.00	CKD with GFR category G4 & albuminuria category A2
110626	1Z1c.00	CKD with GFR category G4 & albuminuria category A3
110133	1Z1d.00	CKD with GFR category G5 & albuminuria category A1
109981	1Z1e.00	CKD with GFR category G5 & albuminuria category A2
110467	1Z1f.00	CKD with GFR category G5 & albuminuria category A3

Supplementary Table S4. Characteristics of people included and excluded from the study cohort

Cohort	Included	< 1 year followup	> 52 tests per year
<i>N</i> (% of cohort)	933,907 (79.4%)	235,489 (20%)	15,976 (1.4%)
Women (%)	475,028 (50.9%)	119,836 (50.9%)	8,612 (53.9%)
Average age (SD)	69 years (14.1)	69 years (16.2)	72 years (14.3)
<i>Region</i>			
North East	6,231 (0.7%)	7,458 (3.2%)	147 (0.9%)
North West	92,285 (9.9%)	25,448 (10.8%)	1,245 (7.8%)
Yorkshire & the Humber	8,392 (0.9%)	3,639 (1.5%)	181 (1.1%)
East Midlands	1,552 (0.2%)	4,042 (1.7%)	056 (0.4%)
West Midlands	80,959 (8.7%)	27,136 (11.5%)	882 (5.5%)
East of England	49,304 (5.3%)	12,055 (5.1%)	567 (3.5%)
South West	66,696 (7.1%)	31,832 (13.5%)	1,782 (11.2%)
South Central	98,201 (10.5%)	21,396 (9.1%)	1,504 (9.4%)
London	95,507 (10.2%)	31,278 (13.3%)	903 (5.7%)
South East Coast	104,946 (11.2%)	26,643 (11.3%)	1,108 (6.9%)
Northern Ireland	40,539 (4.3%)	4,689 (2%)	1,561 (9.8%)
Scotland	135,156 (14.5%)	18,562 (7.9%)	4,354 (27.3%)
Wales	154,139 (16.5%)	21,311 (9%)	1,686 (10.6%)
<i>Deprivation Quintile</i>			
1 - Least	111,908 (23.6%)	31,484 (20.4%)	1,317 (19.6%)
2	104,013 (22%)	34,316 (22.2%)	1,474 (21.9%)
3	101,630 (21.5%)	32,115 (20.8%)	1,644 (24.4%)
4	87,265 (18.4%)	30,708 (19.9%)	1,310 (19.5%)
5 - Most	68,773 (14.5%)	25,972 (16.8%)	983 (14.6%)
Missing	460,318 (49.3%)	80,894 (34.4%)	9,248 (57.9%)
<i>Ethnicity</i>			
White	360,296 (92%)	117,434 (90.8%)	5,845 (93.7%)
Black	9,646 (2.5%)	3,511 (2.7%)	115 (1.8%)
Asian	13,958 (3.6%)	5,294 (4.1%)	200 (3.2%)
Other	7,757 (2%)	3,068 (2.4%)	079 (1.3%)
Missing	542,250 (58.1%)	106,182 (45.1%)	9,737 (60.9%)

Supplementary Table S5. Grouping of tests into test panels

Panel	Test
Acid phosphatase	Acid phosphatase
ACR / Microalbumin	Albumin creatinine ratio
ACR / Microalbumin	Urine Biochemistry
ACR / Microalbumin	Urine microalbumin
Adrenal autoantibodies	Adrenal autoantibodies
Amylase	Amylase
Anti mitochondrial antibodies	Anti mitochondrial antibodies
Anti nuclear antibodies	Anti nuclear antibodies
Anti smooth muscle autoantibodies	Anti smooth muscle autoantibodies
Antistreptolysin o titre	Antistreptolysin o titre
Biochemical screening tests	Biochemical screening tests
Blood alcohol level	Blood alcohol level
Blood group antibodies	Blood group antibodies
Blood lead level	Blood lead level
Blood trace elements / vitamins	Blood trace elements / vitamins
Bone Profile	Bone studies
Bone Profile	Calcium
Bone Profile	Calcium adjusted
Bone Profile	Serum inorganic phosphate
C Reactive protein	C Reactive protein
CAP (RAST)	CAP (RAST)
Carbamazepine	Carbamazepine
Cardiac enzymes	Cardiac enzymes
Chemical function tests	Chemical function tests
Clotting Tests	Clotting tests
Clotting Tests	INR
Clotting Tests	Partial thromboplastin time
Clotting Tests	Prothrombin time

Clotting Tests	Thrombin time
Complement tests	Complement tests
Creatine phosphokinase level	Creatine phosphokinase level
Creatinine clearance	Creatinine clearance
DNA binding autoantibodies	DNA binding autoantibodies
Digoxin blood level	Digoxin blood level
E2 prostaglandin	E2 prostaglandin
Enzymes/specific protein	Enzymes/specific protein
Erythrocyte sedimentation rate	Erythrocyte sedimentation rate
FBC	Basophil count
FBC	Differential white cell count
FBC	Eosinophil count
FBC	Full blood count
FBC	Haemoglobin
FBC	Lymphocyte count
FBC	MCH Hb Concentration
FBC	Mean corpuscular haemoglobin
FBC	Mean corpuscular volume
FBC	Monocyte count
FBC	Neutrophil count
FBC	Packed cell volume
FBC	Platelets
FBC	RBC red blood cell size
FBC	Red blood cell count
FBC	Total White Blood cell count
Feto-placental hormones	Feto-placental hormones
Film report	Film report
Fructosamine	Fructosamine
Gastrointestinal hormones	Gastrointestinal hormones
Glandular fever test	Glandular fever test

Glucose	Blood glucose
Glucose	Fasting glucose
Glucose	Glucose tolerance test
Gonadotrophin	Gonadotrophin
Guthrie test	Guthrie test
HIV test	HIV test
Haematinics	B12 & Folate level
Haematinics	B12 levels
Haematinics	Folate level
Haematinics	RBC - folate
Haematinics	Serum ferritin
Haematology screening tests	Haematology screening tests
Haemoglobin variants	Haemoglobin variants
HbA1c - diabetic control	HbA1c - diabetic control
Hepatitis B Antibody	Hepatitis B Antibody
Hepatitis a test	Hepatitis a test
Human chorionic gonadotropin	Human chorionic gonadotropin
Immuno electrophoresis	Immuno electrophoresis
Immunoglobulin	Immunoglobulin
Immunology screening tests	Immunology screening tests
Iron kinetics	Iron kinetics
LE cells	LE cells
Lactate dehydrogenase	Lactate dehydrogenase
Legionella antibody test	Legionella antibody test
Lipid Profile	Blood lipids
Lipid Profile	HDL/LDL ratio
Lipid Profile	High density lipoprotein
Lipid Profile	Low density lipoprotein
Lipid Profile	Serum cholesterol
Lipid Profile	Triglycerides

Lipoprotein electrophoresis	Lipoprotein electrophoresis
Lithium levels	Lithium levels
Liver Function Tests	Alanine aminotransferase
Liver Function Tests	Albumin
Liver Function Tests	Alkaline phosphatase
Liver Function Tests	Aspartate aminotransferase
Liver Function Tests	Bilirubin
Liver Function Tests	Gamma glutamyl transpeptidase
Liver Function Tests	Liver enzymes
Liver Function Tests	Liver function tests
Liver Function Tests	Serum globin
Liver Function Tests	Total protein
Methotrexate	Methotrexate
Other Lab Result Information	Other Lab Result Information
Other laboratory tests	Other laboratory tests
Parietal cell autoantibodes	Parietal cell autoantibodes
Phenobarbitone	Phenobarbitone
Phenytoin	Phenytoin
Plasma electrophoresis	Plasma electrophoresis
Plasma viscosity	Plasma viscosity
Prolactin level	Prolactin level
Prostate specific antigen	Prostate specific antigen
Prostatic acid phosphatase	Prostatic acid phosphatase
Red blood cell clumping	Red blood cell clumping
Red blood cell colour	Red blood cell colour
Red blood cell shape	Red blood cell shape
Red blood cells enzymes	Red blood cells enzymes
Renal function tests	Glomerular Filtration Rate
Renal function tests	Potassium
Renal function tests	Serum creatinine

Renal function tests	Serum electrolytes
Renal function tests	Sodium
Renal function tests	Urea - blood
Renal function tests	Urea and electrolytes
Reticulocytes	Reticulocytes
Rheumatoid factor	Rheumatoid factor
Rubella test	Rubella test
SH-antigen (hepatitis b) test	SH-antigen (hepatitis b) test
Serology	Serology
Serum Iron Studies	Iron studies
Serum Iron Studies	Serum iron tests
Serum Iron Studies	Total iron binding capacity
Serum adrenaline	Serum adrenaline
Serum adrenocorticotrophic hormone	Serum adrenocorticotrophic hormone
Serum aldosterone	Serum aldosterone
Serum amino acids	Serum amino acids
Serum amiodarone	Serum amiodarone
Serum cortisol	Serum cortisol
Serum cyclosporin	Serum cyclosporin
Serum fibrinogen level	Serum fibrinogen level
Serum growth hormone	Serum growth hormone
Serum insulin	Serum insulin
Serum lactate	Serum lactate
Serum noradrenaline	Serum noradrenaline
Serum osmolality	Serum osmolality
Serum paracetamol	Serum paracetamol
Serum parathyroid hormone	Serum parathyroid hormone
Serum renin	Serum renin
Sex Hormones	Female sex hormone profile
Sex Hormones	Follicle stimulating hormone

Sex Hormones	Luteinising hormone
Sex Hormones	Male sex hormone profile
Sex Hormones	Oestrodiol level
Sex Hormones	Progesterone
Sex Hormones	Sex hormone binding globulin
Sex Hormones	Testosterone
Sickle cell disease screen	Sickle cell disease screen
Syphilis test	Syphilis test
Theophylline	Theophylline
Thyroid Function Tests	Free thyroxine
Thyroid Function Tests	Free tri-iodothyronine
Thyroid Function Tests	Thyroid function
Thyroid Function Tests	Thyroid stimulating hormone
Thyroid Function Tests	Thyroxine
Thyroid Function Tests	Triiodothyronine
Thyroid autoantibodies	Thyroid autoantibodies
Thyroid disorder screening	Thyroid disorder screening
Toxicology	Toxicology
Tricyclics	Tricyclics
Tuberculin test	Tuberculin test
Tumour markers	Tumour markers
Urine Leucocytes	Urine Leucocytes
Valproate	Valproate
Very low density lipoprotein	Very low density lipoprotein
Viral studies	Viral studies

Supplementary Table S6. Age-sex standardised testing rates (per 1,000 person years) by different characteristics for people with only hypertension, only type 2 diabetes, or only CKD

	Only hypertension (n=514,757)					Only T2 Diabetes (n=76,707)					Only CKD (n=37,585)				
	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control
Number tested	452,375	411,971	385,140	394,246	211,762	73,296	70,167	62,957	72,222	73,392	33,761	31,282	31,284	25,753	14,776
% tested	88	80	75	77	41	96	92	82	94	96	90	83	83	69	39
<i>Sex</i>															
<i>Men</i>	1,031	797	706	620	238	1,645	1,269	1,010	1,181	1,573	1,496	1,025	1,111	602	241
<i>Women</i>	1,094	858	831	577	233	1,707	1,347	1,169	1,179	1,593	1,422	1,063	1,165	521	228
<i>Age Group</i>															
0-49	760	579	547	415	186	1,400	1,067	868	1,061	1,447	1,077	738	842	315	166
50-59	890	705	618	541	217	1,577	1,278	1,009	1,193	1,581	1,136	854	895	451	216
60-69	1,034	828	715	646	242	1,756	1,390	1,117	1,250	1,665	1,341	1,034	1,033	590	236
70-79	1,198	942	871	686	262	1,939	1,485	1,278	1,254	1,683	1,501	1,114	1,160	644	261
80-89	1,323	987	1,036	605	252	2,074	1,486	1,407	1,177	1,566	1,672	1,167	1,343	576	243
90+	1,230	856	1,014	419	188	1,814	1,295	1,334	874	1,240	1,563	1,021	1,297	428	190
<i>Region</i>															

<i>North East</i>	1,322	906	780	638	389	1,782	1,589	1,266	1,323	1,727	1,745	1,261	1,318	576	338
<i>North West</i>	1,084	864	846	665	500	1,610	1,394	1,408	1,235	1,632	1,377	1,025	1,081	669	509
<i>Yorkshire & the Humber</i>	962	876	851	475	248	1,457	1,363	1,256	1,029	1,353	1,542	1,167	1,107	563	148
<i>East Midlands</i>	1,017	634	531	450	487	1,575	1,073	431	895	1,631	1,083	803	630	486	455
<i>West Midlands</i>	1,029	788	712	625	346	1,595	1,385	1,079	1,288	1,598	1,221	858	919	559	331
<i>East of England</i>	947	686	638	533	177	1,527	1,220	872	1,140	1,534	1,199	842	876	490	198
<i>South West</i>	1,134	845	896	575	282	1,684	1,443	1,433	1,157	1,631	1,512	1,128	1,241	551	280
<i>South Central</i>	963	652	663	507	146	1,538	1,248	1,018	1,127	1,586	1,341	851	960	477	120
<i>London</i>	943	735	718	587	279	1,459	1,186	1,056	1,108	1,450	1,049	784	848	516	258
<i>South East Coast</i>	1,006	748	739	522	185	1,543	1,302	1,118	1,136	1,422	1,219	890	981	473	185
<i>Northern Ireland</i>	1,247	1,093	892	672	200	1,960	1,716	1,282	1,411	1,644	1,738	1,332	1,249	702	250
<i>Scotland</i>	1,298	1,022	885	691	75	2,741	1,519	1,205	1,275	1,744	1,805	1,249	1,344	614	73
<i>Wales</i>	1,089	864	851	571	279	1,633	1,352	1,242	1,084	1,564	1,257	931	1,024	464	243
<i>Year</i>															
<i>2013/14</i>	1,098	851	796	662	159	1,724	1,403	1,167	1,257	1,637	1,471	1,053	1,125	645	158
<i>2014/15</i>	1,071	829	795	575	201	1,755	1,363	1,164	1,173	1,570	1,402	1,011	1,096	539	196
<i>2015/16</i>	1,105	854	813	580	253	1,847	1,397	1,214	1,177	1,579	1,383	1,008	1,061	516	235
<i>2016/17</i>	1,122	862	827	577	299	1,864	1,374	1,231	1,141	1,558	1,374	979	1,068	507	282
<i>2017/18</i>	1,137	866	836	563	342	1,899	1,367	1,230	1,112	1,542	1,349	981	1,064	511	328
<i>% change</i>	3	2	5	-15	115	10	-3	5	-11	-6	-8	-7	-5	-21	107
<i>Deprivation Quintile</i>															
<i>1 - Least</i>	1,029	739	716	587	265	1,571	1,329	1,114	1,172	1,547	1,340	914	996	561	258

2	1,024	761	749	574	252	1,540	1,290	1,106	1,158	1,535	1,296	925	1,024	546	255
3	1,041	772	763	574	275	1,573	1,329	1,206	1,162	1,555	1,317	945	1,036	518	266
4	1,022	775	783	565	283	1,541	1,284	1,167	1,130	1,516	1,263	928	1,017	518	270
5 - Most	1,035	803	805	582	331	1,560	1,303	1,213	1,148	1,536	1,315	961	1,029	563	307
Missing	1,134	903	828	611	203	1,991	1,435	1,204	1,208	1,627	1,451	1,061	1,116	549	199
<i>Ethnicity</i>															
White	1,094	821	819	590	284	1,620	1,363	1,223	1,166	1,561	1,383	984	1,082	548	275
Black	960	749	799	607	367	1,447	1,115	1,018	1,136	1,459	970	735	813	504	291
Asian	1,155	943	984	724	444	1,615	1,355	1,246	1,233	1,594	1,409	1,102	1,212	660	416
Other	1,018	805	805	631	338	1,502	1,243	1,093	1,169	1,521	1,110	886	873	594	285
Missing	1,087	854	782	596	206	1,905	1,389	1,161	1,190	1,598	1,391	1,014	1,067	543	199
<i>Time since diagnosis</i>															
< 1 year	1,392	949	863	708	241	1,898	1,538	1,207	1,349	1,878	1,712	1,116	1,189	566	221
>= 1 year	1,074	839	795	592	237	1,800	1,375	1,193	1,181	1,577	1,354	994	1,065	547	234
<i>GP practice variation</i>															
10th percentile	780	534	529	381	33	1,191	872	571	887	1,193	815	518	568	279	18
90th percentile	1,387	1,159	1,148	849	548	2,423	1,775	1,647	1,453	1,885	1,857	1,337	1,450	760	494
90/10 ratio	1.8	2.2	2.2	2.2	16.6	2.0	2.0	2.9	1.6	1.6	2.3	2.6	2.6	2.7	27.1

Supplementary Table S7. Age-sex standardised testing rates (per 1,000 person years) by different characteristics for people with only hypertension

	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Thyroid Function tests	Glucose	ACR / Microalbumin	Bone Profile	Haematinics	C Reactive protein	Erythrocyte sedimentation rate
Number tested	452,375	411,971	385,140	394,246	211,762	311,008	333,341	65,127	203,641	164,874	174,453	133,813
% tested	87.9	80.0	74.8	76.6	41.1	60.4	64.8	12.7	39.6	32.0	33.9	26.0
<i>Sex</i>												
<i>Men</i>	1,031	797	706	620	238	351	476	62	206	149	181	131
<i>Women</i>	1,094	858	831	577	233	529	471	61	269	220	254	201
<i>Age Group</i>												
<i>0-49</i>	760	579	547	415	186	350	338	46	156	148	155	117
<i>50-59</i>	890	705	618	541	217	381	416	46	182	143	180	138
<i>60-69</i>	1,034	828	715	646	242	425	490	60	214	150	204	156
<i>70-79</i>	1,198	942	871	686	262	483	531	73	271	198	247	192
<i>80-89</i>	1,323	987	1,036	605	252	548	532	77	348	293	290	222
<i>90+</i>	1,230	856	1,014	419	188	523	439	61	352	333	264	181
<i>Region</i>												
<i>North East</i>	1,322	906	780	638	389	438	581	123	276	150	217	198

<i>North West</i>	1,084	864	846	665	500	538	305	87	343	237	203	188
<i>Yorkshire & the Humber</i>	962	876	851	475	248	445	317	61	640	280	145	118
<i>East Midlands</i>	1,017	634	531	450	487	258	67	36	209	123	104	128
<i>West Midlands</i>	1,029	788	712	625	346	421	372	38	254	211	182	162
<i>East of England</i>	947	686	638	533	177	360	389	27	146	167	178	210
<i>South West</i>	1,134	845	896	575	282	465	468	90	276	193	283	60
<i>South Central</i>	963	652	663	507	146	350	441	74	218	149	272	145
<i>London</i>	943	735	718	587	279	451	454	27	214	236	149	208
<i>South East Coast</i>	1,006	748	739	522	185	403	416	57	230	162	222	240
<i>Northern Ireland</i>	1,247	1,093	892	672	200	531	506	82	312	278	364	340
<i>Scotland</i>	1,298	1,022	885	691	75	511	790	70	228	170	222	130
<i>Wales</i>	1,089	864	851	571	279	445	409	65	251	207	229	137

Year

<i>2013/14</i>	1,098	851	796	662	159	466	582	76	243	173	209	181
<i>2014/15</i>	1,071	829	795	575	201	443	497	62	253	191	223	176
<i>2015/16</i>	1,105	854	813	580	253	451	468	57	266	206	235	175
<i>2016/17</i>	1,122	862	827	577	299	457	412	59	258	226	236	169
<i>2017/18</i>	1,137	866	836	563	342	454	369	58	255	237	247	152
<i>% change</i>	3	2	5	-15	115	-3	-37	-24	5	37	19	-16

Deprivation Quintile

<i>1 - Least</i>	1,029	739	716	587	265	422	402	50	212	178	206	177
<i>2</i>	1,024	761	749	574	252	422	431	52	236	184	207	184

3	1,041	772	763	574	275	420	415	58	259	195	225	168
4	1,022	775	783	565	283	441	408	58	263	207	211	170
5 - Most	1,035	803	805	582	331	480	396	71	297	218	194	159
Missing	1,134	903	828	611	203	464	531	68	250	199	236	168

Ethnicity

White	1,094	821	819	590	284	457	426	59	269	208	238	190
Black	960	749	799	607	367	446	422	45	267	240	170	201
Asian	1,155	943	984	724	444	599	514	51	374	395	233	283
Other	1,018	805	805	631	338	481	457	46	274	232	202	204
Missing	1,087	854	782	596	206	444	506	65	236	187	219	158

Time since diagnosis

< 1 year	1,392	949	863	708	241	504	538	95	271	207	231	191
>= 1 year	1,074	839	795	592	237	449	476	61	248	196	225	170

Region variation

10th percentile	947	652	638	475	146	350	305	27	209	149	145	118
90th percentile	1,298	1,022	892	672	487	531	581	90	343	278	283	240
90/10 ratio	1.4	1.6	1.4	1.4	3.3	1.5	1.9	3.3	1.6	1.9	1.9	2.0

GP practice variation

10th percentile	780	534	529	381	33	264	157	11	101	102	95	1
90th percentile	1,387	1,159	1,148	849	548	745	901	147	467	308	368	312
90/10 ratio	1.8	2.2	2.2	2.2	16.6	2.8	5.7	13.2	4.6	3.0	3.9	388.7

Supplementary Table S8. Age-sex standardised testing rates (per 1,000 person years) by different characteristics for people with only type 2 diabetes

Test	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Thyroid Function tests	Glucose	ACR / Microalbumin	Bone Profile	Haematinics	C Reactive protein	Erythrocyte sedimentation rate
Number tested	73,296	70,167	62,957	72,222	73,392	59,249	41,553	63,013	29,744	31,955	24,119	17,872
% tested	95.6	91.5	82.1	94.2	95.7	77.2	54.2	82.1	38.8	41.7	31.4	23.3
<i>Sex</i>												
<i>Men</i>	1,645	1,269	1,010	1,181	1,573	737	491	782	253	281	174	121
<i>Women</i>	1,707	1,347	1,169	1,179	1,593	895	496	724	310	375	262	191
<i>Age Group</i>												
<i>0-49</i>	1,400	1,067	868	1,061	1,447	710	428	571	215	256	166	112
<i>50-59</i>	1,577	1,278	1,009	1,193	1,581	789	476	728	261	288	198	141
<i>60-69</i>	1,756	1,390	1,117	1,250	1,665	830	518	853	279	321	211	152
<i>70-79</i>	1,939	1,485	1,278	1,254	1,683	874	543	925	330	387	253	186
<i>80-89</i>	2,074	1,486	1,407	1,177	1,566	896	582	866	407	476	283	213
<i>90+</i>	1,814	1,295	1,334	874	1,240	778	564	573	401	468	289	180
<i>Region</i>												
<i>North East</i>	1,782	1,589	1,266	1,323	1,727	941	380	688	460	159	250	162

<i>North West</i>	1,610	1,394	1,408	1,235	1,632	1,003	349	857	500	577	220	196
<i>Yorkshire & the Humber</i>	1,457	1,363	1,256	1,029	1,353	745	321	845	722	593	132	183
<i>East Midlands</i>	1,575	1,073	431	895	1,631	873	62	753	129	176	48	39
<i>West Midlands</i>	1,595	1,385	1,079	1,288	1,598	892	495	773	311	389	177	167
<i>East of England</i>	1,527	1,220	872	1,140	1,534	543	482	765	160	252	185	211
<i>South West</i>	1,684	1,443	1,433	1,157	1,631	809	495	780	296	358	337	53
<i>South Central</i>	1,538	1,248	1,018	1,127	1,586	765	368	882	348	275	269	133
<i>London</i>	1,459	1,186	1,056	1,108	1,450	723	477	704	256	435	159	222
<i>South East Coast</i>	1,543	1,302	1,118	1,136	1,422	768	448	695	280	263	218	231
<i>Northern Ireland</i>	1,960	1,716	1,282	1,411	1,644	1,015	1,050	850	474	454	435	336
<i>Scotland</i>	2,741	1,519	1,205	1,275	1,744	1,010	582	867	241	268	242	135
<i>Wales</i>	1,633	1,352	1,242	1,084	1,564	771	580	784	303	411	242	139

Year

<i>2013/14</i>	1,724	1,403	1,167	1,257	1,637	866	640	973	319	312	220	139
<i>2014/15</i>	1,755	1,363	1,164	1,173	1,570	825	538	797	322	337	236	167
<i>2015/16</i>	1,847	1,397	1,214	1,177	1,579	851	510	745	339	385	247	183
<i>2016/17</i>	1,864	1,374	1,231	1,141	1,558	853	453	705	310	428	256	184
<i>2017/18</i>	1,899	1,367	1,230	1,112	1,542	840	397	688	310	451	263	175
<i>% change</i>	10	-3	5	-11	-6	-3	-38	-29	-3	45	20	26

Deprivation Quintile

<i>1 - Least</i>	1,571	1,329	1,114	1,172	1,547	818	391	800	237	379	225	184
<i>2</i>	1,540	1,290	1,106	1,158	1,535	789	426	772	288	345	210	179

3	1,573	1,329	1,206	1,162	1,555	802	424	789	347	346	237	179
4	1,541	1,284	1,167	1,130	1,516	791	415	746	346	390	228	177
5 - Most	1,560	1,303	1,213	1,148	1,536	852	421	731	393	416	204	159
Missing	1,991	1,435	1,204	1,208	1,627	875	609	824	313	361	253	170

Ethnicity

White	1,620	1,363	1,223	1,166	1,561	841	427	773	338	385	250	187
Black	1,447	1,115	1,018	1,136	1,459	678	379	744	248	312	144	177
Asian	1,615	1,355	1,246	1,233	1,594	859	446	809	397	547	216	231
Other	1,502	1,243	1,093	1,169	1,521	783	464	762	336	340	167	176
Missing	1,905	1,389	1,161	1,190	1,598	848	576	813	299	348	235	162

Time since diagnosis

< 1 year	1,898	1,538	1,207	1,349	1,878	881	759	956	345	343	258	198
>= 1 year	1,800	1,375	1,193	1,181	1,577	850	504	792	316	372	240	173

Region variation

10th percentile	1,459	1,186	872	1,029	1,422	723	321	695	160	176	132	53
90th percentile	1,960	1,589	1,408	1,323	1,727	1,010	582	867	500	577	337	231
90/10 ratio	1.3	1.3	1.6	1.3	1.2	1.4	1.8	1.2	3.1	3.3	2.5	4.4

GP practice variation

10th percentile	1,191	872	571	887	1,193	323	95	509	90	112	88	0
90th percentile	2,423	1,775	1,647	1,453	1,885	1,200	1,235	1,025	686	659	395	336
90/10 ratio	2.0	2.0	2.9	1.6	1.6	3.7	13.0	2.0	7.6	5.9	4.5	n/a

Supplementary Table S9. Age-sex standardised testing rates (per 1,000 person years) by different characteristics for people with only CKD

Test	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Thyroid Function tests	Glucose	ACR / Microalbumin	Bone Profile	Haematinics	C Reactive protein	Erythrocyte sedimentation rate
Number tested	33,761	31,282	31,284	25,753	14,776	25,423	23,083	23,701	19,908	17,234	16,845	12,400
% tested	89.8	83.2	83.2	68.5	39.3	67.6	61.4	63.1	53.0	45.9	44.8	33.0
<i>Sex</i>												
<i>Men</i>	1,496	1,025	1,111	602	241	495	489	430	376	292	316	209
<i>Women</i>	1,422	1,063	1,165	521	228	682	463	395	418	338	392	297
<i>Age Group</i>												
<i>0-49</i>	1,077	738	842	315	166	426	307	232	301	241	292	191
<i>50-59</i>	1,136	854	895	451	216	562	380	295	319	245	329	230
<i>60-69</i>	1,341	1,034	1,033	590	236	612	463	379	368	248	363	267
<i>70-79</i>	1,501	1,114	1,160	644	261	630	505	446	398	303	375	287
<i>80-89</i>	1,672	1,167	1,343	576	243	653	532	482	478	404	393	289
<i>90+</i>	1,563	1,021	1,297	428	190	616	466	418	447	433	340	212
<i>Region</i>												
<i>North East</i>	1,745	1,261	1,318	576	338	602	437	504	659	177	230	320

<i>North West</i>	1,377	1,025	1,081	669	509	654	317	478	536	377	294	257
<i>Yorkshire & the Humber</i>	1,542	1,167	1,107	563	148	415	434	506	776	370	222	193
<i>East Midlands</i>	1,083	803	630	486	455	321	105	569	423	32	182	121
<i>West Midlands</i>	1,221	858	919	559	331	550	360	395	333	316	242	211
<i>East of England</i>	1,199	842	876	490	198	502	373	455	230	248	280	303
<i>South West</i>	1,512	1,128	1,241	551	280	650	455	485	485	308	413	94
<i>South Central</i>	1,341	851	960	477	120	447	454	459	336	226	428	219
<i>London</i>	1,049	784	848	516	258	521	404	317	269	289	214	299
<i>South East Coast</i>	1,219	890	981	473	185	489	380	346	311	220	348	356
<i>Northern Ireland</i>	1,738	1,332	1,249	702	250	745	572	320	410	393	558	477
<i>Scotland</i>	1,805	1,249	1,344	614	73	640	726	524	438	275	358	185
<i>Wales</i>	1,257	931	1,024	464	243	532	376	219	336	302	323	161

Year

<i>2013/14</i>	1,471	1,053	1,125	645	158	611	576	637	388	260	328	266
<i>2014/15</i>	1,402	1,011	1,096	539	196	566	487	528	387	278	341	253
<i>2015/16</i>	1,383	1,008	1,061	516	235	557	446	266	392	297	348	249
<i>2016/17</i>	1,374	979	1,068	507	282	564	383	216	364	323	354	235
<i>2017/18</i>	1,349	981	1,064	511	328	574	349	197	372	339	368	221
<i>% change</i>	-8	-7	-5	-21	107	-6	-40	-69	-4	30	12	-17

Deprivation Quintile

<i>1 - Least</i>	1,340	914	996	561	258	522	401	442	314	263	328	251
<i>2</i>	1,296	925	1,024	546	255	553	409	426	344	266	317	252

3	1,317	945	1,036	518	266	516	381	403	378	270	354	258
4	1,263	928	1,017	518	270	548	408	388	375	288	319	248
5 - Most	1,315	961	1,029	563	307	588	429	403	432	292	291	209
Missing	1,451	1,061	1,116	549	199	595	497	363	389	303	362	246

Ethnicity

White	1,383	984	1,082	548	275	561	415	420	384	291	352	265
Black	970	735	813	504	291	423	361	255	406	265	225	144
Asian	1,409	1,102	1,212	660	416	596	476	450	472	395	326	309
Other	1,110	886	873	594	285	562	456	364	326	251	238	232
Missing	1,391	1,014	1,067	543	199	577	480	365	372	288	342	234

Time since diagnosis

< 1 year	1,712	1,116	1,189	566	221	597	491	565	425	343	381	280
>= 1 year	1,354	994	1,065	547	234	571	453	369	374	285	342	244

Region variation

10th percentile	1,083	803	848	473	120	415	317	317	269	177	214	121
90th percentile	1,745	1,261	1,318	669	455	654	572	524	659	377	428	356
90/10 ratio	1.6	1.6	1.6	1.4	3.8	1.6	1.8	1.7	2.5	2.1	2.0	3.0

GP practice variation

10th percentile	815	518	568	279	18	301	117	129	124	106	88	0
90th percentile	1,857	1,337	1,450	760	494	767	757	671	657	454	557	476
90/10 ratio	2.3	2.6	2.6	2.7	27.1	2.5	6.5	5.2	5.3	4.3	6.4	n/a

Supplementary Table S10. Age-sex standardised testing rates (per 1,000 person years) by different characteristics of the whole cohort

Test	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Thyroid Function tests	Glucose	ACR / Microalbumin	Bone Profile	Haematinics	C Reactive protein	Erythrocyte sedimentation rate
Number tested	856,969	798,082	750,206	770,734	538,603	633,928	601,569	401,897	413,989	370,012	345,345	259,641
% tested	91.8	85.5	80.3	82.5	57.7	67.9	64.4	43.0	44.3	39.6	37.0	27.8
<i>Sex</i>												
<i>Men</i>	1,435	1,034	924	828	694	509	515	368	265	233	207	145
<i>Women</i>	1,460	1,071	1,042	744	575	661	514	319	331	298	289	222
<i>Age Group</i>												
<i>0-49</i>	1,035	770	687	639	610	474	382	235	191	193	168	120
<i>50-59</i>	1,168	906	771	743	631	516	455	267	221	198	197	147
<i>60-69</i>	1,355	1,034	887	833	661	563	519	324	256	216	223	167
<i>70-79</i>	1,596	1,160	1,080	864	673	625	560	391	327	281	276	210
<i>80-89</i>	1,796	1,213	1,274	781	610	680	574	429	418	381	323	239
<i>90+</i>	1,658	1,059	1,248	565	415	630	500	352	419	405	306	195
<i>Region</i>												
<i>North East</i>	1,597	1,184	1,026	857	767	608	563	385	402	176	239	215

<i>North West</i>	1,404	1,088	1,098	857	870	705	333	398	441	371	228	202
<i>Yorkshire & the Humber</i>	1,239	1,101	1,034	657	583	550	318	384	780	379	155	129
<i>East Midlands</i>	1,353	844	563	600	876	481	86	363	237	154	111	133
<i>West Midlands</i>	1,350	1,023	900	840	724	585	436	334	305	302	195	173
<i>East of England</i>	1,215	867	755	705	543	428	426	297	166	208	198	223
<i>South West</i>	1,486	1,112	1,170	765	691	619	503	393	347	280	321	65
<i>South Central</i>	1,247	850	825	687	528	474	457	359	274	202	300	155
<i>London</i>	1,202	916	881	765	660	553	478	292	248	312	164	228
<i>South East Coast</i>	1,294	955	921	703	530	522	438	308	268	204	249	260
<i>Northern Ireland</i>	1,672	1,368	1,092	901	611	704	692	361	361	354	418	371
<i>Scotland</i>	1,931	1,220	1,070	879	551	673	776	388	274	219	246	141
<i>Wales</i>	1,383	1,046	1,031	732	657	559	465	307	292	286	250	145

Year

<i>2013/14</i>	1,442	1,067	987	852	573	605	630	441	298	233	232	196
<i>2014/15</i>	1,438	1,042	990	763	596	578	537	370	307	257	249	189
<i>2015/16</i>	1,483	1,070	1,011	765	641	589	502	303	322	281	262	190
<i>2016/17</i>	1,504	1,066	1,025	755	675	591	439	284	304	310	264	182
<i>2017/18</i>	1,523	1,067	1,029	738	708	590	395	280	305	327	276	165
<i>% change</i>	6	0	4	-13	24	-2	-37	-37	2	40	19	-16

Deprivation Quintile

<i>1 - Least</i>	1,295	928	881	742	581	539	421	311	250	245	231	191
<i>2</i>	1,307	963	927	746	607	544	451	325	284	250	232	198

3	1,340	984	962	755	646	544	436	338	315	260	247	182
4	1,339	999	988	767	694	578	437	359	319	290	236	186
5 - Most	1,392	1,053	1,047	813	784	645	432	385	370	310	220	169
Missing	1,549	1,111	1,016	798	613	605	578	347	299	268	262	182

Ethnicity

White	1,396	1,032	1,014	770	658	587	447	344	324	281	262	202
Black	1,337	987	1,003	871	883	591	448	397	320	306	183	207
Asian	1,592	1,248	1,250	1,033	1,141	774	506	533	418	508	246	273
Other	1,338	1,026	991	873	836	613	470	388	325	307	206	203
Missing	1,483	1,062	969	781	600	582	552	337	285	255	245	172

Time since diagnosis

< 1 year	1,614	1,112	1,001	831	555	600	601	348	312	258	261	208
>= 1 year	1,446	1,053	990	782	636	588	511	344	301	269	250	184

Number of conditions

1	1,183	910	855	658	380	501	482	161	264	220	233	175
2	1,827	1,295	1,196	998	1,052	735	579	645	355	339	276	201
3	2,817	1,607	1,525	1,285	1,685	899	609	891	482	483	325	209

Region variation

10th percentile	1,215	850	755	657	530	474	318	297	237	176	155	129
90th percentile	1,672	1,220	1,098	879	870	704	692	393	441	371	321	260
90/10 ratio	1.4	1.4	1.5	1.3	1.6	1.5	2.2	1.3	1.9	2.1	2.1	2.0

GP practice variation

<i>10th percentile</i>	1,068	703	623	572	423	319	178	216	119	129	109	1
<i>90th percentile</i>	1,925	1,390	1,363	1,020	906	914	919	524	612	440	404	330
<i>90/10 ratio</i>	1.8	2.0	2.2	1.8	2.1	2.9	5.2	2.4	5.1	3.4	3.7	318.0
<i>% variation by region</i>	2.6	1.7	0.9	1.2	1.9	1.1	3.1	0.4	1.9	1.2	1.1	1.3
<i>% variation by practice</i>	3.2	7.3	6.6	8.8	6.9	14.4	25.5	7.8	24.3	10.2	4.4	6.0
<i>% variation by person</i>	94.2	91.0	92.5	90.0	91.2	84.5	71.4	91.8	73.8	88.6	94.6	92.7

Supplementary Table S11. Age-sex standardised testing rates (per 1,000 person years) by different characteristics for everyone with hypertension

	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Thyroid Function tests	Glucose	ACR / Microalbumin	Bone Profile	Haematinics	C Reactive protein	Erythrocyte sedimentation rate
Number tested	740,823	687,763	647,437	663,901	441,454	541,505	530,962	306,994	359,029	315,264	299,927	226,340
% tested	91.4	84.9	79.9	81.9	54.5	66.8	65.5	37.9	44.3	38.9	37.0	27.9
<i>Sex</i>												
Men	1,388	996	897	786	590	477	516	306	259	221	206	145
Women	1,428	1,043	1,017	718	507	637	516	277	326	287	284	219
<i>Age Group</i>												
0-49	917	680	625	524	378	406	369	134	179	172	164	120
50-59	1,095	844	725	678	490	468	451	189	210	181	192	145
60-69	1,304	994	854	796	570	531	520	265	249	203	219	164
70-79	1,560	1,133	1,055	843	616	604	561	346	321	270	272	206
80-89	1,775	1,197	1,255	772	582	668	575	399	413	372	319	236
90+	1,644	1,049	1,234	563	403	623	500	333	415	398	302	194
<i>Region</i>												
North East	1,568	1,133	987	810	681	570	583	341	389	174	239	212

<i>North West</i>	1,363	1,046	1,053	816	790	668	331	336	425	343	224	200
<i>Yorkshire & the Humber</i>	1,193	1,061	999	612	506	529	313	320	774	354	154	120
<i>East Midlands</i>	1,305	792	560	568	778	424	85	303	231	151	112	133
<i>West Midlands</i>	1,313	981	869	796	641	546	428	276	301	288	194	171
<i>East of England</i>	1,177	830	736	669	460	413	419	245	164	203	195	220
<i>South West</i>	1,441	1,062	1,123	727	606	586	503	338	337	266	312	64
<i>South Central</i>	1,200	803	793	644	428	442	463	295	263	191	296	154
<i>London</i>	1,169	885	857	732	583	532	479	241	244	299	162	225
<i>South East Coast</i>	1,255	913	888	665	451	496	439	258	262	197	243	254
<i>Northern Ireland</i>	1,617	1,326	1,058	851	517	663	658	304	348	339	407	365
<i>Scotland</i>	1,836	1,182	1,038	840	432	634	793	326	268	210	241	139
<i>Wales</i>	1,351	1,016	1,005	704	584	537	456	263	286	272	246	144

Year

<i>2013/14</i>	1,397	1,027	955	816	482	576	628	372	289	223	227	192
<i>2014/15</i>	1,389	1,004	958	726	510	550	536	314	299	246	244	187
<i>2015/16</i>	1,435	1,032	980	729	559	559	502	257	314	268	258	187
<i>2016/17</i>	1,457	1,030	993	721	596	561	439	241	298	295	258	179
<i>2017/18</i>	1,475	1,033	998	706	633	561	395	239	298	311	271	162
<i>% change</i>	6	1	5	-13	31	-3	-37	-36	3	40	19	-16

Deprivation Quintile

<i>1 - Least</i>	1,256	887	848	707	505	510	424	255	246	231	226	188
<i>2</i>	1,269	923	896	709	525	516	454	270	278	239	227	196

3	1,302	942	927	719	566	515	438	285	306	249	242	179
4	1,301	959	955	728	609	549	438	304	311	276	231	183
5 - Most	1,353	1,013	1,013	771	696	614	430	329	362	294	217	167
Missing	1,491	1,073	984	760	521	573	574	292	291	256	257	179

Ethnicity

White	1,358	992	980	733	578	558	449	290	317	268	257	199
Black	1,317	967	991	841	821	577	450	358	320	302	183	208
Asian	1,561	1,207	1,223	984	1,032	748	517	456	415	493	244	278
Other	1,305	989	971	829	738	584	469	323	322	300	209	207
Missing	1,427	1,024	937	743	510	551	549	283	277	242	240	170

Time since diagnosis

< 1 year	1,633	1,076	979	808	467	581	574	260	306	250	252	200
>= 1 year	1,392	1,013	956	743	547	556	511	290	293	256	245	181

Number of conditions

1	1,088	842	796	596	236	450	478	63	249	196	224	171
2	1,798	1,279	1,182	984	1,021	724	578	629	352	334	274	200
3	2,827	1,606	1,527	1,285	1,685	896	608	888	484	483	326	209

Region variation

10th percentile	1,177	803	736	612	432	424	313	245	231	174	154	120
90th percentile	1,617	1,182	1,058	840	778	663	658	338	425	343	312	254
90/10 ratio	1.4	1.5	1.4	1.4	1.8	1.6	2.1	1.4	1.8	2.0	2.0	2.1

GP practice variation

<i>10th percentile</i>	1,012	679	616	521	317	307	175	173	118	123	104	1
<i>90th percentile</i>	1,837	1,347	1,323	979	831	876	931	440	589	413	398	323
<i>90/10 ratio</i>	1.8	2.0	2.1	1.9	2.6	2.9	5.3	2.5	5.0	3.4	3.8	384.0
<i>% variation by region</i>	2.4	1.7	0.9	1.1	3.5	1.0	3.5	0.3	1.8	1.2	1.0	1.2
<i>% variation by practice</i>	3.7	7.5	6.4	9.8	11.6	14.7	26.3	7.0	23.4	9.1	4.3	5.9
<i>% variation by person</i>	93.9	90.9	92.7	89.0	84.9	84.3	70.2	92.7	74.9	89.7	94.7	92.9

Supplementary Table S12. Age-sex standardised testing rates (per 1,000 person years) by different characteristics for everyone with diabetes

Test	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Thyroid Function tests	Glucose	ACR / Microalbumin	Bone Profile	Haematinics	C Reactive protein	Erythrocyte sedimentation rate
Number tested	259,949	251,150	232,042	256,271	258,571	215,056	161,669	229,781	124,106	130,701	100,531	74,352
% tested	97.7	94.4	87.2	96.3	97.1	80.8	60.7	86.3	46.6	49.1	37.8	27.9
<i>Sex</i>												
Men	2,016	1,407	1,192	1,238	1,656	786	523	876	311	352	212	143
Women	2,122	1,498	1,357	1,231	1,651	948	538	840	384	438	293	216
<i>Age Group</i>												
0-49	1,516	1,120	910	1,097	1,489	722	441	601	228	272	174	117
50-59	1,736	1,334	1,061	1,224	1,629	803	495	759	279	311	208	149
60-69	1,985	1,453	1,195	1,283	1,714	854	528	892	310	355	226	162
70-79	2,280	1,564	1,401	1,293	1,735	908	556	977	380	438	275	199
80-89	2,513	1,599	1,568	1,219	1,629	928	582	939	462	514	318	224
90+	2,373	1,440	1,533	1,004	1,357	856	560	744	457	498	315	190
<i>Region</i>												
North East	2,032	1,716	1,446	1,379	1,723	989	464	835	588	217	257	198

<i>North West</i>	1,884	1,489	1,526	1,271	1,698	1,031	351	918	556	618	243	200
<i>Yorkshire & the Humber</i>	1,645	1,465	1,374	1,054	1,429	791	232	963	982	589	151	141
<i>East Midlands</i>	1,879	1,205	577	884	1,656	917	104	811	225	196	116	131
<i>West Midlands</i>	1,867	1,510	1,200	1,362	1,670	935	537	827	372	463	191	171
<i>East of England</i>	1,740	1,276	957	1,168	1,569	558	479	841	185	286	215	225
<i>South West</i>	1,946	1,528	1,557	1,178	1,691	860	494	854	370	418	337	60
<i>South Central</i>	1,755	1,300	1,115	1,167	1,636	783	402	946	372	306	307	149
<i>London</i>	1,644	1,262	1,154	1,159	1,525	745	491	750	287	457	171	237
<i>South East Coast</i>	1,808	1,396	1,220	1,195	1,484	783	447	770	307	283	246	242
<i>Northern Ireland</i>	2,343	1,897	1,394	1,475	1,717	1,046	1,097	941	450	491	453	367
<i>Scotland</i>	3,306	1,592	1,310	1,335	1,829	1,036	628	942	278	298	251	146
<i>Wales</i>	1,875	1,407	1,336	1,116	1,599	794	556	823	343	438	262	146

Year

<i>2013/14</i>	2,000	1,480	1,271	1,306	1,700	891	652	1,047	352	340	234	189
<i>2014/15</i>	2,078	1,449	1,289	1,223	1,634	860	556	878	365	378	254	186
<i>2015/16</i>	2,161	1,484	1,325	1,219	1,642	875	519	804	383	418	271	190
<i>2016/17</i>	2,191	1,457	1,337	1,186	1,613	866	457	752	348	464	274	180
<i>2017/18</i>	2,228	1,451	1,336	1,154	1,599	864	419	734	350	491	284	164
<i>% change</i>	11	-2	5	-12	-6	-3	-36	-30	-1	44	21	-13

Deprivation Quintile

<i>1 - Least</i>	1,801	1,396	1,201	1,209	1,608	845	400	868	288	409	239	192
<i>2</i>	1,793	1,387	1,224	1,201	1,596	811	441	842	341	384	237	194

3	1,827	1,398	1,292	1,205	1,607	808	431	842	383	383	249	180
4	1,785	1,371	1,279	1,186	1,583	820	441	821	377	426	245	189
5 - Most	1,827	1,400	1,351	1,214	1,616	891	440	795	435	442	225	165
Missing	2,329	1,513	1,308	1,250	1,681	898	618	879	346	395	270	179

Ethnicity

White	1,873	1,439	1,324	1,209	1,617	857	437	837	383	418	265	193
Black	1,722	1,253	1,198	1,216	1,602	765	423	779	340	372	181	212
Asian	1,840	1,443	1,395	1,267	1,674	893	472	837	435	580	238	254
Other	1,696	1,308	1,196	1,221	1,582	795	446	805	375	406	199	195
Missing	2,243	1,475	1,270	1,237	1,660	878	592	872	334	384	255	172

Time since diagnosis

< 1 year	2,119	1,588	1,281	1,356	1,893	895	736	1,033	359	357	279	205
>= 1 year	2,102	1,458	1,299	1,228	1,640	873	522	852	356	407	257	182

Number of conditions

1	1,791	1,376	1,183	1,184	1,586	845	520	799	316	366	239	173
2	1,983	1,439	1,251	1,225	1,638	860	530	852	333	387	246	179
3	2,891	1,628	1,541	1,314	1,761	913	571	925	483	495	323	203

Region variation

10th percentile	1,645	1,262	957	1,054	1,484	745	232	770	225	217	151	131
90th percentile	2,343	1,716	1,526	1,379	1,723	1,036	628	946	588	589	337	242
90/10 ratio	1.4	1.4	1.6	1.3	1.2	1.4	2.7	1.2	2.6	2.7	2.2	1.8

GP practice variation

<i>10th percentile</i>	1,489	1,022	683	987	1,341	345	115	619	121	162	109	1
<i>90th percentile</i>	3,076	1,919	1,839	1,579	2,000	1,327	1,355	1,116	838	781	432	337
<i>90/10 ratio</i>	2.1	1.9	2.7	1.6	1.5	3.9	11.7	1.8	6.9	4.8	4.0	372.5
<i>% variation by region</i>	5.8	2.1	1.3	2.6	1.5	2.4	3.3	0.7	2.5	1.7	1.3	1.3
<i>% variation by practice</i>	4.7	14.3	15.5	13.7	9.7	34.3	56.1	15.4	43.7	27.1	6.3	8.0
<i>% variation by person</i>	89.4	83.5	83.2	83.8	88.8	63.3	40.6	84.0	53.8	71.3	92.4	90.7

Supplementary Table S13. Age-sex standardised testing rates (per 1,000 person years) by different characteristics for everyone with CKD

Test	Renal Function tests	Liver Function tests	FBC	Lipid Profile	HbA1c - diabetic control	Thyroid Function tests	Glucose	ACR / Microalbumin	Bone Profile	Haematinics	C Reactive protein	Erythrocyte sedimentation rate
Number tested	203,011	191,822	187,723	177,403	125,957	157,578	144,902	160,765	121,088	110,772	98,401	71,100
% tested	95.8	90.5	88.6	83.7	59.4	74.4	68.4	75.9	57.1	52.3	46.4	33.5
<i>Sex</i>												
<i>Men</i>	2,092	1,276	1,323	875	737	612	573	653	427	371	309	201
<i>Women</i>	1,939	1,270	1,343	769	598	760	562	579	459	394	372	273
<i>Age Group</i>												
<i>0-49</i>	1,531	882	965	537	400	429	376	319	382	258	276	160
<i>50-59</i>	1,637	1,071	1,054	706	567	609	475	444	378	278	306	212
<i>60-69</i>	1,870	1,238	1,180	863	698	675	547	576	389	303	327	229
<i>70-79</i>	2,068	1,336	1,336	908	748	721	587	666	433	366	354	259
<i>80-89</i>	2,134	1,337	1,458	818	660	740	600	654	492	443	367	263
<i>90+</i>	1,888	1,149	1,381	603	446	671	525	519	465	444	335	206
<i>Region</i>												
<i>North East</i>	2,140	1,455	1,382	854	739	618	554	652	675	233	304	278

<i>North West</i>	1,837	1,269	1,358	895	933	792	351	671	613	495	302	245
<i>Yorkshire & the Humber</i>	1,828	1,439	1,323	766	543	518	388	634	1,026	455	213	164
<i>East Midlands</i>	2,027	991	944	563	888	500	125	699	565	210	190	188
<i>West Midlands</i>	1,662	1,116	1,098	840	722	646	447	571	378	383	239	204
<i>East of England</i>	1,645	1,029	972	727	604	480	442	615	250	261	272	271
<i>South West</i>	1,893	1,331	1,434	775	674	717	546	634	537	353	398	74
<i>South Central</i>	1,682	1,034	1,086	698	520	524	519	637	400	268	415	195
<i>London</i>	1,459	1,003	1,028	764	671	585	479	507	319	361	211	275
<i>South East Coast</i>	1,538	1,049	1,087	682	506	558	432	479	329	239	322	316
<i>Northern Ireland</i>	2,171	1,590	1,347	948	621	800	756	515	417	433	539	456
<i>Scotland</i>	2,843	1,414	1,421	933	610	741	823	702	459	298	323	175
<i>Wales</i>	1,768	1,170	1,257	737	675	614	462	432	382	363	312	165

Year

<i>2013/14</i>	1,887	1,239	1,245	892	589	676	666	805	420	298	304	240
<i>2014/15</i>	1,882	1,204	1,236	789	614	644	569	690	425	324	321	230
<i>2015/16</i>	1,923	1,222	1,237	777	655	648	529	456	434	348	335	228
<i>2016/17</i>	1,935	1,199	1,251	763	691	650	456	396	403	381	339	221
<i>2017/18</i>	1,967	1,206	1,252	752	727	654	411	389	417	405	352	202
<i>% change</i>	4	-3	1	-16	23	-3	-38	-52	-1	36	16	-16

Deprivation Quintile

<i>1 - Least</i>	1,673	1,078	1,109	743	579	593	448	589	357	305	313	232
<i>2</i>	1,690	1,126	1,175	756	612	616	472	576	394	318	315	245

3	1,717	1,134	1,202	748	633	586	449	570	431	319	324	222
4	1,677	1,136	1,192	777	691	632	471	580	415	353	303	222
5 - Most	1,735	1,192	1,247	821	777	693	456	592	482	366	287	190
Missing	2,074	1,274	1,274	825	642	675	600	553	422	348	340	226

Ethnicity

White	1,765	1,175	1,237	768	654	637	466	581	434	345	335	238
Black	1,644	1,092	1,167	887	899	600	465	620	436	354	242	195
Asian	1,970	1,358	1,445	986	1,093	762	508	696	517	526	306	281
Other	1,639	1,122	1,175	875	838	627	473	607	419	365	246	214
Missing	1,996	1,231	1,227	812	628	657	581	551	405	333	324	217

Time since diagnosis

< 1 year	2,271	1,323	1,357	802	648	680	574	719	451	395	369	265
>= 1 year	1,876	1,204	1,226	803	650	650	535	553	417	336	324	223

Number of conditions

1	1,384	1,001	1,071	546	231	570	455	387	377	289	344	246
2	1,756	1,142	1,183	722	395	583	554	501	411	301	319	224
3	2,835	1,595	1,527	1,271	1,677	883	590	892	493	482	327	205

Region variation

10th percentile	1,538	1,003	972	682	520	500	351	479	319	233	211	164
90th percentile	2,171	1,455	1,421	933	888	792	756	699	675	455	415	316
90/10 ratio	1.4	1.5	1.5	1.4	1.7	1.6	2.2	1.5	2.1	2.0	2.0	1.9

GP practice variation

<i>10th percentile</i>	1,317	807	787	565	400	364	182	350	163	164	121	0
<i>90th percentile</i>	2,800	1,606	1,692	1,040	957	970	924	862	836	527	555	423
<i>90/10 ratio</i>	2.1	2.0	2.2	1.8	2.4	2.7	5.1	2.5	5.1	3.2	4.6	n/a
<i>% variation by region</i>	3.5	2.1	1.4	1.6	2.9	1.2	3.3	2.6	2.6	1.2	1.4	1.4
<i>% variation by practice</i>	4.0	7.7	6.3	9.6	10.3	11.9	26.1	15.2	21.7	10.5	6.0	7.1
<i>% variation by person</i>	92.5	90.2	92.3	88.8	86.8	87.0	70.6	82.1	75.8	88.3	92.6	91.6

Supplementary Box S1. Included tests, test panels, and testing rates

CPRD records over 300 categories of tests; we excluded those unrelated to laboratory testing to monitor LTC, e.g. lung function after bronchodilation (Supplementary Figure S1). Test results are recorded separately in CPRD even if requested as a 'panel'. For example, red and white blood cell counts are recorded separately as part of a full blood count. Results from the same test panel for the same person and date were grouped as one test request¹ (Supplementary Table S5). To focus on common tests, we excluded tests ordered less than once in every 10 years per person.

Whilst CPRD collects information from GP practice records, hospital test results might also be recorded. Additionally, some test categories are not specific enough to be of interest (e.g. miscellaneous). Inclusion/exclusion decisions for the remaining test panels were made independently by two clinicians (JW and KA), with a final consensus decision following discussion of discrepancies. Supplementary Figure S1 shows the inclusion/exclusion process, with 12 tests included in the analysis: renal function, liver function, full blood count (FBC), lipid profile, HbA1c, thyroid function, blood glucose, albumin-to-creatinine ratio (ACR)/microalbumin, bone profile, haematinics, C-reactive protein, and erythrocyte sedimentation rate (ESR).

Crude testing rates were calculated by dividing the number of tests ordered by the person-years of follow-up. People may have multiple registration periods if they moved between CPRD practices – only the most recent period of registration was considered. A person's 'index date' was their earliest diagnosis of one of the three LTC. For condition-specific analyses, the index date was the diagnosis of that condition.

Follow-up to ascertain testing rates started at the latest of practice up-to-standard date (an indication of reasonable data quality), current registration at practice, index date, or study start (1st June 2013). Follow-up ended at the earliest of transfer out from practice, death, last data collection date, or study end (31st May 2018).

Age-sex standardised testing rates were estimated using direct standardisation.¹⁵ The whole cohort included in our study was used as our standard population, to be representative of people with LTC. We produced age-sex specific counts of tests by summing the number of tests, grouped by sex and age group. Similarly, person years of follow-up were summed by sex, and age group. Age-sex-specific testing rates were calculated by dividing the age-sex specific test counts by the equivalent age-sex-specific person years. We weighted the age-sex-specific rates according to the standard population distribution, to produce directly standardised rates which are more comparable.