

Supplementary Tables, How does general practitioner discontinuity affect health care utilisation? An observational cohort study of 2.4 million Norwegians 2007-2017

*Supplementary Table 1: Patient health status during the 12-month period prior to follow-up, assessed by various indicators of health care usage among patients with available data. Gray shading indicate groups included in the sub-group analyses.*

	0-18 years	19-44 years	45-64 years	65-79 years	80+ years
<b>Regular GP consultations during 12 months</b>					
N (patient episodes)	559,509	939,841	664,549	311,647	138,929
mean number of consultations(SD)	1.4 (1.9)	2.4 (3.4)	2.9(3.8)	4.0 (4.4)	4.8 (5.3)
median number of consultations (IQR)	1 [0-2]	1[0-3]	2[0-4]	3[1-5]	3[1-7]
% with at least one consultation	59.4	67.1	73.0	84.1	80.6
% with at least one consultation for hypertension <sup>1</sup>	0.0	1.0	8.6	20.4	19.2
% with at least one consultation for ischaemic heart disease <sup>2</sup>	0.0	0.1	2.0	8.6	16.8
% with at least one consultation for mental illness <sup>3</sup>	1.4	6.1	6.1	4.1	5.7
<b>Acute hospital admission during 12 months</b>					
N	441,434	751,145	532,225	257,262	111,526
% with at least one acute hospital admission <sup>4</sup>	4.1	6.8	6.0	11.7	25.5

1: One or more consultations with hypertension diagnoses (ICPC2 diagnosis K85-87) in the KUHR data

2: One or more consultations with ischemic heart disease diagnoses (ICPC2 diagnosis K74-80) in the KUHR data

3: One or more consultations with mental illness diagnoses (ICPC2 diagnosis P70-99) in the KUHR data

4: One or more registered acute hospital stays in the Norwegian Patient Registry (excl. psychiatric care)

Supplementary Table 2: Subgroup analysis of patients who had at least one GP consultation for Hypertension (ICPC2 diagnosis K85-87) or Ischaemic heart disease (ICPC2 diagnosis K74-80) during the 12-month period before follow-up. Estimated Odds Ratios (OR) with 95% Confidence Intervals (95% CI) for monthly healthcare use (one or more) in periods during and after a sudden discontinuity of GP care, compared to a 6-month control period before the discontinuity; GEE analyses (generalizing estimating equations) based on repeated monthly measurements within patient within GP and adjusted for month/time, calendar month, calendar year, patient age and sex.

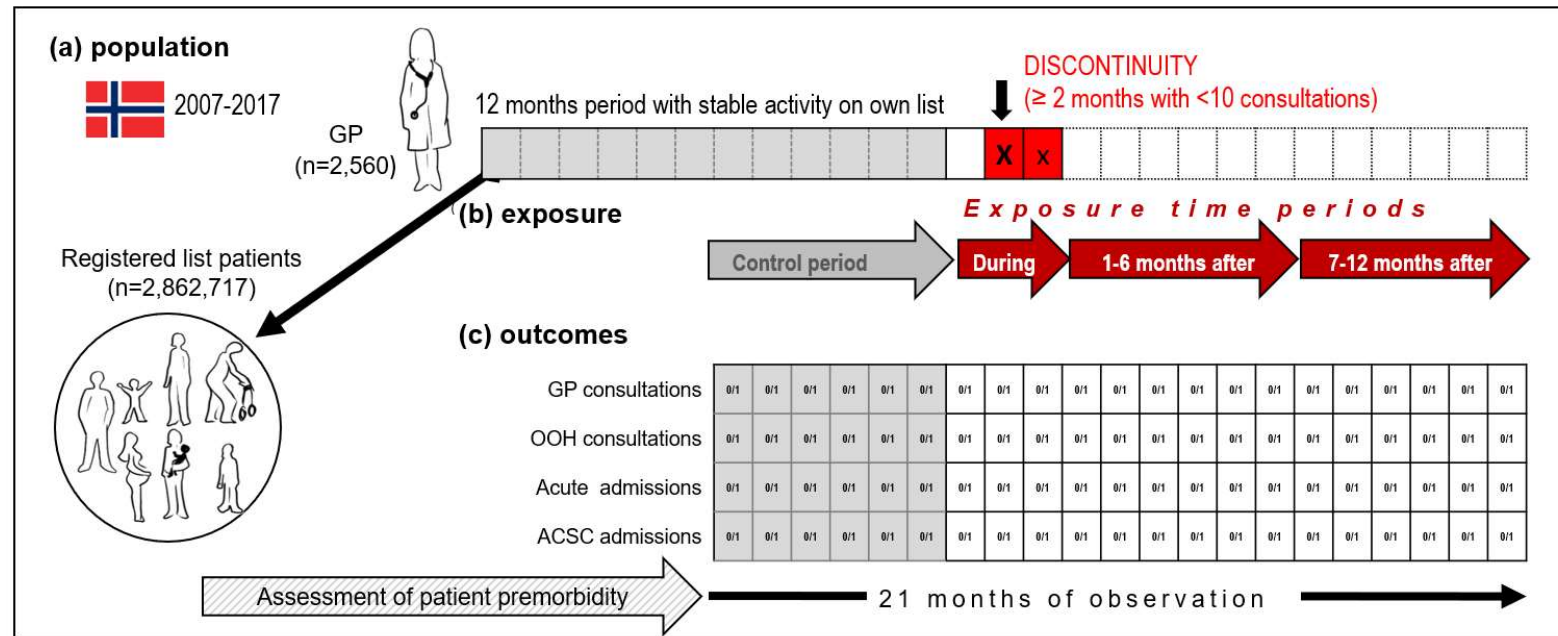
	Hypertension						Ischaemic heart disease					
	45-64 years		65-79 years		80+ years		45-64 years		65-79 years		80+ years	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Monthly GP consultations (one or more)</b>												
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	0.91	(0.90-0.93)	0.93	(0.92-0.94)	0.94	(0.92-0.96)	0.93	(0.91-0.96)	0.93	(0.91-0.95)	0.95	[0.93-0.97]
After discontinuity I (1-6 months after)	0.97	(0.95-0.99)	1.00	(0.98-1.02)	1.00	(0.97-1.03)	0.97	(0.93-1.01)	1.00	(0.97-1.02)	1.01	[0.98-1.04]
After discontinuity II (7-12 months after)	0.98	(0.95-1.02)	0.99	(0.96-1.02)	0.96	(0.91-1.01)	1.00	(0.94-1.07)	1.00	(0.96-1.05)	1.01	[0.96-1.06]
<b>Monthly out-of-hours consultations (one or more)</b>												
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	Ref	1.00	Ref
Discontinuity (3-month period)	1.05	(0.98-1.12)	1.08	(1.01-1.16)	0.96	(0.88-1.05)	1.00	(0.89-1.12)	1.03	(0.95-1.12)	1.03	[0.95-1.11]
After discontinuity I (1-6 months after)	1.08	(0.98-1.20)	1.13	(1.02-1.24)	0.95	(0.84-1.08)	0.95	(0.80-1.12)	1.07	(0.95-1.21)	1.05	[0.93-1.18]
After discontinuity II (7-12 months after)	1.12	(0.96-1.31)	1.18	(1.01-1.37)	0.84	(0.69-1.02)	1.03	(0.79-1.33)	1.04	(0.86-1.25)	1.03	[0.86-1.23]
<b>Monthly acute hospital admissions (one or more)</b>												
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	Ref	1.00	Ref
Discontinuity (3-month period)	1.05	(0.96-1.14)	1.07	(1.00-1.14)	1.04	(0.97-1.12)	0.99	(0.89-1.10)	1.04	(0.97-1.11)	1.03	[0.98-1.10]
After discontinuity I (1-6 months after)	1.03	(0.91-1.18)	1.08	(0.98-1.19)	0.99	(0.90-1.10)	0.99	(0.85-1.15)	1.13	(1.03-1.25)	1.06	[0.97-1.16]
After discontinuity II (7-12 months after)	1.06	(0.87-1.28)	1.07	(0.93-1.23)	0.96	(0.82-1.13)	1.14	(0.90-1.44)	1.15	(0.99-1.34)	1.05	[0.92-1.20]
<b>Monthly ACSC acute hospital admissions (one or more)</b>												
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	Ref	1.00	Ref
Discontinuity (3-month period)	1.22	(0.99-1.52)	1.11	(0.95-1.28)	0.88	(0.75-1.03)	0.78	(0.63-0.96)	1.06	(0.94-1.20)	1.04	[0.93-1.15]
After discontinuity I (1-6 months after)	1.26	(0.92-1.72)	1.31	(1.07-1.61)	0.87	(0.70-1.08)	0.68	(0.50-0.93)	1.27	(1.06-1.51)	1.04	[0.90-1.21]
After discontinuity II (7-12 months after)	1.46	(0.90-2.38)	1.33	(0.97-1.82)	0.74	(0.53-1.04)	0.73	(0.46-1.18)	1.38	(1.05-1.81)	1.01	[0.80-1.28]

Supplementary Table 3: Subgroup analysis of patients who had at least one GP consultation for mental illness (ICPC2 diagnosis P70-99) during the 12-month period before follow-up. Estimated Odds Ratios (OR) with 95% Confidence Intervals (95% CI) for monthly healthcare use (one or more) in periods during and after a sudden discontinuity of GP care, compared to a 6-month control period before the discontinuity; GEE analyses (generalizing estimating equations) based on repeated monthly measurements within patient within GP and adjusted for month/time, calendar month, calendar year, patient age and sex.

	19-44 years		45-64 years		65-79 years		80+ years	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Monthly GP consultations (one or more)</b>								
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	0.93	(0.92-0.94)	0.92	(0.91-0.94)	0.94	(0.91-0.97)	0.96	(0.92-1.00)
After discontinuity I (1-6 months after)	0.96	(0.94-0.99)	0.99	(0.96-1.01)	0.98	(0.94-1.03)	0.99	(0.93-1.05)
After discontinuity II (7-12 months after)	1.00	(0.97-1.04)	1.02	(0.98-1.06)	1.00	(0.94-1.07)	0.98	(0.90-1.08)
<b>4Monthly out-of-hours consultations (one or more)</b>								
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	1.04	(1.00-1.09)	1.06	(1.00-1.12)	1.03	(0.93-1.15)	1.08	(0.94-1.24)
After discontinuity I (1-6 months after)	1.03	(0.97-1.10)	1.02	(0.94-1.12)	1.07	(0.92-1.25)	0.97	(0.79-1.20)
After discontinuity II (7-12 months after)	1.04	(0.95-1.15)	1.03	(0.90-1.18)	1.15	(0.91-1.47)	0.92	(0.66-1.27)
<b>Monthly acute hospital admissions (one or more)</b>								
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	1.09	(1.02-1.17)	1.01	(0.93-1.09)	1.02	(0.92-1.13)	1.03	(0.92-1.15)
After discontinuity I (1-6 months after)	1.01	(0.91-1.11)	0.99	(0.88-1.11)	1.05	(0.90-1.22)	0.98	(0.84-1.16)
After discontinuity II (7-12 months after)	1.00	(0.86-1.17)	1.01	(0.85-1.21)	1.06	(0.84-1.35)	1.03	(0.80-1.33)
<b>Monthly ACSC acute hospital admissions (one or more)</b>								
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	0.99	(0.82-1.19)	0.88	(0.78-1.00)	1.05	(0.96-1.15)	1.15	(1.04-1.26)
After discontinuity I (1-6 months after)	1.07	(0.82-1.40)	0.87	(0.73-1.03)	1.14	(1.00-1.29)	1.24	(1.08-1.43)
After discontinuity II (7-12 months after)	1.08	(0.71-1.65)	0.90	(0.69-1.18)	1.19	(0.98-1.46)	1.38	(1.11-1.72)

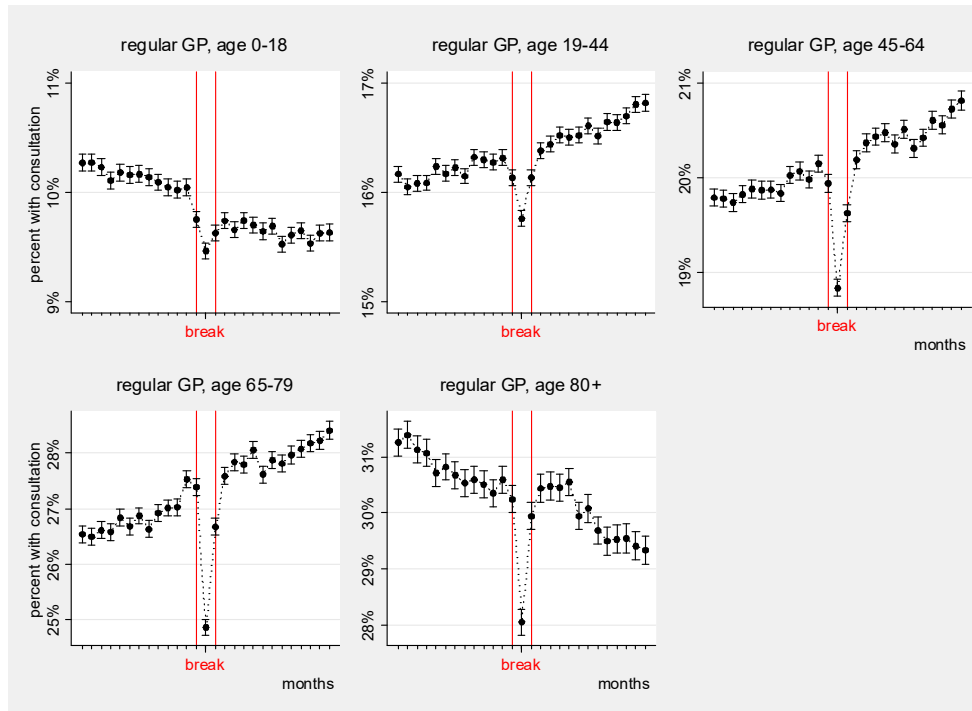
Supplementary Table 4: Subgroup analysis of patients who had at least one emergency hospital admission during the 12-month period before follow-up (2008-2017). Estimated Odds Ratios (OR) with 95% Confidence Intervals (95% CI) for monthly health care use (one or more) in periods during and after a sudden discontinuity of GP care, compared to a 6-month control period before the discontinuity; GEE analyses (generalizing estimating equations) based on repeated monthly measurements within patient within GP and adjusted for month/time, calendar month, calendar year, patient age and sex.

	0-18 years		19-44 years		45-64 years		65-79 years		80+ years	
	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI	OR	95% CI
<b>Monthly GP consultations (one or more)</b>										
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	0.97	(0.93-1.01)	0.97	(0.96-0.99)	0.94	(0.92-0.96)	0.95	(0.93-0.96)	0.97	(0.95-0.99)
After discontinuity I (1-6 months after)	0.99	(0.94-1.04)	1.03	(1.01-1.06)	0.99	(0.97-1.02)	1.02	(0.99-1.05)	1.02	(0.99-1.05)
After discontinuity II (7-12 months after)	0.98	(0.91-1.07)	1.06	(1.02-1.10)	1.04	(0.99-1.09)	1.04	(0.99-1.08)	1.00	(0.95-1.05)
<b>Monthly out-of-hours consultations (one or more)</b>										
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	1.03	(0.96-1.11)	1.03	(0.98-1.08)	1.00	(0.94-1.07)	1.00	(0.94-1.07)	1.06	(0.98-1.14)
After discontinuity I (1-6 months after)	1.01	(0.91-1.12)	1.06	(0.99-1.14)	1.00	(0.91-1.09)	1.06	(0.96-1.17)	1.09	(0.98-1.22)
After discontinuity II (7-12 months after)	1.02	(0.87-1.20)	1.09	(0.97-1.21)	0.95	(0.82-1.10)	1.09	(0.94-1.28)	1.10	(0.92-1.30)
<b>Monthly acute hospital admissions (one or more)</b>										
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	0.99	(0.87-1.13)	0.98	(0.92-1.04)	0.99	(0.94-1.05)	1.03	(0.98-1.08)	1.06	(1.01-1.11)
After discontinuity I (1-6 months after)	1.15	(0.96-1.38)	1.04	(0.95-1.13)	1.03	(0.95-1.12)	1.10	(1.02-1.19)	1.13	(1.05-1.22)
After discontinuity II (7-12 months after)	1.36	(1.02-1.81)	1.07	(0.94-1.22)	1.15	(1.01-1.31)	1.16	(1.03-1.30)	1.16	(1.03-1.30)
<b>Monthly ACSC acute hospital admissions (one or more)</b>										
Control period (6-month period before)	1.00	ref	1.00	ref	1.00	ref	1.00	ref	1.00	ref
Discontinuity (3-month period)	1.02	(0.80-1.29)	0.99	(0.82-1.19)	0.88	(0.78-1.00)	1.05	(0.96-1.15)	1.15	(1.04-1.26)
After discontinuity I (1-6 months after)	1.14	(0.80-1.63)	1.07	(0.82-1.40)	0.87	(0.73-1.03)	1.14	(1.00-1.29)	1.24	(1.08-1.43)
After discontinuity II (7-12 months after)	1.38	(0.80-2.39)	1.08	(0.71-1.65)	0.90	(0.69-1.18)	1.19	(0.98-1.46)	1.38	(1.11-1.72)

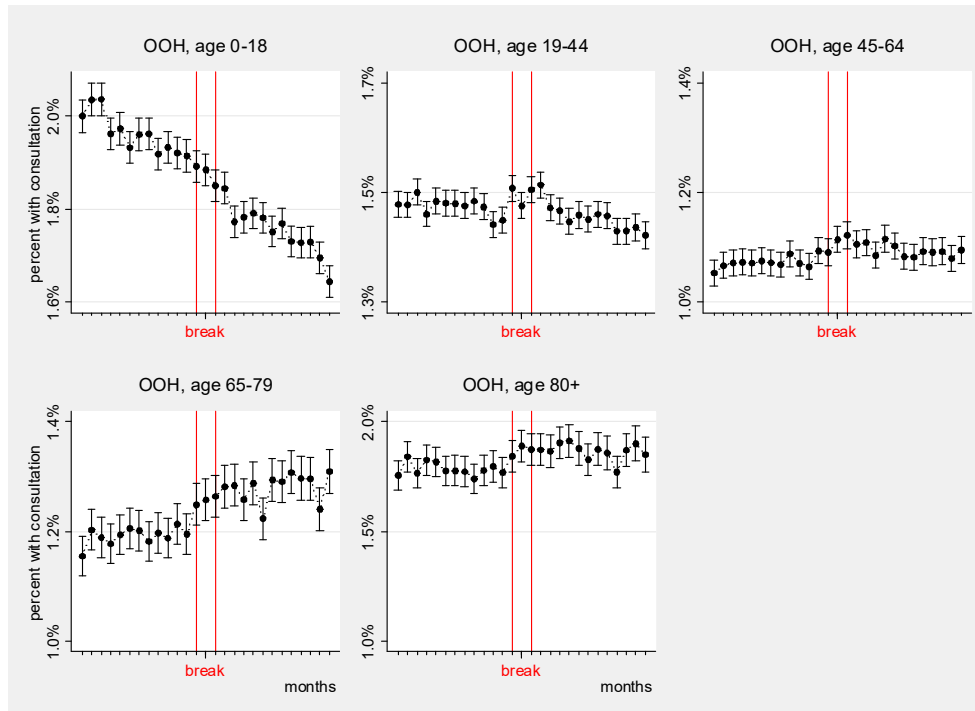


Supplementary figure 1: Illustration of subgroup study design and timeline for the (a) study population and GPs, (b) definition of control period (6 last of 12 months of stable GP activity on own patient list), exposure time periods during (3-month period defined discontinuity with at least two months with no/low activity (X)), 1-6 months after discontinuity and 7-12 months after discontinuity, and (c) patient outcome assessment (four outcomes) in four defined periods. Patients premorbidity was assessed 12 months prior to the control period.

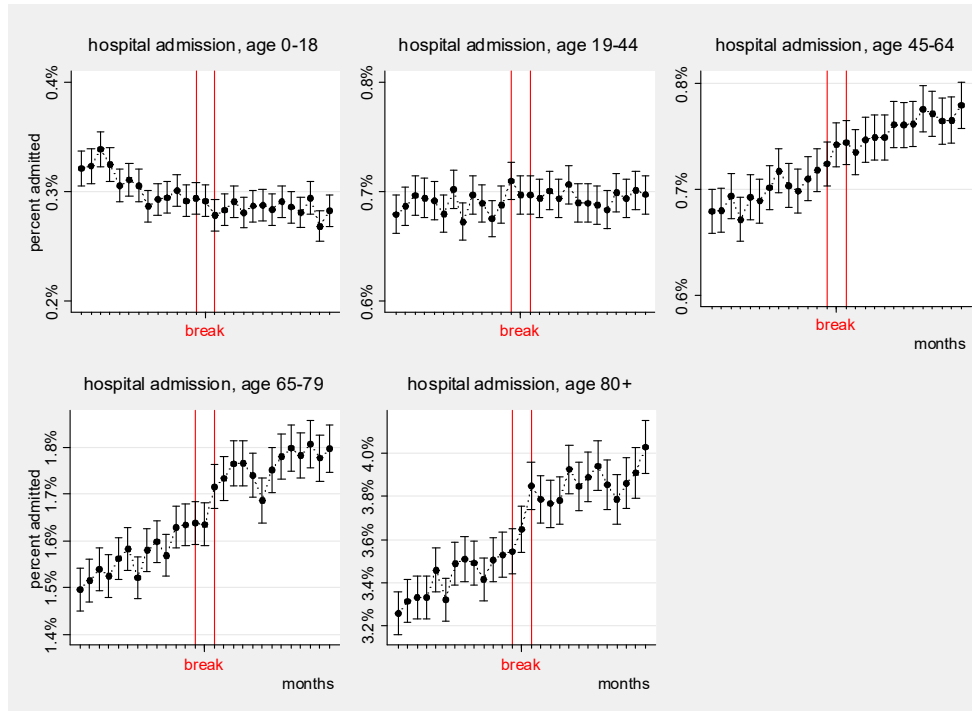
Supplementary Figure 2: Estimated percentage with regular general practitioner (GP) consultation per month for 27 months follow-up (x-axis, with time of discontinuity/break indicated in red) according to age group. Adjusted for calendar month, calendar year, patient age and sex. (2007-2017)



Supplementary Figure 3: Estimated percentage with out-of-hours (OOH) consultation per month for 27 months follow-up (x-axis, with time of discontinuity/break indicated in red) according to age group. Adjusted for calendar month, calendar year, patient age and sex. (2007-2017)



Supplementary Figure 4: Estimated percentage with acute hospital admission per month for 27 months follow-up (x-axis, with time of discontinuity/break indicated in red) according to age group. Adjusted for calendar month, calendar year, patient age and sex. (2008-2016)





Supplementary Figure 5: Estimated percentage with hospital admission for ambulatory care sensitive condition (ACSC) per month for 27 months follow-up (x-axis, with time of discontinuity/break indicated in red) according to age group. Adjusted for calendar month, calendar year, patient age and sex. (2008-2016)

