

Supplementary Tables

Supplementary Table 1: Descriptive statistics and standardised differences for non-binary baseline variables, comparing matched to unmatched patients, for integrated care and control patients

Variable		Integrated care patients				Controls				Standard. diff.	
		Matched (N=1,720)		Unmatched (N=739)		Matched (N=2,867)		Unmatched (N=94,173)		IC patients	Control patients
		Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	(%)	(%)
	Age (years)	76.66	11.17	77.09	11.71	77.10	10.63	70.94	10.91	3.74	56.44
	Age squared	6,001	1,646	6,081	1,724	6,057	1,574	5,152	1,529	4.62	59.22
	QAdmissions risk score	34.56	14.08	60.03	20.18	33.79	14.44	21.59	13.33	126.21	91.51
	IMD score	41.52	9.22	43.04	9.05	41.51	8.73	38.63	10.43	16.76	27.57
0-1 months prior to intervention/ index date	A&E attendances	0.05	0.24	0.24	0.60	0.05	0.25	0.06	0.28	30.75	2.18
	Outpatient attendances	0.41	0.82	0.67	1.60	0.32	0.71	0.29	0.80	16.44	3.41
	Emergency inpatient admissions	0.01	0.11	0.18	0.46	0.01	0.12	0.03	0.18	35.25	7.68
	Elective inpatient admissions	0.04	0.23	0.10	0.41	0.02	0.16	0.04	0.28	13.36	7.09
	Inpatient bed days	0.33	2.63	1.69	5.17	0.17	1.83	0.32	2.49	26.40	5.97
	GP contacts	1.31	1.50	1.72	1.92	1.25	1.51	0.97	1.32	21.66	21.05
1-6 months prior to intervention/ index date	A&E attendances	0.32	0.67	1.10	1.72	0.31	0.67	0.30	0.78	45.43	0.46
	Outpatient attendances	1.95	3.09	3.27	6.33	1.69	2.94	1.48	2.77	20.81	7.40
	Emergency inpatient admissions	0.14	0.39	0.75	1.18	0.15	0.40	0.15	0.50	51.86	0.89
	Elective inpatient admissions	0.22	0.59	0.53	2.08	0.17	0.53	0.21	0.94	15.39	4.25
	Inpatient bed days	1.64	8.61	7.54	17.45	1.28	6.77	1.42	8.56	33.80	1.61
	GP contacts	6.29	4.75	8.75	6.59	6.04	4.66	4.99	4.35	37.27	24.24
6-12 months prior to intervention/ index date	A&E attendances	0.37	0.72	1.27	1.63	0.36	0.73	0.33	0.80	54.94	3.40
	Outpatient attendances	2.24	3.58	3.46	4.56	1.86	2.90	1.68	3.07	26.68	5.71
	Emergency inpatient admissions	0.21	0.72	0.55	2.23	0.18	0.52	0.22	0.95	14.84	4.31
	Elective inpatient admissions	0.16	0.41	0.87	1.20	0.17	0.42	0.15	0.51	58.98	4.24
	Inpatient bed days	1.66	9.16	7.70	17.99	1.42	8.06	1.28	7.89	33.57	1.79
	GP contacts	7.18	5.47	9.54	7.50	6.76	5.07	5.66	4.82	31.45	22.93
12-24 months prior to intervention/ index date	A&E attendances	0.57	1.03	1.96	3.19	0.54	0.97	0.56	1.22	43.66	1.39
	Outpatient attendances	3.98	5.51	6.17	7.82	3.25	4.89	3.14	5.05	28.01	2.25
	Emergency inpatient admissions	0.21	0.52	1.32	1.71	0.23	0.54	0.23	0.75	64.29	0.31
	Elective inpatient admissions	0.40	1.07	0.89	2.78	0.32	0.74	0.41	1.93	17.38	4.32
	Inpatient bed days	2.55	14.36	12.92	26.37	1.76	6.57	2.08	12.95	39.32	2.50
	GP contacts	12.40	9.08	15.93	11.67	11.98	8.61	9.97	7.98	30.28	25.24
24-36 months prior to intervention/ index date	A&E attendances	0.49	0.94	1.84	5.64	0.48	0.90	0.52	1.21	23.87	2.57
	Outpatient attendances	4.13	6.15	5.59	7.18	3.35	4.97	3.13	5.22	20.35	4.21
	Emergency inpatient admissions	0.18	0.45	1.12	1.62	0.19	0.46	0.21	0.67	57.79	3.07
	Elective inpatient admissions	0.37	1.17	0.80	2.55	0.32	0.80	0.40	2.00	16.94	3.90
	Inpatient bed days	1.58	10.66	9.79	20.38	1.27	6.15	1.88	11.77	40.27	5.19
	GP contacts	9.77	9.15	12.17	10.93	9.08	7.93	7.74	7.18	21.95	18.66
	Weight (kg)	72.87	18.02	72.17	18.52	71.91	16.53	73.65	17.90	3.78	9.72
	Alcohol screen	0.71	1.98	0.60	2.05	0.66	1.93	0.94	2.53	5.35	11.40
	Platelet count	260.02	83.91	258.03	88.75	258.79	71.73	265.83	78.81	2.24	8.93

Supplementary Table 2: Descriptive statistics and standardised differences for binary baseline variables, comparing matched to unmatched patients, for integrated care and control patients

Variable	Integrated care patients				Controls				Standard. diff.	
	Matched (N=1,720)		Unmatched (N=739)		Matched (N=2,867)		Unmatched (N=94,173)		IC patients	Control patients
	Mean (%)	St. Dev.	Mean (%)	St. Dev.	Mean (%)	St. Dev.	Mean (%)	St. Dev.	(%)	(%)
Male	47.9	50.0	49.5	50.0	47.6	50.0	48.2	50.0	3.24	1.22
Asian ethnicity	24.9	43.2	21.9	41.4	30.7	46.1	29.6	45.6	7.16	2.54
Black ethnicity	7.7	26.6	7.4	26.3	5.2	22.1	7.0	25.4	0.88	7.04
Other ethnicity	2.4	15.4	2.4	15.4	2.6	15.9	3.5	18.4	0.04	5.08
Ex-smoker	33.1	47.1	34.8	47.7	32.1	46.7	26.0	43.9	3.56	14.00
Light smoker	13.8	34.5	13.7	34.4	13.9	34.6	16.7	37.3	0.33	7.51
Moderate smoker	6.7	25.1	7.0	25.6	4.5	20.7	7.7	26.7	1.14	12.11
Heavy smoker	5.4	22.6	4.6	21.0	4.8	21.3	6.1	23.9	3.85	5.39
Atrial fibrillation	13.7	34.4	22.1	41.5	8.3	27.5	6.5	24.7	20.23	7.14
Peripheral arterial disease	6.2	24.1	9.5	29.3	3.7	18.8	4.4	20.6	11.29	3.78
Coronary heart disease	35.6	47.9	51.0	50.0	33.9	47.3	23.3	42.3	30.74	24.95
Cardiovascular disease	22.1	41.5	18.7	39.0	19.0	39.2	27.1	44.5	8.77	18.32
Stroke	15.0	35.7	20.4	40.3	11.3	31.7	8.5	27.9	13.47	10.18
Heart failure	13.7	34.4	26.8	44.3	9.6	29.5	7.3	26.1	29.50	8.74
Myocardial infarction	13.0	33.7	21.8	41.3	11.2	31.5	7.3	26.1	21.21	14.80
Hypertension	71.2	45.3	72.4	44.7	72.2	44.8	61.8	48.6	2.62	21.42
COPD	23.3	42.3	30.4	46.0	20.0	40.0	16.3	37.0	15.62	9.86
MRC3+ breathlessness score	17.6	38.1	25.3	43.5	14.3	35.0	11.5	31.9	17.81	8.68
Asthma	17.9	38.4	23.4	42.4	15.5	36.2	16.0	36.6	12.99	1.25
Diabetes	46.7	49.9	51.0	50.0	51.9	50.0	39.8	48.9	8.65	24.77
At risk of diabetes	10.3	30.4	8.7	28.1	6.6	24.8	11.2	31.6	5.79	14.78
Family diabetes	9.2	29.0	5.8	23.4	6.8	25.1	11.3	31.6	14.62	14.29
Family hypercholesterolaemia	11.4	31.8	10.6	30.7	9.3	29.1	13.5	34.2	2.73	12.14
Abnormal liver function test	13.1	33.7	12.4	33.0	11.4	31.8	13.0	33.6	1.91	4.57
Dementia	8.1	27.4	15.8	36.5	6.5	24.6	2.6	15.9	21.06	24.17
Manic depression / schizophrenia	4.0	19.5	5.0	21.8	2.8	16.5	4.0	19.6	4.83	6.18
Anxiety	16.7	37.3	19.6	39.7	13.5	34.2	17.0	37.6	7.39	9.34
Depression	22.7	41.9	27.9	44.9	20.5	40.4	23.7	42.5	11.46	7.43
Cancer	15.6	36.3	19.5	39.6	15.5	36.2	10.9	31.2	9.70	14.56
Thyroidism	8.2	27.4	7.7	26.7	4.6	21.0	6.9	25.3	1.81	8.77
Chronic kidney disease	32.4	46.8	43.4	49.6	30.5	46.1	20.1	40.1	22.17	25.92
Palliative care	4.0	19.5	9.3	29.1	2.4	15.3	1.6	12.5	18.49	6.53
Interpreter needed	27.2	44.5	26.5	44.2	32.2	46.7	30.2	45.9	1.56	4.51
Falls	44.4	49.7	57.8	49.4	40.6	49.1	23.3	42.3	27.15	41.07
NHS health check	28.1	45.0	23.0	42.1	25.1	43.4	38.1	48.6	12.06	26.62
Flu vaccination	92.4	26.4	93.4	24.9	94.3	23.2	86.3	34.4	3.73	23.27
Pneumonia vaccination	81.9	38.5	83.1	37.5	84.8	35.9	71.5	45.2	3.11	29.53
Referred for pulmonary rehab	13.7	34.4	18.7	39.0	10.0	30.1	9.4	29.2	12.85	2.20
Smoking advice given	78.4	41.1	79.7	40.2	79.9	40.0	74.1	43.8	3.16	13.41
Referred to smoking cessation	15.3	36.0	12.7	33.3	14.0	34.7	17.6	38.1	7.71	9.50
Lipid lowering advice given	87.5	33.1	88.9	31.4	89.8	30.3	83.5	37.1	4.47	16.98
Health network 2	16.0	36.7	15.3	36.0	21.5	41.1	20.2	40.2	1.94	3.17
Health network 3	6.3	24.4	9.7	29.7	11.1	31.4	10.0	30.0	11.48	3.75
Health network 4	10.8	31.0	10.0	30.0	9.0	28.6	12.8	33.4	2.47	11.53
Health network 5	11.7	32.2	9.2	28.9	9.8	29.7	12.9	33.5	8.79	9.26
Health network 6	9.4	29.1	8.4	27.7	7.0	25.5	7.6	26.6	3.50	2.38
Health network 7	24.8	43.2	31.8	46.6	18.9	39.2	12.0	32.5	15.09	21.37
Health network 8	2.9	16.8	1.5	12.1	3.4	18.2	9.6	29.5	11.71	21.10
Intervention/index date in quarter 2	8.2	27.4	9.1	28.7	9.6	29.5	25.0	43.3	3.02	35.63
Intervention/index date in quarter 3	12.7	33.3	9.9	29.9	12.6	33.2	25.6	43.7	9.37	29.78
Intervention/index date in quarter 4	46.0	49.9	37.2	48.4	45.3	49.8	25.7	43.7	18.14	44.89

Supplementary Table 3: Descriptive statistics and standardised differences for non-binary baseline variables, before matching and after genetic matching (but before entropy balancing), for controls and integrated care patients

Variable		Before matching				After genetic matching only				Standard. diff.	
		Potential controls (N=97,040)		Integrated care patients (N=2,459)		Controls (N=2,867)		Integrated care patients (N=1,720)		Before match	After genetic match
		Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.	(%)	(%)
Age (years)		71.12	10.96	76.79	11.33	77.88	10.42	76.66	11.17	50.00	10.99
Age squared		5,178	1,538	6,025	1,670	6,174	1,553	6,001	1,646	50.69	10.54
QAdmissions risk score		21.95	13.52	42.22	19.93	34.41	14.17	34.56	14.08	101.68	1.10
IMD score		38.72	10.40	41.97	9.19	41.80	8.67	41.52	9.22	35.42	3.04
0-1 months prior to intervention/index date	A&E attendances	0.06	0.28	0.11	0.39	0.05	0.25	0.05	0.24	12.51	0.94
	Outpatient attendances	0.29	0.80	0.49	1.12	0.31	0.68	0.41	0.82	17.43	12.17
	Emergency inpatient admissions	0.03	0.18	0.06	0.28	0.01	0.11	0.01	0.11	12.02	0.00
	Elective inpatient admissions	0.04	0.28	0.06	0.30	0.02	0.15	0.04	0.23	5.69	9.59
	Inpatient bed days	0.32	2.47	0.74	3.64	0.15	1.67	0.33	2.63	11.46	6.80
	GP contacts	0.98	1.32	1.43	1.65	1.27	1.53	1.31	1.50	27.31	2.40
1-6 months prior to intervention/index date	A&E attendances	0.30	0.78	0.56	1.15	0.29	0.65	0.32	0.67	21.77	4.37
	Outpatient attendances	1.49	2.77	2.35	4.37	1.69	2.98	1.95	3.09	19.65	8.37
	Emergency inpatient admissions	0.15	0.50	0.32	0.77	0.14	0.39	0.14	0.39	22.90	0.00
	Elective inpatient admissions	0.21	0.93	0.31	1.25	0.17	0.51	0.22	0.59	8.19	7.92
	Inpatient bed days	1.42	8.51	3.41	12.27	1.21	6.58	1.64	8.61	16.26	5.06
	GP contacts	5.02	4.36	7.03	5.48	6.13	4.66	6.29	4.75	36.66	3.37
6-12 months prior to intervention/index date	A&E attendances	0.33	0.80	0.64	1.15	0.33	0.71	0.37	0.72	27.05	5.17
	Outpatient attendances	1.69	3.06	2.61	3.94	1.85	2.84	2.24	3.58	23.34	10.98
	Emergency inpatient admissions	0.22	0.94	0.31	1.37	0.17	0.51	0.21	0.72	7.10	6.41
	Elective inpatient admissions	0.15	0.51	0.37	0.81	0.16	0.41	0.16	0.41	27.35	0.00
	Inpatient bed days	1.28	7.90	3.48	12.78	1.34	8.02	1.66	9.16	17.18	3.53
	GP contacts	5.69	4.83	7.89	6.25	6.93	5.05	7.18	5.47	35.23	4.65
12-24 months prior to intervention/index date	A&E attendances	0.56	1.21	0.99	2.05	0.52	0.93	0.57	1.03	20.87	5.11
	Outpatient attendances	3.14	5.04	4.64	6.37	3.22	4.73	3.98	5.51	23.46	13.76
	Emergency inpatient admissions	0.23	0.75	0.55	1.15	0.21	0.52	0.21	0.52	27.60	0.00
	Elective inpatient admissions	0.41	1.90	0.55	1.78	0.32	0.72	0.40	1.07	8.01	7.89
	Inpatient bed days	2.08	12.81	5.67	19.38	1.64	6.26	2.55	14.36	18.54	6.36
	GP contacts	10.03	8.00	13.46	10.06	12.27	8.61	12.40	9.08	34.09	1.39
24-36 months prior to intervention/index date	A&E attendances	0.52	1.21	0.90	3.25	0.48	0.88	0.49	0.94	11.79	1.83
	Outpatient attendances	3.14	5.21	4.57	6.51	3.30	4.90	4.13	6.15	21.99	13.41
	Emergency inpatient admissions	0.21	0.66	0.46	1.06	0.18	0.45	0.18	0.45	24.22	0.00
	Elective inpatient admissions	0.40	1.98	0.50	1.72	0.32	0.77	0.37	1.17	5.61	4.42
	Inpatient bed days	1.87	11.65	4.04	14.78	1.21	5.87	1.58	10.66	14.75	3.49
	GP contacts	7.78	7.21	10.49	9.78	9.38	8.24	9.77	9.15	27.73	4.26
Weight (kg)		73.60	17.86	72.66	18.17	71.80	16.50	72.87	18.02	5.18	5.95
Alcohol screen		0.94	2.52	0.67	2.00	0.65	1.88	0.71	1.98	13.06	2.72
Platelet count		265.62	78.62	259.42	85.38	257.93	70.29	260.02	83.91	7.26	2.49

Supplementary Table 4: Descriptive statistics and standardised differences for binary baseline variables, before matching and after genetic matching (but before entropy balancing), for controls and integrated care patients

Variable	Before matching				After genetic matching only				Standard. diff.	
	Potential controls (N=97,040)		Integrated care patients (N=2,459)		Controls (N=2,867)		Integrated care patients (N=1,720)		Before match (%)	After genetic match (%)
	Mean (%)	St. Dev.	Mean (%)	St. Dev.	Mean (%)	St. Dev.	Mean (%)	St. Dev.		
Male	48.2	50.0	48.4	50.0	47.6	50.0	47.9	50.0	0.38	0.58
Asian ethnicity	29.6	45.7	24.0	42.7	30.0	45.8	24.9	43.2	13.14	11.88
Black ethnicity	6.9	25.3	7.6	26.5	4.8	21.4	7.7	26.6	2.66	10.70
Other ethnicity	3.5	18.4	2.4	15.4	2.3	14.9	2.4	15.4	6.80	1.13
Ex-smoker	26.2	44.0	33.6	47.2	34.7	47.6	33.1	47.1	15.72	3.46
Light smoker	16.6	37.2	13.7	34.4	13.0	33.6	13.8	34.5	8.39	2.25
Moderate smoker	7.6	26.6	6.8	25.2	4.0	19.6	6.7	25.1	3.20	10.93
Heavy smoker	6.0	23.8	5.2	22.1	4.3	20.3	5.4	22.6	3.90	4.93
Atrial fibrillation	6.6	24.8	16.2	36.8	8.7	28.2	13.7	34.4	26.14	14.36
Peripheral arterial disease	4.4	20.5	7.2	25.8	3.5	18.5	6.2	24.1	10.63	10.88
Coronary heart disease	23.7	42.5	40.3	49.1	34.7	47.6	35.6	47.9	33.85	2.02
Cardiovascular disease	26.9	44.3	21.1	40.8	18.6	38.9	22.1	41.5	14.25	8.48
Stroke	8.6	28.0	16.6	37.2	11.4	31.8	15.0	35.7	21.62	10.12
Heart failure	7.4	26.2	17.6	38.1	9.5	29.4	13.7	34.4	26.84	12.13
Myocardial infarction	7.5	26.3	15.7	36.3	11.3	31.6	13.0	33.7	22.58	5.27
Hypertension	62.1	48.5	71.6	45.1	73.0	44.4	71.2	45.3	20.99	4.02
COPD	16.4	37.1	25.4	43.5	19.5	39.6	23.3	42.3	20.60	8.92
MRC3+ breathlessness score	11.6	32.0	19.9	39.9	13.6	34.3	17.6	38.1	20.73	10.44
Asthma	16.0	36.6	19.6	39.7	15.5	36.2	17.9	38.4	9.06	6.34
Diabetes	40.1	49.0	48.0	50.0	52.3	50.0	46.7	49.9	15.72	11.24
At risk of diabetes	11.1	31.4	9.8	29.7	6.2	24.2	10.3	30.4	4.32	13.36
Family diabetes	11.2	31.5	8.2	27.5	6.8	25.2	9.2	29.0	10.71	8.36
Family hypercholesterolaemia	13.4	34.0	11.1	31.5	8.7	28.2	11.4	31.8	7.08	8.51
Abnormal liver function test	12.9	33.6	12.9	33.5	11.3	31.7	13.1	33.7	0.12	5.29
Dementia	2.7	16.3	10.5	30.6	6.3	24.2	8.1	27.4	25.28	6.91
Manic depression / schizophrenia	4.0	19.5	4.3	20.2	2.4	15.2	4.0	19.5	1.51	8.20
Anxiety	16.9	37.5	17.6	38.1	13.1	33.7	16.7	37.3	1.74	9.66
Depression	23.6	42.4	24.3	42.9	20.8	40.6	22.7	41.9	1.64	4.55
Cancer	11.0	31.3	16.8	37.4	16.1	36.8	15.6	36.3	15.37	1.31
Thyroidism	6.8	25.2	8.1	27.2	4.6	20.9	8.2	27.4	4.64	13.14
Chronic kidney disease	20.4	40.3	35.7	47.9	33.0	47.0	32.4	46.8	31.94	1.12
Palliative care	1.6	12.6	5.6	22.9	2.2	14.6	4.0	19.5	17.25	9.10
Interpreter needed	30.2	45.9	27.0	44.4	31.4	46.4	27.2	44.5	7.24	9.40
Falls	23.8	42.6	48.4	50.0	42.9	49.5	44.4	49.7	49.22	2.85
NHS health check	37.7	48.5	26.6	44.2	23.6	42.4	28.1	45.0	25.21	10.05
Flu vaccination	86.5	34.2	92.7	26.0	95.1	21.7	92.4	26.4	23.91	9.93
Pneumonia vaccination	71.8	45.0	82.3	38.2	85.5	35.2	81.9	38.5	27.28	9.41
Referred for pulmonary rehab	9.4	29.2	15.2	35.9	9.5	29.3	13.7	34.4	16.01	12.10
Smoking advice given	74.2	43.7	78.8	40.9	81.8	38.6	78.4	41.1	11.18	8.10
Referred to smoking cessation	17.5	38.0	14.5	35.2	13.2	33.9	15.3	36.0	8.35	5.73
Lipid lowering advice given	83.7	37.0	87.9	32.6	90.8	28.9	87.5	33.1	13.07	10.02
Health network 2	20.3	40.2	15.8	36.5	20.7	40.6	16.0	36.7	12.26	12.98
Health network 3	10.0	30.0	7.4	26.1	10.2	30.3	6.3	24.4	10.11	15.86
Health network 4	12.7	33.3	10.5	30.7	8.4	27.8	10.8	31.0	7.07	7.54
Health network 5	12.8	33.4	11.0	31.3	9.7	29.5	11.7	32.2	5.87	6.47
Health network 6	7.6	26.5	9.1	28.7	6.9	25.4	9.4	29.1	5.03	8.28
Health network 7	12.2	32.7	26.9	44.3	21.4	41.0	24.8	43.2	33.17	7.90
Health network 8	9.5	29.3	2.5	15.6	2.9	16.9	2.9	16.8	44.90	0.12
Intervention/index in quarter 2	24.6	43.1	8.5	27.8	8.3	27.6	8.2	27.4	57.89	0.39
Intervention/index in quarter 3	25.2	43.4	11.8	32.3	11.4	31.8	12.7	33.3	41.50	3.70
Intervention/index in quarter 4	26.3	44.0	43.4	49.6	47.3	49.9	46.0	49.9	34.46	2.66