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# BMJ Open

## A Longitudinal Evaluation of a Countywide Alternative to the Quality Outcomes Framework in UK General Practice, Aimed at Improving Person Centred Coordinated Care.

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## Evaluation of a Countywide Alternative to the Quality Outcomes Framework, Aimed at Improving Person Centred Coordinated Care.

### Abstract

#### Objectives.

To evaluate a county-wide deincentivisation of the Quality Outcomes Framework (QOF) payment scheme for UK General Practice (GP).

#### Setting

In 2014, NHS England signalled a move towards devolution of QOF to Clinical Commissioning Groups. Fifty-five GP practices in Somerset established the Somerset Quality Practice Scheme (SPQS) – a de-incentivisation of QOF – with the goal of redirecting resources towards Person Centred Coordinated Care (P3C), especially for those with Long Term Conditions (LTCs). We evaluated the impact on care from April 2016 to March 2017.

#### Participants & Design

The evaluation used matched data from 55 SPQS practices and 17 regional control practices for three survey instruments. We collected patient experiences ('P3C-EQ'; 2363 returns from patients with 1+ LTC; 36% response rate), staff experiences ('P3C-practitioner'; 127 professionals), and organisational data ('P3C-OCT'; 36 of 55 practices at two time points, 65% response rate; 17 control practices). Hospital Episode Statistics emergency admission data were analysed for 2014-2017 for ambulatory-sensitive conditions across Somerset using interrupted time series.

#### Results

Discretion from QOF resulted in time savings in the majority of practices. Practice data showed a significant increase in P3C oriented organisational processes, with a moderate effect size (Wilcoxon signed rank test;  $p=0.01$ ;  $r=0.42$ ). Care delivery was altered via stronger federation-level agreements and informal networks, increased multidisciplinary working, reallocation of resources for other health care professionals and changes to the structure and timings of GP appointments. Patient and practitioner experiences were similar in SPQS versus control practices. No disbenefits were detected in admissions data.

#### Conclusions

The SPQS scheme leveraged time savings and reduced administrative burden via discretionary removal of QOF, enabling practices to engage actively in a number of schemes aimed at improving care for people with LTCs. We found no differences in the experiences of patients or healthcare professionals between SPQS and control practices.

## 63 Article Summary

### 64 Strengths and limitations of this study

- 66 ■ This study evaluated changes to service delivery, conducted using two survey tools – offering  
67 a perspective on the experiences of both patients and healthcare professionals.
- 68 ■ These were supplemented with a longitudinal analysis of organisational change (to measure  
69 alterations to service deliver) and a time-series of emergency admissions for ambulatory-  
70 sensitive conditions (to detect disbenefits arising from the scheme).
- 71 ■ Due to time and resource pressures on general practice in the UK, we struggled to recruit  
72 controls from the within the same county (Somerset) or matched controls from the region.  
73 As an alternative, we obtained non-matched controls from the region.
- 74 ■ No detectable improvements were established in experiences of healthcare professionals or  
75 patients – this could be because the intervention had no effect on these outcomes, the  
76 instruments were not sensitive enough, or changes to patient/practitioner experiences were  
77 somewhat distal to the intervention.

## 78 Main Text

### 79 BACKGROUND

80 The Quality Outcomes Framework (QOF) for UK General Practice (GP) is one of the largest health-  
81 related pay-for-performance (P4P) schemes in the world[1]. Following implementation in 2004, the  
82 scheme initially had a positive impact on quality of care, primarily achieved via establishment of  
83 consistent procedural baselines in the clinical management of incentivised (mostly chronic)  
84 diseases[1–5]. It reduced between-practice inequalities in care delivery[1–3] whilst also leading to  
85 improved disease registers, widespread recording of clinical activities and adoption of electronic  
86 medical record systems[1], leading to growth in GP data and related research[6,7].

87 Since the introduction of QOF, demographic shifts of an ageing population have continued to drive a  
88 shifting clinical landscape[8], with the number of people with three or more long-term conditions  
89 (mLTCs) thought to have risen by one million over the last decade[9]. The subsequent rising demand  
90 for the management of LTCs and mLTCs – requiring tailored and coordinated support[10,11] – has  
91 led to QOF (with its emphasis on processes for single disease guidelines) being viewed as  
92 increasingly anachronistic[6,12–16]. After introduction of QOF, there was a significant reduction in  
93 the continuity of care[2,17] and the person-centeredness of GP consultations[13,14,18,19], with a  
94 subsequent decline in patients' satisfaction[20]. It has been argued that QOF does not incentivise  
95 appropriate clinical care for people with multimorbidity[6,12–16], who require individualised  
96 support, greater continuity of care and a holistic, biopsychosocial approach that is responsive and  
97 empowering[10,11]. An oft-quoted criticism is that QOF reduces consultations to 'box-ticking'  
98 exercise[21].

99 In response to such criticisms, both the NHS Chief Executive and the General Practitioners  
100 Committee (GPC) Chairman have backed the removal of QOF[21]. In 2014, NHS England signalled a  
101 move towards devolution of QOF to Clinical Commissioning Groups (CCGs), allowing organisations  
102 the freedom to develop alternatives. Potential advantages included the targeting of local health

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3 103 needs and greater clinical engagement for quality improvement[22]. The Somerset Practice Quality  
4 104 Scheme (SPQS) was established in the same years as a de-incentivisation of QOF. It arose because  
5 105 GPs, the Clinical Commissioning Group (CCG) and the Local Medical Committee (LMC) felt that QOF  
6 106 was not incentivising the highest value clinical behaviour. The goals were to allow clinicians the  
7 107 freedom to innovate, enable consultations to be more person-centred and increase involvement  
8 108 with a number of concurrent schemes aimed at improving Person Centred Coordinated Care  
9 109 (P3C)[23]. The details of the scheme were included in the SPQS contract[24] and local Sustainability  
10 110 and Transformation Plan (STPs – Plans for reforming healthcare mandated by the Five Year Forward  
11 111 View[25]) of the GPs[26]. (See Supplementary File 1 for a summary of Somerset STPs; box 1 for  
12 112 brief details of the various schemes and references for details). The contract removed incentives  
13 113 from QOF, although CQRS (Calculating Quality Reporting System) remains active in order to collect  
14 114 prevalence data for payment calculations. The STPs detailed how the reduced QOF overhead would  
15 115 be exploited, with SPQS implemented via a number of initiatives, including involvement in related  
16 116 schemes such as Symphony Vanguard[27], Village Agents[28] and Health Connections Mendip  
17 117 (HCM)[29]. Fifty five Somerset practices opted for SPQS, with 18 Somerset practices (initially 20)  
18 118 retaining the existing QOF contract. (The SPQS practices increased to 57 in 2015/16; but two  
19 119 mergers reduced it back to 55).

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**Test & Learn:** Comprises three similar initiatives (South Somerset, Taunton and Mendip – see below), which share a common goal of targeting complex, multimorbid patients with a suite of approaches including single personalised care plans, multi-disciplinary team (MDT) input and single point of access to provide person centred coordinated care (P3C).

**Test & Learn – South Somerset Vanguard:** A symphony hub system located at Yeovil District Hospital, with complex patients remaining under management of GP practice, but receiving extra support from Health Coaches/Key Workers at the Symphony service.

**Enhanced Primary Care (EPC):** EPC is a sub-component of the Symphony vanguard scheme that incorporates health coaches (HCs) into primary care, focusing on less complex patients, allowing GPs to focus primarily on medical problems.

**Test & Learn – Taunton:** Operates under a “virtual hub” model, with complex/frail patients managed by a multidisciplinary team with shared care plans and Wellbeing Advisors.

**Test & Learn – Frome Mendip, including “Health Connections Mendip”.** With loose eligibility criteria and a number of referral routes, Community Practice Nurse and Health Connectors (based at Frome) liaise regularly in MDT meetings. There is a hub telephone line for single point of access. The model advocates utilising existing assets in the community. The Health Connections team lead social prescribing work with a service directory to signpost patients to appropriate resources.

**Village Agents Service:** Supports isolated, excluded and vulnerable (including elderly and multimorbid) people by offering a signposting and referral service. The service links with general practices.

**Living Better:** A working partnership between the GP practices in the pilot, AGE UK Somerset, Social Care, Somerset Partnership, West Somerset District Council, and Somerset Clinical Commissioning Group. The project supports people with one or more long-term conditions to better self- manage, reconnection their lives to the community and reducing dependency on health and social care.

**Box 1. Initiative for implementation of SPQS, as discussed in Supplementary File 1.**

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123 The initial phase of the scheme was previously evaluated with a retrospective approach[30]. This  
 124 revealed early stages of organisational change. There was a genuine passion and commitment to  
 125 improving P3C, including stronger federation-level agreements and informal networks, increased  
 126 multidisciplinary team working, reallocation of resources towards health care assistants, nurses and  
 127 others, and changes to structure and timings of appointments with GPs. From April 2016 to March  
 128 2017 we conducted a longitudinal evaluation of the second full year of the SPQS programme (see  
 129 Supplementary File 2 for a timeline of the SPQS scheme and associated evaluations). This was  
 130 commissioned with the aims of establishing the nature and extent of P3C that has been

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3 131 implemented since discretion from QOF, explore staff and patient experiences of care delivery and  
4 132 examine non-elective hospital admissions before and after inception of the scheme.  
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## 134 **METHODS**

135 We conducted a mixed-methods evaluation of SPQS which included a suite of quantitative and  
136 qualitative tools. Analysis of quantitative data is described in this paper. In-depth qualitative findings  
137 will be published in a subsequent paper (including semi-structured interviews with practitioners;  
138 observations of consultations and facilitation workshops with practices). A schematic overview of  
139 the full SPQS evaluation framework is provided in figure 1. The quantitative evaluation included  
140 completion of survey tools targeting patient experiences (P3C-EQ), staff experiences (P3C-  
141 practitioner) and organisational perspectives (P3C-OCT tool), alongside time series of Hospital  
142 Episode Statistics (HES) for ambulatory-sensitive conditions across Somerset. We chose not to use  
143 national measures of General Practice (i.e. GP Patient Survey (GPPS) and Friends and Family Test  
144 (FFT)): they have a broad sample and do not target the patient group (i.e. patients with LTCs) that  
145 are the focus of SPQS. Furthermore, they do not target the construct of interest (i.e. P3C).

146 <figure 1 here>

147 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.

## 148 **Samples**

149 The 55 participating Somerset practices (mean list size = 7,695; median = 6515.5; smallest = 1834;  
150 largest = 29,078) completed our evaluation tools (see below). Whilst these 55 practices were  
151 incentivised to take part in our evaluation (i.e. by being part of SPQS), the non-SPQS Somerset  
152 practices had no incentive to act as controls and did not participate in this study. Therefore, for  
153 control practices, we initially identified a cohort of non-Somerset control practices matched for  
154 staffing data, list size, population density, indices of multiple deprivation, QOF scores and disease  
155 prevalence. However, the incentives available for this evaluation (£200 per practice) were only  
156 sufficient to recruit six practices by this method. We therefore supplemented this group with 11  
157 unmatched practices from across the Southwest, making a total of 17 control practices (mean list  
158 size = 6,714; median = 4878; smallest = 2678; largest = 4878). The control group therefore represents  
159 a self-selected sample of practices that are likely to represent engaged, active practices (i.e. with the  
160 resources to engage with research). In contrast, completion of our evaluation was mandatory for all  
161 SPQS practices.

## 162 **Patient and Public Involvement**

163 Patients were involved via the peninsula CLAHRC patient involvement group (PenPig), who set  
164 priorities for research objectives. Patients, public and healthcare professionals were also involved in  
165 co-design workshops to develop the measurement framework and individual questionnaires (see  
166 papers for details [23,31–36]). Patients also reviewed drafts of ethics approval applications and all  
167 patient-facing communication. The work was co-presented with patients at the South West Society  
168 for Academic Primary Care Regional Meeting 2018.



## 169 **Survey Tools**

170 **The P3C-Patient Experience Questionnaire (P3C-EQ)** is a brief, 11-item patient-completed measure  
171 of patient experiences of person centred coordinated care delivery, which we have previously  
172 validated[31,37,38]. The tool can be used to generate an aggregate score of patient experience[31],  
173 or be sub-scored to previously described sub-domains of P3C[23,31,33–36]. From each practice, 100  
174 patients with one or more LTCs, randomly sampled from the practice list, were invited to complete a  
175 postal questionnaire at a single time point.

176 **The P3C-Practitioner Experience Survey** is a 29-item instrument that measures individual and  
177 managerial experience of delivering person centred and coordinated care. Via a workshop with  
178 healthcare professionals, we selected the previously validated P3C-Practitioner questionnaire (also  
179 known as the Person-Centred Health Care for Older Adults Survey[39]) as the most suitable  
180 instrument to examine practitioners' perspectives of P3C (see Supplementary File 3). A minimum of  
181 two practitioners from each practice were requested to respond.

182 **The P3C-Organisational Change Tool (P3C-OCT)** is an evidenced-based measure of progress towards  
183 delivering person centred coordinated care from an organisational perspective[39]. It was developed  
184 to support and measure P3C in line with Year of Care[34] and RCGP principles of Collaborative Care  
185 and Support Planning[40], thus providing a way to monitor changes in line with policy directives  
186 which improve P3C. The tool was designed to measure all core P3C routines which have been  
187 identified through research[41,42], patients' accounts, policy documents[34] and our own  
188 work[23,39]. The design of the P3C-OCT is based on a shared consensus of the components of  
189 person-centred coordinated care (e.g. [34,35,43]), which broadly correspond to five domains:  
190 Information and Communication; Care Planning; Goals and Outcomes; Transitions; Organisational  
191 Process Activities; and Decision Making. These domains have been mapped to real-world actions  
192 that support the delivery of P3C (e.g. multi-disciplinary team meetings, care planning, provisions for  
193 information etc.) This allows the tool to translate concepts which are often abstract, and may be  
194 drawn from academic literature and policy documents, into actionable, tangible processes which a  
195 practice can implement. The result is a unique 29-question instrument with over 500 different  
196 possible responses, which provides a detailed and practical interrogation of P3C delivery. An equally-  
197 weighted scoring system allows results of the P3C-OCT to be aggregated into a single composite  
198 score, or alternatively by sub-domains of P3C.

199 Offered as an electronic or paper version, we requested that the tool was completed by a  
200 combination of General Practitioner and Practice Manager (PM), thus ensuring representation of  
201 front-facing and backend operations of GP surgeries. The P3C-OCT provides a detailed profile of care  
202 delivery and organisation through 29 core questions. All questions ask about objective activities (e.g.  
203 processes in place to deliver P3C) and subjective responses (e.g. how well these are working). Scores  
204 are given out of a theoretical maximum of 20 points. The P3C-OCT was also prepended by a series of  
205 SPQS-related questions about administrative and consultation time savings from discretion from  
206 QOF. Each SPQS practice was requested to complete the P3C-OCT at two time points (from Feb-Aug  
207 2016 and Dec 2016-Mar 2017). In contrast, control practices only completed the P3C-OCT once (at  
208 Time 2).

## 209 **Analysis**

210 SPQS and control practices were compared on the P3C-Patient Experience survey and the P3C-  
211 Practioner Experience Survey (at time 2; 6-12 months after initiation of second year/phase 2 of  
212 SPQS), with significance tested using the non-parametric unmatched Mann–Whitney–Wilcoxon  
213 (MWW) test taking into account within-practice clustering by calculating Somers' D statistic (non-  
214 parametric tests were used as the scoring is a summation of Likert responses i.e. data was ordinal).  
215 For the P3C-Organisational Change Tool, we compared Time 1 (immediately after implementation of  
216 second year/phase 2 of SPQS) and Time 2 (6-12 months later), with significance evaluated by  
217 Wilcoxon signed rank test.

## 218 **Time Series of emergency admissions to hospital**

219 A multi-group interrupted time-series analysis (ITS) was conducted to identify whether de-  
220 incentivisation of QOF and the introduction of SPQS was associated with changes in emergency  
221 admissions to acute hospitals with a primary diagnoses for four long-term, ambulatory care sensitive  
222 conditions (ACSCs). Hospital episode statistics (HES) were obtained for patients from all 55 GP  
223 practices enrolled in the SPQS scheme (actually 56 practices in 2015/15) and 18 Somerset QOF  
224 practices (i.e. Somerset practices not enrolled in SPQS; initially 20). Data was obtained for a 70  
225 month period from April 2011 to May 2018. This time period is divided into 38 months pre-  
226 intervention (Apr 2011 – May 2014) and 48 months post intervention (June 2014 – May 2018; SPQS  
227 contract went live in June 2014, month 39). Data include monthly admission counts for four ACSCs:  
228 Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary Disease (COPD), Diabetes, and  
229 Stroke. We selected these ACSCs as a proxy for preventable admissions and an indicator of any  
230 deteriorating quality of care associated with SPSS. Due to the difference in number of practices  
231 between SPQS and QOF practices, admissions were divided by the number of practices, thus  
232 providing an average of emergency admissions (expressed as admissions per month per practice).  
233 Analysis was performed using the *itsa* command[44] on STATA (StataCorp Ltd). This uses regression-  
234 based model with Newey-West standard errors. Pre- and post-intervention slopes/intercepts of the  
235 sample (SPQS practices) were compared to controls (QOF practices). Lag period was set to 1 month.

236

237

## 238 RESULTS

### 239 P3C-EQ

240 There were 1,752 responses received from 49 (89%) of the 55 practices enrolled in SPQS, and 611  
 241 responses from patients enrolled in the 17 control (QOF) practices (36% response rate and similar to  
 242 other similar other studies[45]). The two groups of responses are compared in Table 1.

243

244 **Table 1:** Demographic profile of responses to P3C-EQ as percentages.

	Participant demographics as a percentage										
	Age		Education			Gender			Multi-morbidity		
	QOF	SPQS	QOF	SPQS	QOF	SPQS	No. LTCs	QOF	SPQS		
<=24	0.3	0.4	None	1.0	1.3	Male	44.0	43.4	1	19.6	20.1
25-34	2.5	1.3	Primary	3.1	2.1	Female	53.8	53.9	2	19.6	23.8
35-44	2.5	2.6	Secondary	33.7	34.6	Non-response	2.2	2.7	3	20.6	17.8
45-54	8.8	5.3	College	26.4	28.1				4	11.3	13.7
55-64	18.3	13.3	Undergraduate	11.5	10.8				5	9.3	7.5
65-74	25.7	29.2	Postgraduate	8.2	7.8				6	4.7	5.1
75-84	29.3	32.7	Non-response	16.2	15.3				7	2.8	2.8
>=85	12.1	14.1							>=8	4.2	2.8
Non-response	0.5	1.0							Non-response	7.9	6.4

245

246 The mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1,752) and QOF controls  
 247 (23.68, n. 611) were not significantly different (MWW U test;  $p=0.346$ ).

### 248 P3C-Practitioner results

249 Full results of the P3C-Practitioner are provided in Supplementary File 3. We received 98 responses  
 250 from 55 SPQS practices and 29 responses from 18 control practices from a mix of healthcare  
 251 professionals – 62 GPs (49%); 35 Nurses (27%); 12 Wellbeing Advisors; 7 LTC nurse; 11 others. The  
 252 mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1752) and QOF controls (23.68, n.  
 253 611) were not significantly different (MWW test;  $p=0.405$ ). Return rates are not applicable, as this  
 254 was a convenience sample where we requested response from at least two different professionals at  
 255 each practice.

### 256 P3C-OCT Results

257 To evaluate changes to P3C during the SPQS scheme we undertook an analysis of the organisation  
 258 and delivery of care using the P3C-OCT. Of 55 practices enrolled in the scheme, 36 practices  
 259 provided admissible data at the two evaluation time-points (Time 1: 2/2016–8/2016 and Time 2 was  
 260 12/2016-5/2017; 65% response rate). This revealed an increase (0.9;  $p=0.034$ ) in aggregate scores on  
 261 the P3C-OCT between T1 (5.8) to T2 (6.7). This therefore represents a measurable increase in activity  
 262 towards person centred coordinated care delivery and organisation (see table 2), with a moderate  
 263 effect size ( $r=0.42$ ). To determine the specific areas of person centred coordinated care (P3C) that  
 264 improved during the evaluation, this was examined by domains of P3C[34–36]. When broken into  
 265 subdomains of P3C, significant improvements were delivered in areas related to 'Goals and  
 266 Outcomes' (e.g. goal setting with patients; 1.7 increase,  $p=0.00$ ; large effect size  $r=0.61$ ) and

267 'Organisational Process Activities' and "Organisational Process Activities" (0.9 increase,  $p=0.03$ ;  
268  $r=0.3$ )

269

270 **Table 2:** Mean changes in P3C-OCT scores between time 1 and time 2 for 36 paired practices. The top row  
271 provides the total OCT score (out of a maximum of 20), followed by domains of P3C. The OCT score for each  
272 domain is given for time 1, time 2 and the difference between time 1 and 2. The statistical significant of these  
273 differences is indicated by  $p$ -value from Wilcoxon signed rank test. Statistically significant results (at the level  
274  $p<0.05$ ) are indicated in bold font and with an asterisk next to the  $p$ -value. Effect sizes were calculated as test  
275 statistic  $z$  by the square root of the number of pairs.

	Time 1	Time 2	Change T1→ T2 ( $p$ -value; effect size)
<b>Total OCT Score:</b>	<b>5.8</b>	<b>6.7</b>	<b>0.9 (<math>p=0.01</math>; <math>r=0.42</math>)*</b>
<b>Information &amp; Communication</b>	7.4	8.1	0.7 ( $p=0.25$ ; $r=0.19$ )
<b>Care Planning</b>	6.6	7.2	0.6 ( $p=0.14$ ; $r=0.25$ )
<b>Goals &amp; Outcomes</b>	6.1	7.8	<b>1.7 (<math>p=0.00</math>; <math>r=0.61</math>)*</b>
<b>Transitions</b>	4.9	5.2	0.3 ( $p=0.43$ ; $r=0.13$ )
<b>Organisational Process Activities</b>	4.3	5.2	<b>0.9 (<math>p=0.03</math>; <math>r=0.36</math>)*</b>
<b>Decision Making</b>	3.8	4.4	0.6 ( $p=0.07$ ; $r=0.3$ )

276

277 Further to the longitudinal analysis, SPQS practices were also compared to a cohort of 17 non-SPQS  
278 practices from the South West (all control practices returned data at Time 2). Aggregate results for  
279 the P3C-OCT revealed that control practices had an aggregate score of 6.2 on the P3C-OCT. This  
280 suggests that SPQS practices were underperforming against the control group at time 1 (e.g. a score  
281 of 5.8 versus 6.2;  $p=0.64$ ), whereas later in the evaluation, at time-point 2, this situation had been  
282 reversed (6.7 versus 6.2;  $p=0.41$ ) – although these are both non-significant.

### 283 **Discretion from QOF and time savings**

284 When asking SPQS practices to complete the P3C-OCT, we also included a number of additional  
285 questions related to the SPQS scheme. We asked SPQS practices a subjective appraisal of time  
286 savings (both in GP consultations and administration) from enrolment in the scheme. These are  
287 shown in figure 2. More than half (55%) of the practices (28 of 51 practices that completed these  
288 questions) agreed that time had been freed up within the 10 minute standard consultation time.  
289 Flexibility in consultations is a prerequisite for person-centred consultations for those with complex

health needs. A free text response box (following the above 3 questions) illuminated how time savings were utilised. Whilst qualitative analysis is beyond the scope of this paper, these comments reiterated the SPTs, e.g. “the conversation has changed, and consultations take a very different path”, including more personalised care planning with “using their own clinical judgement, which is more patient-focused/led, rather than a tick-box”. These opinions were reiterated: “a more holistic consultation geared to the individual patient's needs and situation.” These findings were confirmed from non-SPQS (QOF) practices, who stated that “QOF collecting data can often take time away from dealing with more important aspects of patient needs”. Finally, the alterations have allowed more flexibility in GP appointments, where the removal of QOF incentivisation also enabled greater flexibility for practice-management, where “the 10 minute appointment system in primary care imposes great restraints”.

<figure 2 here>

**Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

With regard to administrative time savings, more than three quarters of SPQS practices (40/51; 78 %) reported administrative (non-consultation time for practitioners) time savings since initiation of the scheme, with just over one third of these practices (14/51; 27%) reporting gains of more than 2 hours per week. For administrators and non-clinical staff, SPQS was reported to free up time for more than 86% (44/51) of practices with only 13 % (7/51) reporting a negligible effect. Again, the free text response boxes confirmed the plans of the STPs (see introduction and Supplementary File 1), stating that efficiency had been leveraged for increased collaborative and federation-level working, including engagement with a number of schemes in Somerset designed to improve person centred and coordinated care e.g. “Better use of Symphony”, “Engagement with EPC”, “Rural Practice Network”, “Health coaches”, “Huddles”, “P3C relevant training”, “Replaced by other work such as Symphony/health coaching etc”, “This hasn't shown a reduction in workload but rather a change in workload.”

### *Retention of QOF elements*

When asking SPQS practices to complete the P3C-OCT, we also included a number questions specific to the implementation of SPQS. When asked ‘Are you still using components of the QOF?’, nearly all practices enrolled in SPQS continued to use at least some aspects of QOF (only 1 out of 51 respondents to this question stated “none”; 86% of practices used “Some”, “Most” or “All”). We further investigated the continued utilisation of QOF via a free-text response in the P3C-OCT questionnaire. This revealed that QOF was still (according to one practice) utilised by “applying individually, not 'point scoring’”. A common aspect that was dropped was exception reporting, with time also being saved by avoiding “target chasing”. Elements of QOF were also contractually retained such as the CQRS (Calculating Quality Reporting System). This remained active under the SPQS contract to allow data on prevalence and key indicators to be collected from practices via GPES (GP Extraction System), where prevalence figures are utilised in the SPQS payments calculation.

QOF also continued to be utilised for the monitoring of LTCs and recall of patients with LTCs for routine check-ups. Around a half of SPQS practices (n. 25) still use QOF for recall of at least some (or

all) conditions (e.g. checking for recall requirements for patients with LTCs and the management of specific chronic diseases). Free text responses suggested that whilst recall was an essential function, the implementation under QOF was overly burdensome and not tailored for multiple morbidities. Some practices countered this by running in-house developed searches with a priority to “concentrate on an integrated LTC system”. This suggests that there is scope for collaboration to design an overhauled, integrated recall system that is specifically designed for efficient management of multiple LTCs (as previously proposed[46,47]).

### Time Series of Hospital Episode Statistics

Results of the interrupted time series (ITS) are shown in figure 3. No significant increases were detected in the slope post-intervention (i.e. after the initiation of the SPQS contract in June 2014) in emergency admissions for patients with a primary diagnosis of four ACSCs in SPQS practices. Full results of significance tests are provided in Supplementary File 4. The removal of QOF has had no significant effect on emergency admissions for these four ACSCs at the time of intervention, or in the two years following. However, for the non-SPQS Somerset practices, a significant slope change (increase) in admissions for AMI and Diabetes were observed, and a significant slope change (decrease) for admissions for Stroke was observed. These changes in admissions are therefore unrelated to the SPQS contract (see discussion below).

<figure 3 here>

**Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was live from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of admissions, normalised as admissions per month per practice. Black circles indicate the average number of emergency admissions in each month for SPQS practices; white circles are average admissions for QOF Somerset practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and dashed (for QOF Somerset practices). All changes between pre- and post-intervention between SPQS and QOF practices are non-significant (see supplementary data).

## DISCUSSION

We observed a variety of responses to de-incentivisation of QOF in Somerset. Some QOF-related components remained mandatory (prevalence reporting). Some ‘desirable’ features of the QOF system were still used (e.g. prompts during consultation), others were adapted (e.g. patient recall) and some burdensome components dropped altogether (e.g. exception reporting).

Practices reported that these alterations had led to time and resource savings in both GP consultations and administration. These time savings were used to increase involvement in implementation projects such as Symphony Test and Learn, Village Agents, Health connections, and the South Somerset Vanguard. These were planned as part of the SPQS contract and associated ongoing healthcare reform. These local implementation projects are actively targeting service redesign for complex patient needs, using person centred coordinated care across practice contexts. These projects have involved stronger federation-level agreements and informal networks, increased multidisciplinary team working, reallocation of resources for health care assistants

372 (including Health and Wellbeing Advisors and Health Coaches), nurses and others, single points of  
373 access for the patient, shared electronic record systems, increased use of care planning and changes  
374 to structure and timings of GP appointments. The results of our longitudinal P3C-OCT survey confirm  
375 significant improvements in P3C, suggesting that SPQS has been successful in its stated aims as a  
376 system lever for service redesign aimed at the delivery of greater person centred and coordinated  
377 primary care.

378 Whilst there is emerging evidence that P3C approaches can improve outcomes (particularly for  
379 complexity/multimorbidity)[35,48], we could not establish that the changes introduced via SPQS are  
380 leading to better outcomes for patients. Patient experience is downstream of the organisational  
381 changes occurring in Somerset, and any detectable improvement in patient outcomes may be  
382 delayed. The results of the patient P3C-EQ experience established a similar experience of care in  
383 Somerset compared to the control QOF practices (who represent active, research engaged-  
384 organisations, whereas completion of the survey was mandatory for SPQS practices; see methods).  
385 Similarly, comparison of practitioner perspective of P3C to the control group revealed similar  
386 experiences in SPQS versus the control practices.

387 Whilst this evaluation did not assess costs on healthcare (data permissions not provided by NHS  
388 Digital), a recent US-based review found large (albeit not statistically significant) average healthcare  
389 savings with interventions that have parallels to the models being deployed in Somerset (e.g.  
390 community health workers/coaches and improved use of health information technology[49]).

391 In reference to disbenefits, we could find no evidence of increased admissions associated with SPQS.  
392 However, ITS did establish trend changes in admissions in non-SPQS Somerset practices (e.g.  
393 those practices that retained the QOF contract). A significant increase was observed in  
394 admissions with a primary diagnosis of AMI and Diabetes, and a significant decrease observed for  
395 those with a primary diagnosis of Stroke. It is, however, unlikely that relatively minor changes to  
396 QOF in the years 2014/15 and 2015/16 [50,51] have led to these observed trend changes in  
397 emergency admission.

398 Whilst the time series did not establish any disbenefits in SPQS practices, earlier evaluation of SPQS  
399 established that de incentivisation of QOF leads to inconsistent recording of QOF data. Subsequently,  
400 analysis of QOF scores have little utility in assessing the quality of care in Somerset[30]. This paucity  
401 of data represents a major disbenefit of QOF de incentivisation: one of the primary benefits of QOF  
402 has been the widespread recording of clinical activities[1] and availability of GP data and  
403 research[6,7]. It is not currently clear how 'quality' could be assessed in the post-QOF landscape – a  
404 question that has major implications for research, evaluation, healthcare management.

#### 405 **Limitation of the study**

406 The ability to draw firm conclusions from this study were limited by several factors. Due to time and  
407 resource pressures on general practice in the UK, we struggled to recruit controls from the within  
408 the same county (Somerset) or matched controls from the region. As an alternative, we obtained  
409 non-matched controls from the region. These represented a biased cohort of research-engaged  
410 practices. We could not detect improvements in experiences of healthcare professionals or patients  
411 – this could be because the intervention had no effect on these outcomes, the instruments were not  
412 sensitive enough, the controls were unsuitable, or changes to patient/practitioner experiences were  
413 somewhat distal to the intervention.

## 414 Implications for the future

415 With both the NHS Chief Executive and the GPC Chairman backing the phased removal of QOF[52],  
416 these lessons from SPQS have implications for UK policy. We have previously made a number of  
417 suggestions for the post-QOF landscape.[46,47] These include retaining limited components of QOF  
418 (e.g. those elements that are desirable by GPs; “QOF-Lite”), the development of novel systematic  
419 data-capture (including GP contact data) or collaboration on an overhauled, integrated recall system  
420 that is specifically designed for efficient management of multiple LTCs[46,47]. General Practice,  
421 however, is under huge time and resource pressures[53]. Any proposed alternatives will have to  
422 fulfil the primary requirements of being a streamlined process for supporting coordination of care,  
423 especially for those with complex health needs. The recent national review of QOF concluded that  
424 QOF should be reformed to become more person-centred, create space for professionalism and  
425 optimally impact wider population health and system resource utilisation[54].

426

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428

## 429 FIGURE LEGENDS

430 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.

431 **Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP  
432 administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

433 **Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left  
434 to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary  
435 Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was  
436 live from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of  
437 admissions, normalised as admissions per month per practice. Black circles indicate the average number of  
438 emergency admissions in each month for SPQS practices; white circles are average admissions for QOF  
439 Somerset practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and  
440 dashed (for QOF Somerset practices). All changes between pre- and post-intervention between SPQS and QOF  
441 practices are non-significant (see supplementary data).

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## 449 DATA SHARING STATEMENT

450 Data available via email from [james.close@plymouth.ac.uk](mailto:james.close@plymouth.ac.uk),



## 451 ETHICS AND FUNDING

452 Ethical clearance was obtained from the Plymouth University Ethics Committees (FREC). All  
453 participants were given an information pack about the study, and gave informed consent.  
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## 458 CONTRIBUTIONS

459 **J Close** corresponded with partaking practices, collected data, analysed data and compiled  
460 manuscript.

461 **B Fosh** input, validated and analysed data.

462 **H Wheat** corresponded with partaking practices and collected data.

463 **J Horrell** corresponded with partaking practices and collected data.

464 **W Lee** supported the Interrupted Time Series analysis.

465 **R Byng** aided study design and conception.

466 **Bainbridge M** corresponded with partaking practices and data collection.

467 **L Witts** helped with study design, data collection and corresponded with partaking practices.

468 **R Blackwell** collected and analysed data for Hospital Episode Statistics.

469 **L Hall** corresponded with partaking practices and collected data.

470 **Lloyd H** designed and oversaw the study from inception to completion.

471 All authors read, contributed to and approved the manuscript.

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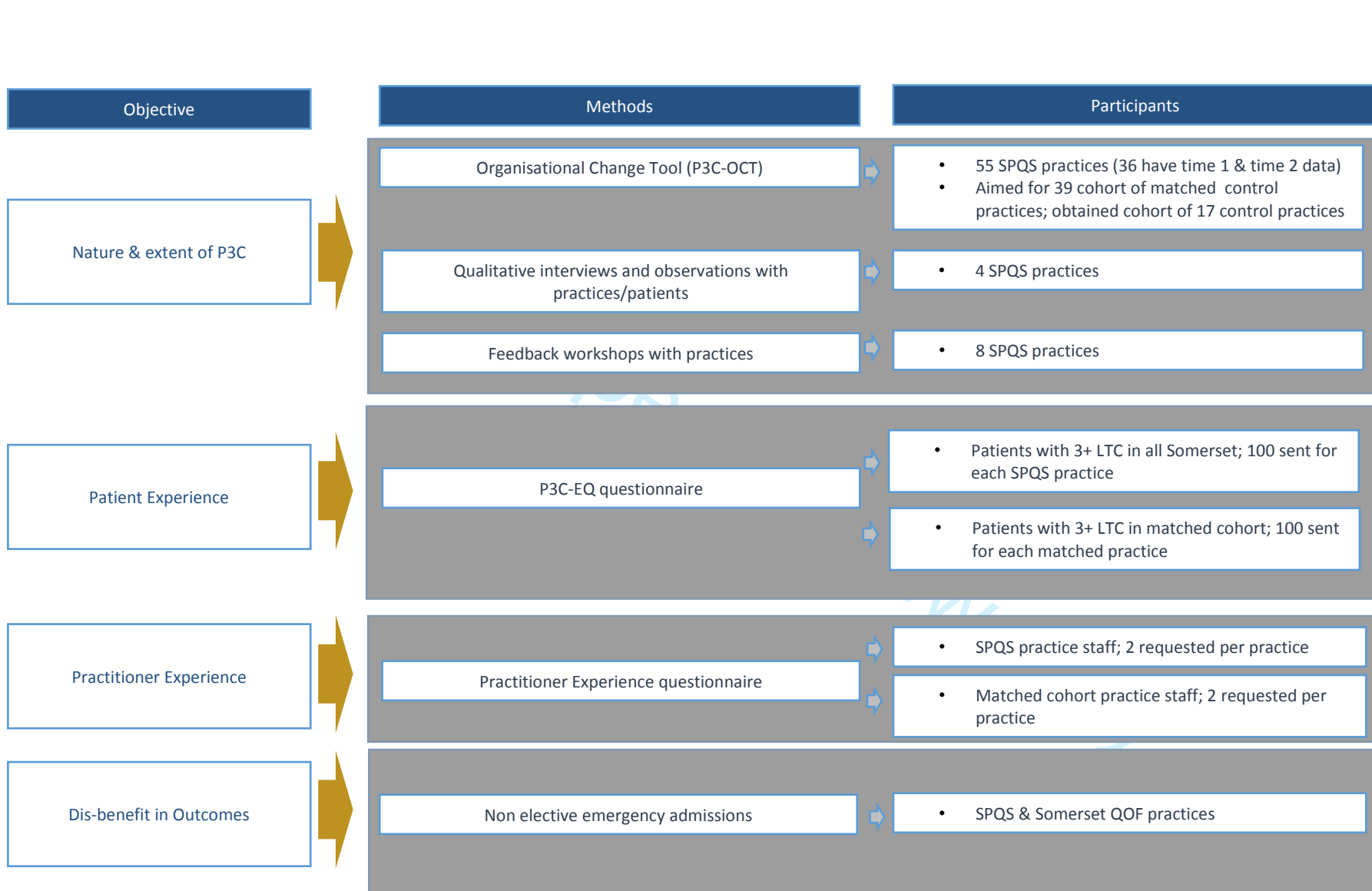
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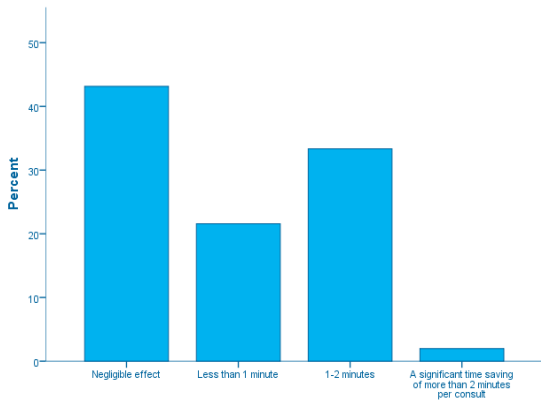
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17 606 [framework-in-england/](https://www.england.nhs.uk/publication/report-of-the-review-of-the-quality-and-outcomes-framework-in-england/)  
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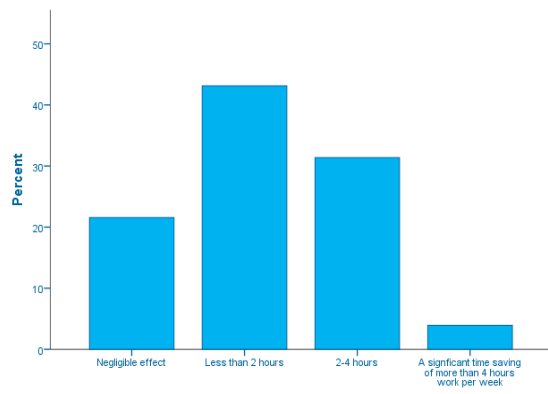


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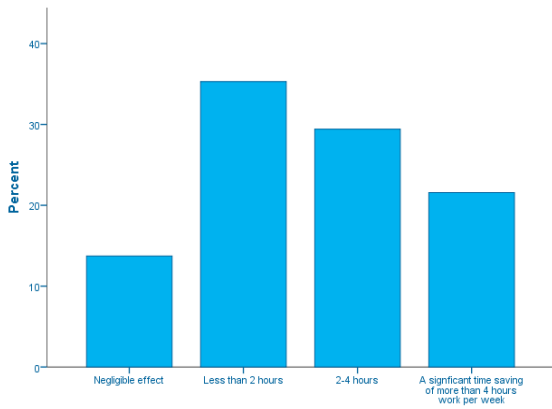
On average, how much time has the removal of QOF freed up per 10 min GP consultation?



On average, how much has been freed up each week from the administrative burden of QOF for GPs (i.e. outside consultation time)?

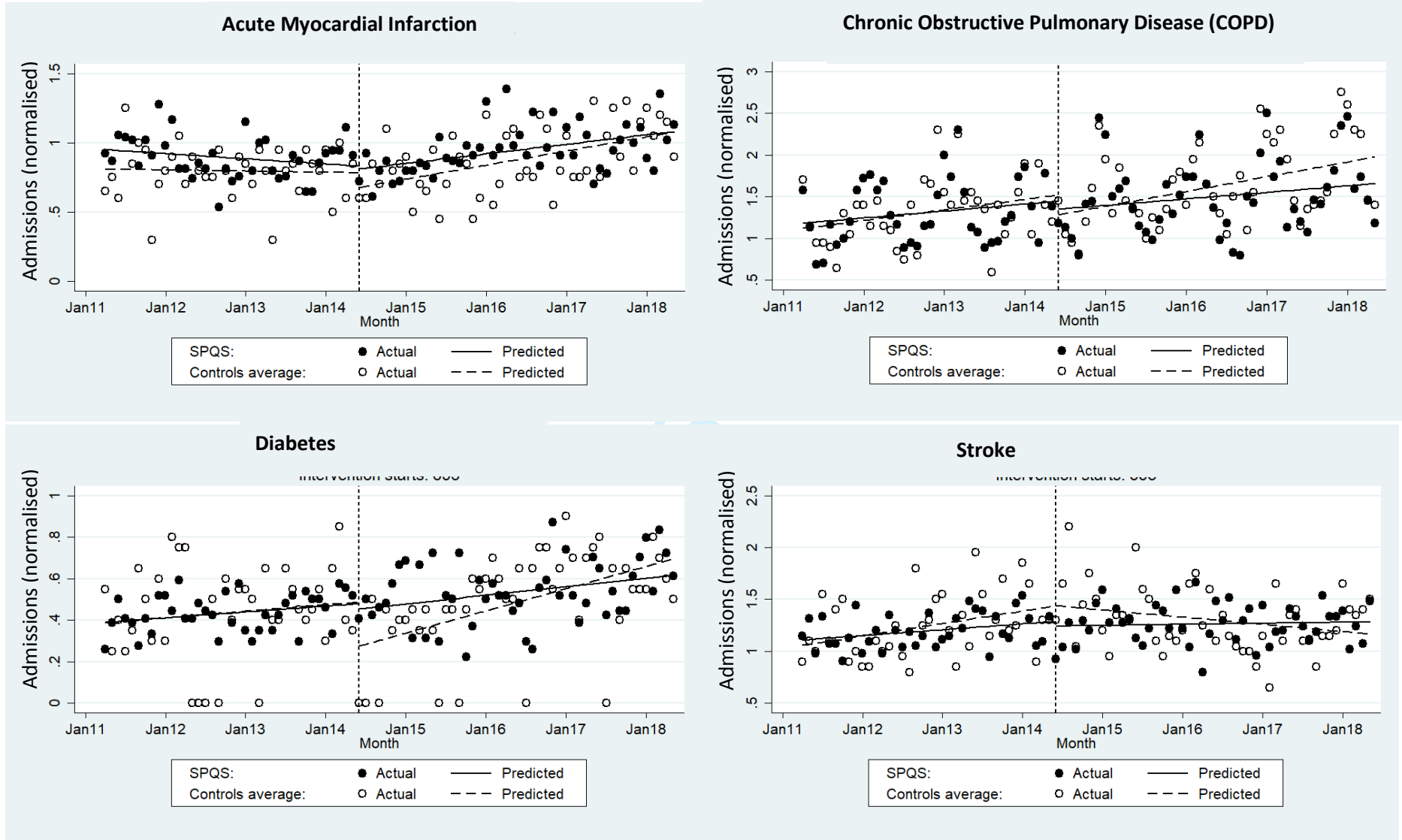


On average, how much time has been freed up in each week from the administrative burden of QOF (for administrators/non-GPs)?



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**Supplementary Table 1: Overview of Sustainability and Transformation Plan (STPs) for 28 of 55 practices enrolled in SPQS; with 2 further STPs (Taunton federation and West Somerset) completed at federation level.**

Development area	East Mendip			West Mendip					Central Mendip			North Sedgemore		Bridgewater Bay
	Beckington	Frome	Mendip County	Glastonbury Health	Glastonbury Surgery	Vine	Wells City	Wells Health	Grove House	Oakhill	Park Medical	Axbridge & Wedmore	Brent & Burnham	North Petherton
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Continued/increased involvement in Mendip Your Health & Wellbeing	✓					✓		✓	✓		✓			
Use/development of technology to assist self-management		✓		✓										
Increased use of Health Connectors Mendip		✓				✓			✓	✓				
Investing time in community engagement		✓												
MDTs in care coordination hubs		✓												
MDTs with district nurses at palliative care reviews (weekly)		✓												
Engagement in compassionate communities and network mapping		✓												
Increased or continued participation with Symphony				✓		✓	✓	✓	✓		✓			
Possible division of urgent and routine care & formation of urgent care hub				✓		✓		✓				✓	✓	
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)		✓	✓	✓				✓	✓		✓		✓	
Consideration of practice merger				✓		✓	✓	✓	✓					
Training & upskilling									✓					
Engagement in Somerset together programme											✓			
Development of personalised care planning											✓			
Telephone consultations/ telemedicine														
Use of health coaches														

Engagement in Living Better programme																
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Development area	South Somerset															Taunton Federation	West Somerset
	Bruton	Ilchester	Buttercross	Yeovil	Crewkerne	Hamdon	Oaklands	Ryalls Park	Hendford Lodge & Abbey	Wincanton	Westlake	Martock & S. Petherton	Penn Hill	Preston Grove			
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	✓	✓	✓									✓	✓	✓	✓	✓	
Continued/ increased involvement in Mendip Your Health & Wellbeing																	
Use/development of technology to assist self-management															✓		
Increased use of Health Connectors Mendip																	
Investing time in community engagement											✓						
MDTs in care coordination hubs																	
MDTs with district nurses at palliative care reviews (weekly)																	
Engagement in compassionate communities and network mapping																	
Increased or continued participation with Symphony					✓	✓	✓				✓		✓	✓			
Possible division of urgent and routine care & formation of urgent care hub																✓	
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)	✓	✓	✓	✓		✓		□	✓	✓			✓			✓	
Consideration of practice merger											✓					✓	
Training & upskilling	✓	✓	✓	✓													
Engagement in Somerset together programme																	
Development of personalised care planning																	
Telephone consultations/ telemedicine	✓	✓															
Use of health coaches	✓	✓				✓		✓	✓	✓		✓	✓	✓			



**Supplementary Figure 1: Timeline of SPQS scheme and evaluation.**

**Development Phase:**

April 2012 – March 2013



**Transition year from QOF to SPQS:**

April 2013 – March 2014



**Year 1 - Planning:**

April 2014 – March 2015



**Year 2 – Transformation:**

April 2015 – March 2016



**Year 3 - Baseline year:**

April 2016 – March 2017



SPQS contract goes live in June 2014

Phase 1 Evaluation  
Nov 2014 – July 2015

Phase 2 Evaluation  
Nov 2015– March 2017

## Full results of P3C-Practitioner questionnaire

### Selection of P3C-Practitioner

The P3C-practitioner was selected for this study by initially conducting a scoping review to identify measures that included aspects of professional experiences of integrated/coordinated care. This identified 33 measures, four of which were deemed relevant (Safety Net Medical Home Provider Experience Survey; Person-Centred Health Care for Older Adults Survey” (PCHCOA) – which we refer to as the “P3C-practitioner”; Staff Questionnaire - Integrated Care Evaluation Pilots; North West London Integrated Care Pilot - Practitioner Survey). These measures were then presented to workshop attendees (healthcare professionals; managers; senior NHS England representatives; local commissioners; academics) to explore the strengths and weaknesses in terms of applicability and utility as part of routine data collection in respective settings. The PCHCOA was selected due to its established psychometric properties (Briony Dow et al., *Development and initial testing of the Person-Centred Health Care for Older Adults Survey*, 25 *International Psychogeriatrics* 1065–1076 (2013)), its good coverage of domains of P3C and a positive response at the feedback workshop. For the purposes of this evaluation, we have renamed the instrument the P3C-practitioner.

### Scoring of P3C-Practitioner

Whilst previously validated, the authors did not develop an aggregate scoring mechanism for the instrument. Therefore, we generated summary scores by simple addition from the 4-point Likert scale (Never = 0; Rarely = 1; Sometimes = 2; Usually = 3; Always = 4). This allowed us to compare aggregate scores to compare SPQS versus controls over all 29 questions (see table below), with significance tested using MWW test. We also generated sub-scales by addition of question relevant to this aspect of P3C (see following page for questions). No significant differences were detected in practitioner experiences in SPQS or control practices, for either mean scores or the following subscales.

**Sub-Scale: Person Centred Care** = Questions 1.1, 1.3, 1.4, 2.1, 2.2, 5.1, 6.1,6.2,6.3, 7.1, 7.2, 7.3, 8.1 8.2 and 8.3.

**Sub-Scale: Coordinated Care** = Questions 4.1, 4.2, 4.3

**Sub-Scale: Working Environment** = Questions 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

	QOF	SPQS	Sig. (2-tailed)
<b>Mean Score</b>	<b>83.79 (n=29)</b>	<b>86.18 (n=98)</b>	<b>.4</b>
Sub-Scale: Person Centred Care	47.62	49.11	.35
Sub-Scale: Coordinated Care	7.41	8.38	.12
Sub-Scale: Working Environment	22.03	21.11	.24

### P3C-Practitioner instrument

Q1.1 In my work area, service users / patients have an equal say with the rest of the team in the development of the support plan.

Q1.2. In my work area, service users / patients and carers have an equal say with the rest of the team in the development of the discharge plan or exit strategy from the service.

Q1.3. My/our support plans are structured around the service user's/patient's goals.

Q1.4. Where I currently work, we provide services in the location that best suits the needs and preferences of the service user/patient and their carers.

Q2.1. I ask service users/patients what their goals/needs are for their health and wellbeing.

Q2.2 I ask the carer/s what their goals/ needs are for the health and wellbeing of the person they support.

Q3.1. I am supported to develop the skills I need to work with the service user/patient and their carers.

Q3.2. Where I am currently working, I have been exposed to good role models in care/support for service users/patients.

Q3.3. Expectations of my role and how I treat the service users/patients I support are communicated clearly and consistently.

Q3.4. I feel that I work as part of a team with a recognised and valued contribution.

Q3.5. The emotional and physical demands of my work are acknowledged and recognised.

Q3.6. I feel that I am able to fully use my skills in my work with the service users/patients

Q3.7. My work environment values the care/support I provide to the service users/patients.

Q4.1. It is clear to the service user/patient or their carer who their key worker is.

Q4.2. The service user/patient and their carer have ready access to a key identified person (i.e. they are available by phone, messages are returned promptly).

Q4.3. Where I currently work, we know how to direct the service user/patient to the most appropriate service without them having to make another call (single point of contact).

Q4.4. After the service user/patient is discharged/leaves the service, they receive a follow-up phone call or visit.

Q5.1. Where I currently work, adequate transport and parking are provided to ensure access for service users/patients and their families/carers.

Q5.2. Where I currently work, service users'/patients' personal privacy is respected.

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3 Q6.1. I am able to meet the communication needs of service users/patients and their carers when  
4 working with them.  
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6 Q6.2. Written materials are provided by my place of work to service users/patients and their carers  
7 in a language they can understand.  
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10 Q6.3. Information is provided in a variety of ways to ensure all service users/patients and their  
11 carers have access (e.g. written, verbal, visual).  
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13 Q7.1. I welcome it when service users/patients are informed and question or challenge my advice.  
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15 Q7.2. The needs and preferences of service users/patients should be central in all services.  
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17 Q7.3. I like working with the service users/patients I support or care for.  
18

19 Q8.1. It is an important part of my job to get to know my service user/patient (e.g. call them by their  
20 preferred name, remember and repeat something they have told me).  
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23 Q8.2. I give service users and their carers adequate time to talk to me (e.g. to discuss their concerns  
24 and their expectations).  
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26 Q8.3. I seek to find out what is important to service users/patients about their health and wellbeing  
27 (e.g. mobility, cognitive function, being part of the family, able to go to the gym).  
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**Supplementary File 4:** Results of interrupted time-series analysis for emergency admissions on four long-term, ambulatory care sensitive conditions (ACSCs). Full results are provided, although the most relevant statistical tests (column “P>|t|”) are for the rows:

“\_z\_x653” the difference between the changes in intercept for SPQS and QOF pre/post intervention)

“\_z\_x\_t653” the difference between the changes in gradient for SPQS and QOF pre/post intervention.

All are non-significant, revealing no excess increases in emergency admissions in SPQS practices for these four ACSCs after the implementation of the SPQS scheme. Significant differences were observed, however, for changes in the *control* slope and/or intercept pre/post intervention for Acute Myocardial Infarction, Stroke and Diabetes. These are highlighted in red below.

**Acute Myocardial Infarction (AMI)**

Description	PRIM_AMI	Coef.	Newey-West		t	P> t	[95% Conf. Interval]	
			Std. Err.					
Pre-intervention control gradient	_t	-.0007003	.0025541	-0.27	0.784	-.0057435	.0043429	
Difference between control/SPQS pre-intervention intercepts	_z	.1396686	.0801094	1.74	0.083	-.0185102	.2978475	
Difference between control/SPQS pre-intervention slopes	_z_t	-.0024182	.0034503	-0.70	0.484	-.009231	.0043946	
Change in control intercept	_x653	-.1043759	.0677199	-1.54	0.125	-.2380911	.0293393	
<b>Change in control slope</b>	<b>_x_t653</b>	<b>.0091594</b>	<b>.0030779</b>	<b>2.98</b>	<b>0.003</b>	<b>.0030819</b>	<b>.0152369</b>	
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.0853708	.0946241	0.90	0.368	-.1014677	.2722093	
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0003106	.0040914	-0.08	0.940	-.0083892	.0077679	
Intercept of control pre-intervention	_cons	.8103239	.0652408	12.42	0.000	.6815037	.9391441	



## Chronic Obstructive Pulmonary Disease (COPD)

Description	PRIM_COPD	Coef.	Newey-West		P> t	[95% Conf. Interval]	
			Std. Err.	t			
Pre-intervention control gradient	_t	.0105427	.0048903	2.16	0.033	.0008867	.0201988
Difference between control/SPQS pre-intervention intercepts	_z	.0619958	.1748488	0.35	0.723	-.2832492	.4072408
Difference between control/SPQS pre-intervention slopes	_z_t	-.0035803	.0077243	-0.46	0.644	-.0188323	.0116717
Change in control intercept	_x653	-.2382072	.1889151	-1.26	0.209	-.6112265	.1348121
Change in control slope	_x_t653	.0041691	.0078257	0.53	0.595	-.011283	.0196211
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.1413474	.2797523	0.51	0.614	-.4110331	.693728
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0046434	.011329	-0.41	0.682	-.0270129	.0177261
Intercept of control pre-intervention	_cons	1.122065	.1089517	10.30	0.000	.9069359	1.337194

## Stroke

Description	PRIM_STRK	Coef.	Newey-West		P> t	[95% Conf. Interval]	
			Std. Err.	t			
Pre-intervention control gradient	_t	.0100503	.0041188	2.44	0.016	.0019176	.0181831
Difference between control/SPQS pre-intervention intercepts	_z	.0528715	.0954745	0.55	0.580	-.1356461	.2413891
Difference between control/SPQS pre-intervention slopes	_z_t	-.0053472	.0047727	-1.12	0.264	-.014771	.0040765
Change in control intercept	_x653	-.0003719	.1374057	-0.00	0.998	-.2716843	.2709404
<b>Change in control slope</b>	<b>_x_t653</b>	<b>-.0158336</b>	<b>.005394</b>	<b>-2.94</b>	<b>0.004</b>	<b>-.0264841</b>	<b>-.005183</b>
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	-.0449425	.1616696	-0.28	0.781	-.3641647	.2742798
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0119868	.0062141	1.93	0.055	-.0002831	.0242568
Intercept of control pre-intervention	_cons	1.05749	.0852406	12.41	0.000	.8891793	1.2258

Diabetes

Description	PRIM_DIAB	Newey-West					[95% Conf. Interval]	
		Coef.	Std. Err.	t	P> t			
Pre-intervention control gradient	_t	.0025823	.0026916	0.96	0.339	-.0027323	.0078969	
Difference between control/SPQS pre-intervention intercepts	_z	.0005698	.0759019	0.01	0.994	-.1493012	.1504408	
Difference between control/SPQS pre-intervention slopes	_z_t	-.0001994	.0029745	-0.07	0.947	-.0060726	.0056738	
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.2114749</b>	<b>.0751425</b>	<b>-2.81</b>	<b>0.005</b>	<b>-.3598463</b>	<b>-.0631036</b>	
Change in control slope	_x_t653	.0063408	.0033715	1.88	0.062	-.0003164	.012998	
<b>difference between the changes in intercept for SPQS and QOF pre/post intervention</b>	<b>_z_x653</b>	<b>.1864524</b>	<b>.0866148</b>	<b>2.15</b>	<b>0.033</b>	<b>.0154285</b>	<b>.3574763</b>	
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0052892	.0038335	-1.38	0.170	-.0128586	.0022802	
Intercept of control pre-intervention	_cons	.3890688	.0704267	5.52	0.000	.2500088	.5281288	

Combined (AMI/COPD/Stroke/Diabetes)

Description	SECD_AMI	Newey-West					[95% Conf. Interval]	
		Coef.	Std. Err.	t	P> t			
Pre-intervention control gradient	_t	.0224751	.0064245	3.50	0.001	.0097898	.0351604	
Difference between control/SPQS pre-intervention intercepts	_z	.2551058	.227217	1.12	0.263	-.193542	.7037535	
Difference between control/SPQS pre-intervention slopes	_z_t	-.0115452	.009923	-1.16	0.246	-.0311385	.0080482	
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.5544301</b>	<b>.2489365</b>	<b>-2.23</b>	<b>0.027</b>	<b>-1.045964</b>	<b>-.0628964</b>	
Change in control slope	_x_t653	.0038357	.0103935	0.37	0.713	-.0166866	.024358	
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.3682284	.3741294	0.98	0.326	-.3705031	1.10696	
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0017436	.0148231	0.12	0.907	-.0275252	.0310124	
Intercept of control pre-intervention	_cons	3.378947	.1531439	22.06	0.000	3.07656	3.681335	

## STROBE Statement—checklist of items that should be included in reports of observational studies

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**Recommendation**

<b>Title and abstract</b>	p2	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
<b>Introduction</b>		
Background/rationale	P3-5	Explain the scientific background and rationale for the investigation being reported
Objectives	L126-132	State specific objectives, including any prespecified hypotheses
<b>Methods</b>		
Study design	L135-145	Present key elements of study design early in the paper
Setting	Setting g L135-145; dates L210-217	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	L148-168	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	L169-198	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	L169-198	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	L158-161	Describe any efforts to address potential sources of bias
Study size	L149-151	Explain how the study size was arrived at

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2	Quantitative variables	L209-	Explain how quantitative variables were handled in the analyses. If applicable,
3		235	describe which groupings were chosen and why
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5	Statistical methods	L209-	(a) Describe all statistical methods, including those used to control for confounding
6		235	(b) Describe any methods used to examine subgroups and interactions
7			(c) Explain how missing data were addressed
8			(d) <i>Cohort study</i> —If applicable, explain how loss to follow-up was addressed
9			<i>Case-control study</i> —If applicable, explain how matching of cases and controls was
10			addressed
11			<i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of
12			sampling strategy
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14			(e) Describe any sensitivity analyses

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60**Results**

Participants	L2 39- 247	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed <hr/> (b) Give reasons for non-participation at each stage <hr/> (c) Consider use of a flow diagram
Descriptive data	Ta 1	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders <hr/> (b) Indicate number of participants with missing data for each variable of interest <hr/> (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)
Outcome data	L2 39- 282	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <hr/> <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <hr/> <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures
Main results	L2 39- 357	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included <hr/> (b) Report category boundaries when continuous variables were categorized <hr/> (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	N/ A	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

**Discussion**

Key results	L3 60- 397	Summarise key results with reference to study objectives
Limitations	L4 05- 413	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	N/ A	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	N/ A	Discuss the generalisability (external validity) of the study results

**Other information**

Funding	L4 51- 6	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
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\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## A Longitudinal Evaluation of a Countywide Alternative to the Quality Outcomes Framework in UK General Practice, Aimed at Improving Person Centred Coordinated Care.

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## 71 **Evaluation of a Countywide Alternative to the Quality Outcomes Framework,** 72 **Aimed at Improving Person Centred Coordinated Care.**

### 73 **Abstract**

#### 74 **Objectives.**

75 To evaluate a county-wide deincentivisation of the Quality Outcomes Framework (QOF) payment  
76 scheme for UK General Practice (GP).

#### 77 **Setting**

78 In 2014, NHS England signalled a move towards devolution of QOF to Clinical Commissioning Groups.  
79 Fifty-five GP practices in Somerset established the Somerset Quality Practice Scheme (SPQS) – a de-  
80 incentivisation of QOF – with the goal of redirecting resources towards Person Centred Coordinated  
81 Care (P3C), especially for those with Long Term Conditions (LTCs). We evaluated the impact on care  
82 from April 2016 to March 2017.

#### 83 **Participants & Design**

84 The evaluation used matched data from 55 SPQS practices and 17 regional control practices for three  
85 survey instruments. We collected patient experiences ('P3C-EQ'; 2363 returns from patients with 1+  
86 LTC; 36% response rate), staff experiences ('P3C-practitioner'; 127 professionals), and organisational  
87 data ('P3C-OCT'; 36 of 55 practices at two time points, 65% response rate; 17 control practices).  
88 Hospital Episode Statistics emergency admission data were analysed for 2014-2017 for ambulatory-  
89 sensitive conditions across Somerset using interrupted time series.

#### 90 **Results**

91 Patient and practitioner experiences were similar in SPQS versus control practices. However,  
92 discretion from QOF incentives resulted in time savings in the majority of practices and practice data  
93 showed a significant increase in P3C oriented organisational processes, with a moderate effect size  
94 (Wilcoxon signed rank test;  $p=0.01$ ;  $r=0.42$ ). Care delivery was altered via stronger federation-level  
95 agreements and informal networks, increased multidisciplinary working, reallocation of resources for  
96 other health care professionals and changes to the structure and timings of GP appointments. No  
97 disbenefits were detected in admissions data.

#### 98 **Conclusions**

99 The SPQS scheme leveraged time savings and reduced administrative burden via discretionary  
100 removal of QOF incentives, enabling practices to engage actively in a number of schemes aimed at  
101 improving care for people with LTCs. We found no differences in the experiences of patients or  
102 healthcare professionals between SPQS and control practices.

## 103 Article Summary

### 104 Strengths and limitations of this study

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- 106 ■ This study evaluated changes to service delivery, conducted using two survey tools – offering  
107 a perspective on the experiences of both patients and healthcare professionals.
- 108 ■ These were supplemented with a longitudinal analysis of organisational change (to measure  
109 alterations to service deliver) and a time-series of emergency admissions for ambulatory-  
110 sensitive conditions (to detect disbenefits arising from the scheme).
- 111 ■ Due to time and resource pressures on general practice in the UK, we struggled to recruit  
112 controls from the within the same county (Somerset) or matched controls from the region.  
113 As an alternative, we obtained non-matched controls from the region.
- 114 ■ No detectable improvements were established in experiences of healthcare professionals or  
115 patients – this could be because the intervention had no effect on these outcomes, the  
116 instruments were not sensitive enough, or changes to patient/practitioner experiences were  
117 somewhat distal to the intervention.

## 118 Main Text

### 119 BACKGROUND

120 The Quality Outcomes Framework (QOF) for UK General Practice (GP) is one of the largest health-  
121 related pay-for-performance (P4P) schemes in the world[1]. Following implementation in 2004, the  
122 scheme initially had a positive impact on quality of care, primarily achieved via establishment of  
123 consistent procedural baselines in the clinical management of incentivised (mostly chronic)  
124 diseases[1–5]. It reduced between-practice inequalities in care delivery[1–3] whilst also leading to  
125 improved disease registers, widespread recording of clinical activities and adoption of electronic  
126 medical record systems[1], leading to growth in GP data and related research[6,7].

127 Since the introduction of QOF, demographic shifts of an ageing population have continued to drive a  
128 shifting clinical landscape[8], with the number of people with three or more long-term conditions  
129 (mLTCs) thought to have risen by one million over the last decade[9]. The subsequent rising demand  
130 for the management of long term conditions (LTCs) and mLTCs – requiring tailored and coordinated  
131 support[10,11] – has led to QOF (with its emphasis on processes for single disease guidelines) being  
132 viewed as increasingly anachronistic[6,12–16]. After introduction of QOF, there was a significant  
133 reduction in the continuity of care[2,17] and the person-centeredness of GP  
134 consultations[13,14,18,19], with a subsequent decline in patients' satisfaction[20]. It has been argued  
135 that QOF does not incentivise appropriate clinical care for people with multimorbidity[6,12–16], who  
136 require individualised support, greater continuity of care and a holistic, biopsychosocial approach that  
137 is responsive and empowering[10,11]. An oft-quoted criticism is that QOF reduces consultations to  
138 'box-ticking' exercise[21].

139 In response to such criticisms, both the NHS Chief Executive and the General Practitioners Committee  
140 (GPC) Chairman previously backed the removal of QOF[21] and In 2014, NHS England signalled a move  
141 towards devolution of QOF to Clinical Commissioning Groups (CCGs), allowing organisations the  
142 freedom to develop alternatives. Potential advantages included the targeting of local health needs

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3 143 and greater clinical engagement for quality improvement[22]. The Somerset Practice Quality Scheme  
4 144 (SPQS) was established in the same years as a de-incentivisation of QOF. It arose because GPs, the  
5 145 CCG and the Local Medical Committee (LMC) felt that QOF was not incentivising the highest value  
6 146 clinical behaviour. The goals were to allow clinicians the freedom to innovate, enable consultations to  
7 147 be more person-centred and increase involvement with a number of concurrent schemes aimed at  
8 148 improving Person Centred Coordinated Care (P3C)[23]. The details of the scheme were included in the  
9 149 SPQS contract[24] and local Sustainability and Transformation Plan (STPs – Plans for reforming  
10 150 healthcare mandated by the Five Year Forward View[25]) of the GPs[26]. (See Supplementary File 1  
11 151 for a summary of Somerset STPs; box 1 for brief details of the various schemes and references for  
12 152 details). The contract removed incentives from QOF, although CQRS (Calculating Quality Reporting  
13 153 System) remains active in order to collect prevalence data for payment calculations. The SPQS contract  
14 154 stated that the reduced QOF overhead would be exploited to better meet the needs of patients with  
15 155 long term conditions by developing new models of care. Implementation was specified in the locality  
16 156 STPs, which included a patchwork of initiatives, most notably the ‘Test and Learn pilots’, which  
17 157 encompassed three distinct schemes (box 1), all of which had a shared vision of targeting complex  
18 158 patients with care plans, multidisciplinary team input (MDT) and single point of contact [27,28] . Other  
19 159 schemes included a Village Agents service[29] and Health Connections Mendip (HCM)[30] – see box  
20 160 1. Fifty five Somerset practices opted for SPQS, with 18 Somerset practices (initially 20) retaining the  
21 161 existing QOF contract. (The SPQS practices increased to 57 in 2015/16; but two mergers reduced it  
22 162 back to 55).

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**Test & Learn:** Comprises three similar initiatives (South Somerset Symphony Vanguard, Taunton, and Mendip – see below), which share a common goal of targeting complex, multimorbid patients with a suite of approaches including single personalised care plans, multi-disciplinary team input and single point of access to provide person centred coordinated care.

**Test & Learn – South Somerset Symphony Vanguard:** A symphony “hub” system located at Yeovil District Hospital, where complex patients receive extra support from Health Coaches/Key Workers at the Symphony hub service, although they remain under management of GP practice [27,28].

**Test & Learn – Taunton:** Operates under a “virtual hub” model, with complex/frail patients managed by a multidisciplinary team moving between practices, with shared care plans and Wellbeing Advisors.

**Test & Learn – Frome Mendip, including “Health Connections Mendip”.** With loose eligibility criteria and a number of referral routes, Community Practice Nurse and Health Connectors (based at Frome) liaise regularly in MDT meetings. There is a hub telephone line for single point of access. The model advocates utilising existing assets in the community. The Health Connections team lead social prescribing work with a service directory to signpost patients to appropriate resources [30].

**Enhanced Primary Care (EPC):** EPC is a sub-component of the Symphony vanguard scheme that incorporates health coaches (HCs) into primary care, focusing on less complex patients, allowing GPs to focus primarily on medical problems.

**Village Agents Service:** Supports isolated, excluded and vulnerable (including elderly and multimorbid) people by offering a signposting and referral service. The service links with general practices [29].

**Living Better:** A working partnership between the GP practices in the pilot, AGE UK Somerset, Social Care, Somerset Partnership, West Somerset District Council, and Somerset Clinical Commissioning Group. The project supports people with one or more long-term conditions to better self-manage, helping them build connections to the community and reducing dependency on health and social care.

**Box 1. Initiative for implementation of SPQS, as discussed in Supplementary File 1.**

166 The initial phase of the scheme was previously evaluated with a retrospective approach[31]. This  
 167 revealed early stages of organisational change,, including stronger federation-level agreements and  
 168 informal networks, increased multidisciplinary team working, reallocation of resources towards health  
 169 care assistants, nurses and others, and changes to structure and timings of appointments with GPs.  
 170 From April 2016 to March 2017 we conducted a longitudinal evaluation of the second full year of the  
 171 SPQS programme (see Supplementary File 2 for a timeline of the SPQS scheme and associated  
 172 evaluations). This was commissioned with the aims of establishing the nature and extent of P3C that

173 has been implemented since discretion from QOF, explore staff and patient experiences of care  
174 delivery and examine non-elective hospital admissions before and after inception of the scheme.

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## 176 METHODS

177 We conducted a mixed-methods evaluation of SPQS which included a suite of quantitative and  
178 qualitative tools. Analysis of quantitative data is described in this paper. In-depth qualitative findings  
179 will be published in a subsequent paper (including semi-structured interviews with practitioners;  
180 observations of consultations and facilitation workshops with practices). A schematic overview of the  
181 full SPQS evaluation framework is provided in figure 1. The quantitative evaluation included  
182 completion of survey tools targeting patient experiences (P3C-EQ), staff experiences (P3C-  
183 practitioner) and organisational perspectives (P3C-OCT tool), alongside time series of Hospital Episode  
184 Statistics (HES) for ambulatory-sensitive conditions across Somerset. We chose not to use national  
185 measures of General Practice (i.e. GP Patient Survey (GPPS) and Friends and Family Test (FFT)): they  
186 have a broad sample and do not target the patient group (i.e. patients with LTCs) that are the focus of  
187 SPQS. Furthermore, they do not target the construct of interest (i.e. P3C).

188 <figure 1 here>

189 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.

## 190 Samples

191 The 55 participating Somerset practices (mean list size = 7,695; median = 6515.5; smallest = 1834;  
192 largest = 29,078) completed our evaluation tools (see below). Whilst these 55 practices were  
193 incentivised to take part in our evaluation (i.e. by being part of SPQS), the non-SPQS Somerset  
194 practices had no incentive to act as controls and did not participate in this study. Therefore, for control  
195 practices, we initially identified a cohort of non-Somerset control practices matched for staffing data,  
196 list size, population density, indices of multiple deprivation, QOF scores and disease prevalence.  
197 However, the incentives available for this evaluation (£200 per practice) were only sufficient to recruit  
198 six practices by this method. We therefore supplemented this group with 11 unmatched practices  
199 from across the Southwest, making a total of 17 control practices (mean list size = 6,714; median =  
200 4878; smallest = 2678; largest = 4878). The control group therefore represents a self-selected sample  
201 of practices that are likely to represent engaged, active practices (i.e. with the resources to engage  
202 with research). In contrast, completion of our evaluation was mandatory for all SPQS practices.

## 203 Patient and Public Involvement

204 Patients were involved via the peninsula CLAHRC patient involvement group (PenPig), who set  
205 priorities for research objectives. Patients, public and healthcare professionals were also involved in  
206 co-design workshops to develop the measurement framework and individual questionnaires (see  
207 papers for details [23,32–37]). Patients also reviewed drafts of ethics approval applications and all  
208 patient-facing communication. The work was co-presented with patients at the South West Society  
209 for Academic Primary Care Regional Meeting 2018.

## 210 Survey Tools

211 **The P3C-Patient Experience Questionnaire (P3C-EQ)** is a brief, 11-item patient-completed measure  
212 of patient experiences of person centred coordinated care delivery, which we have previously

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3 213 validated[32,38,39]. The tool can be used to generate an aggregate score of patient experience[32],  
4 214 with a range of score from 0-30, where a higher score indicates better experiences of care [39]. It can  
5 215 also be sub-scored to previously described sub-domains of P3C[23,32,34–37].  
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8 216 **The P3C-Practitioner Experience Survey** is a 29-item instrument that measures individual and  
9 217 managerial experience of delivering person centred and coordinated care Via a workshop with  
10 218 healthcare professionals, we selected the previously validated P3C-Practitioner questionnaire (also  
11 219 known as the Person-Centred Health Care for Older Adults Survey[40]) as the most suitable instrument  
12 220 to examine practitioners' perspectives of P3C (see Supplementary File 3). A minimum of two  
13 221 practitioners from each practice were requested to respond. The instrument generates an aggregate  
14 222 score with a range of 29-145, where a higher score indicates better experiences of care.  
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17 223 **The P3C-Organisational Change Tool (P3C-OCT)** is an evidenced-based measure of progress towards  
18 224 delivering person centred coordinated care from an organisational perspective[33]. It was developed  
19 225 to support and measure P3C in line with Year of Care[34] and RCGP principles of Collaborative Care  
20 226 and Support Planning[41], thus providing a way to monitor changes in line with policy directives which  
21 227 improve P3C. The tool was designed to measure all core P3C routines which have been identified  
22 228 through research[42,43], patients' accounts, policy documents[34] and our own work[23,33]. The  
23 229 design of the P3C-OCT is based on a shared consensus of the components of person-centred  
24 230 coordinated care (e.g. [35,36,44]), which broadly correspond to six domains: Information and  
25 231 Communication; Care Planning; Goals and Outcomes; Transitions; Organisational Process Activities;  
26 232 and Decision Making. These domains have been mapped to real-world actions that support the  
27 233 delivery of P3C (e.g. multi-disciplinary team meetings, care planning, provisions for information etc.)  
28 234 This allows the tool to translate concepts which are often abstract, and may be drawn from academic  
29 235 literature and policy documents, into actionable, tangible processes which a practice can implement.  
30 236 The result is a unique 29-question instrument with over 500 different possible responses, which  
31 237 provides a detailed and practical interrogation of P3C delivery. An equally-weighted scoring system  
32 238 allows results of the P3C-OCT to be aggregated into a single composite score, or alternatively by sub-  
33 239 domains of P3C – generating a score of 0-20, with higher scores indicating more P3C related activity.  
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40 240 The P3C-OCT provides a detailed profile of care delivery and organisation through 29 core questions.  
41 241 All questions ask about objective activities (e.g. processes in place to deliver P3C) and subjective  
42 242 responses (e.g. how well these are working). Scores are given out of a theoretical maximum of 20  
43 243 points. The P3C-OCT was also prepended by a series of SPQS-related questions about administrative  
44 244 and consultation time savings from discretion from QOF. Each SPQS practice was requested to  
45 245 complete the P3C-OCT at two time points (from Feb-Aug 2016 and Dec 2016-Mar 2017). In contrast,  
46 246 control practices only completed the P3C-OCT once (at Time 2).  
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## 50 247 **Data Collection**

51 248 All participating practices supported data collection of the three survey tools. With the P3C-EQ, from  
52 249 each practice, 100 patients with one or more LTCs, randomly sampled from the practice list (using a  
53 250 customised EMIS script), were invited to complete a postal questionnaire at a single time point.  
54 251 Patients received an information pack, consent sheet, demographic questionnaire and P3C-EQ. All  
55 252 returned questionnaires were entered into a Microsoft Access database prior to statistical analyses.  
56 253 For the P3C-Practitioner, we obtained an opportunity sample via both written and email  
57 254 communication with all participating practices. For the P3C-OCT, all participating practices were  
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3 255 offered an electronic or paper version, and we requested that the tool was completed by a  
4 256 combination of General Practitioner and Practice Manager (PM), thus ensuring representation of  
5 257 front-facing and backend operations of GP surgeries. Completion of the tool was mandatory as part  
6 258 of the SPQS evaluation.

### 9 259 **Analysis**

10 260 SPQS and control practices were compared on the P3C-Patient Experience survey and the P3C-  
11 261 Practitioner Experience Survey (at time 2; 6-12 months after initiation of second year/phase 2 of SPQS),  
12 262 with significance tested using the non-parametric unmatched Mann–Whitney–Wilcoxon (MWW) test  
13 263 taking into account within-practice clustering by calculating Somers' D statistic (non-parametric tests  
14 264 were used as the scoring is a summation of Likert responses i.e. data was ordinal). For the P3C-  
15 265 Organisational Change Tool, we compared Time 1 (immediately after implementation of second  
16 266 year/phase 2 of SPQS) and Time 2 (6-12 months later), with significance evaluated by Wilcoxon signed  
17 267 rank test.

### 21 268 **Time Series of emergency admissions to hospital**

22 269 A multi-group interrupted time-series analysis (ITS) was conducted to identify whether de-  
23 270 incentivisation of QOF and the introduction of SPQS was associated with changes in emergency  
24 271 admissions to acute hospitals with a primary diagnoses for four long-term, ambulatory care sensitive  
25 272 conditions (ACSCs). Hospital episode statistics were obtained for patients from all 55 GP practices  
26 273 enrolled in the SPQS scheme (actually 56 practices in 2015/15) and 18 Somerset QOF practices (i.e.  
27 274 Somerset practices not enrolled in SPQS; initially 20). Data was obtained for a 70 month period from  
28 275 April 2011 to May 2018. This time period is divided into 38 months pre-intervention (Apr 2011 – May  
29 276 2014) and 48 months post intervention (June 2014 – May 2018; SPQS contract went live in June 2014,  
30 277 month 39). Data include monthly admission counts for four ACSCs: Acute Myocardial Infarction (AMI),  
31 278 Chronic Obstructive Pulmonary Disease (COPD), Diabetes, and Stroke. We selected these ACSCs as a  
32 279 proxy for preventable admissions and an indicator of any deteriorating quality of care associated with  
33 280 SPQS. Due to the difference in number of practices between SPQS and QOF practices, admissions were  
34 281 divided by the number of practices, thus providing an average of emergency admissions (expressed as  
35 282 admissions per month per practice). Analysis was performed using the *itsa* command[45] on STATA  
36 283 (StataCorp Ltd). This uses regression-based model with Newey-West standard errors. Pre- and post-  
37 284 intervention slopes/intercepts of the sample (SPQS practices) were compared to controls (QOF  
38 285 practices). Lag period was set to 1 month.

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## 288 RESULTS

### 289 P3C-EQ

290 There were 1,752 responses received from 49 (89%) of the 55 practices enrolled in SPQS, and 611  
 291 responses from patients enrolled in the 17 control (QOF) practices (36% response rate and similar to  
 292 other similar other studies[46]). The responses of the two groups compared in Table 1.

293

294 **Table 1:** Demographic profile of responses to P3C-EQ as percentages.

Age	Participant demographics as a percentage										
	QOF		SPQS		Education		Gender		Multi-morbidity		
	QOF	SPQS	QOF	SPQS	QOF	SPQS	QOF	SPQS	No. LTCs	QOF	SPQS
<=24	0.3	0.4	None	1.0	1.3	Male	44.0	43.4	1	19.6	20.1
25-34	2.5	1.3	Primary	3.1	2.1	Female	53.8	53.9	2	19.6	23.8
35-44	2.5	2.6	Secondary	33.7	34.6	Non-response	2.2	2.7	3	20.6	17.8
45-54	8.8	5.3	College/Vocational	26.4	28.1				4	11.3	13.7
55-64	18.3	13.3	Undergraduate	11.5	10.8				5	9.3	7.5
65-74	25.7	29.2	Postgraduate	8.2	7.8				6	4.7	5.1
75-84	29.3	32.7	Non-response	16.2	15.3				7	2.8	2.8
>=85	12.1	14.1							>=8	4.2	2.8
Non-response	0.5	1.0							Non-response	7.9	6.4

295

296 The mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1,752) and QOF controls (23.68,  
 297 n. 611) were not significantly different (MWW U test;  $p=0.346$ ), and indicate generally positive  
 298 experiences of care across both samples.

### 299 P3C-Practitioner results

300 Full results of the P3C-Practitioner are provided in Supplementary File 3. We received 98 responses  
 301 from 55 SPQS practices and 29 responses from 18 control practices from a mix of healthcare  
 302 professionals – 62 GPs (49%); 35 Nurses (27%); 12 Wellbeing Advisors; 7 LTC nurse; 11 others. The  
 303 mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1752) and QOF controls (23.68, n.  
 304 611) were not significantly different (MWW test;  $p=0.405$ ). Return rates are not applicable, as this was  
 305 a convenience sample where we requested response from at least two different professionals at each  
 306 practice.

### 307 P3C-OCT Results

308 To evaluate changes to P3C during the SPQS scheme we undertook an analysis of the organisation and  
 309 delivery of care using the P3C-OCT. Of 55 practices enrolled in the scheme, 36 practices provided  
 310 admissible data (i.e. complete and timely) at the two evaluation time-points (Time 1: 2/2016–8/2016  
 311 and Time 2 was 12/2016-5/2017; 65% response rate). This revealed an increase (0.9;  $p=0.034$ ) in  
 312 aggregate scores on the P3C-OCT between T1 (5.8) to T2 (6.7). This therefore represents a measurable  
 313 increase in activity towards person centred coordinated care delivery and organisation (see table 2),  
 314 with a moderate effect size ( $r=0.42$ ). To determine the specific areas of person centred coordinated  
 315 care (P3C) that improved during the evaluation, this was examined by domains of P3C[34–36]. When



316 broken into subdomains of P3C, significant improvements were delivered in areas related to 'Goals  
317 and Outcomes' (e.g. goal setting with patients; 1.7 increase,  $p=0.00$ ; large effect size  $r=0.61$ ).

318

319 **Table 2:** Mean changes in P3C-OCT scores between time 1 and time 2 for 36 paired practices. The top row  
320 provides the total OCT score (out of a maximum of 20), followed by domains of P3C. The OCT score for each  
321 domain is given for time 1, time 2 and the difference between time 1 and 2. The statistical significant of these  
322 differences is indicated by  $p$ -value from Wilcoxon signed rank test. Statistically significant results (at the level  
323  $p<0.008$ ; corresponding to a Bonferroni adjustment for 6 tests at the  $p<0.05$  significance level) are indicated in  
324 bold font and with an asterisk next to the  $p$ -value. Effect sizes were calculated as test statistic  $z$  by the square  
325 root of the number of pairs.

	Time 1	Time 2	Change T1→ T2 ( $p$ -value; effect size)
<b>Total OCT Score:</b>	<b>5.8</b>	<b>6.7</b>	<b>0.9 (<math>p=0.01</math>; <math>r=0.42</math>)*</b>
<b>Information &amp; Communication</b>	7.4	8.1	0.7 ( $p=0.25$ ; $r=0.19$ )
<b>Care Planning</b>	6.6	7.2	0.6 ( $p=0.14$ ; $r=0.25$ )
<b>Goals &amp; Outcomes</b>	6.1	7.8	<b>1.7 (<math>p&lt;0.001</math>; <math>r=0.61</math>)*</b>
<b>Transitions</b>	4.9	5.2	0.3 ( $p=0.43$ ; $r=0.13$ )
<b>Organisational Process Activities</b>	4.3	5.2	0.9 ( $p=0.03$ ; $r=0.36$ )
<b>Decision Making</b>	3.8	4.4	0.6 ( $p=0.07$ ; $r=0.3$ )

326

327 Further to the longitudinal analysis, SPQS practices were also compared to a cohort of 17 non-SPQS  
328 practices from the South West (all control practices returned data at Time 2). Aggregate results for  
329 the P3C-OCT revealed that control practices had an aggregate score of 6.2 on the P3C-OCT, with no  
330 significant difference between SPQS and control practices either before ( a score of 5.8 versus 6.2;  
331  $p=0.64$ ) or after (6.7 versus 6.2;  $p=0.41$ ) the intervention

### 332 **Discretion from QOF and time savings**

333 When asking SPQS practices to complete the P3C-OCT, we also included a number of additional  
334 questions related to the SPQS scheme. We asked SPQS practices a subjective appraisal of time savings  
335 (both in GP consultations and administration) from enrolment in the scheme. These are shown in  
336 figure 2. More than half (55%) of the practices (28 of 51 practices that completed these questions)  
337 agreed that time had been freed up within the 10 minute standard consultation time.

338 <figure 2 here>

339 **Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP  
 340 administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

341

342 With regard to administrative time savings, more than three quarters of SPQS practices (40/51; 78 %)   
 343 reported administrative (non-consultation time for practitioners) time savings since initiation of the   
 344 scheme, with just over one third of these practices (14/51; 27%) reporting gains of more than 2 hours   
 345 per week. For administrators and non-clinical staff, SPQS was reported to free up time for more than   
 346 86% (44/51) of practices with only 13 % (7/51) reporting a negligible effect. Free text response boxes   
 347 confirmed the plans of the STPs (see introduction and Supplementary File 1), stating that efficiency   
 348 had been leveraged for increased collaborative and federation-level working, including engagement   
 349 with a number of schemes in Somerset designed to improve person centred and coordinated care e.g.   
 350 “Better use of Symphony”, “Engagement with EPC”, “Rural Practice Network”, “Health coaches”,   
 351 “Huddles”, “P3C relevant training”, “Replaced by other work such as Symphony/health coaching etc”,   
 352 “This hasn't shown a reduction in workload but rather a change in workload.” In this manner, the time   
 353 savings leveraged from QOF were not hypothesised to lead to an improvement of experiences for   
 354 practitioners, but instead a shift in workload.

### 355 *Retention of QOF elements*

356 When asking SPQS practices to complete the P3C-OCT, we also included a number questions specific   
 357 to the implementation of SPQS. When asked ‘Are you still using components of the QOF?’, nearly all   
 358 practices enrolled in SPQS continued to use at least some aspects of QOF (only 1 out of 51 respondents   
 359 to this question stated “none”; 86% of practices used “Some”, “Most” or “All”). We further   
 360 investigated the continued utilisation of QOF via a free-text response in the P3C-OCT questionnaire.   
 361 This revealed that QOF was still (according to one practice) utilised by “applying individually, not 'point   
 362 scoring’”. A common aspect that was dropped was exception reporting, with time also being saved by   
 363 avoiding “target chasing”. Elements of QOF were also contractually retained such as the CQRS   
 364 (Calculating Quality Reporting System). This remained active under the SPQS contract to allow data   
 365 on prevalence and key indicators to be collected from practices via GPES (GP Extraction System),   
 366 where prevalence figures are utilised in the SPQS payments calculation.

367 QOF also continued to be utilised for the monitoring of LTCs and recall of patients with LTCs for routine   
 368 check-ups. Around a half of SPQS practices (n. 25) still use QOF for recall of at least some (or all)   
 369 conditions (e.g. checking for recall requirements for patients with LTCs and the management of   
 370 specific chronic diseases). Free text responses suggested that whilst recall was an essential function,   
 371 the implementation under QOF was overly burdensome and not tailored for multiple morbidities.   
 372 Some practices countered this by running in-house developed searches with a priority to “concentrate   
 373 on an integrated LTC system”. This suggests that that there is scope for collaboration to design an   
 374 overhauled, integrated recall system that is specifically designed for efficient management of multiple   
 375 LTCs (as previously proposed[47,48]).

### 376 **Time Series of Hospital Episode Statistics**

377 Results of the ITS are shown in figure 3. No significant increases were detected in the slope post-   
 378 intervention (i.e. after the initiation of the SPQS contract in June 2014) in emergency admissions for   
 379 patients with a primary diagnosis of four ACSCs in SPQS practices. Full results of significance tests are   
 380 provided in Supplementary File 4. The removal of QOF has had no significant effect on emergency

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3 381 admissions for these four ACSCs at the time of intervention, or in the two years following. However,  
4 382 for the non-SPQS Somerset practices, a significant slope change (increase) in admissions for AMI and  
5 383 Diabetes were observed, and a significant slope change (decrease) for admissions for Stroke was  
6 384 observed. These changes in admissions are therefore unrelated to the SPQS contract (see discussion  
7 385 below).

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10 386 <figure 3 here>

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12 387 **Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left  
13 388 to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary  
14 389 Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was live  
15 390 from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of  
16 391 admissions, normalised as admissions per month per practice. Black circles indicate the average number of  
17 392 emergency admissions in each month for SPQS practices; white circles are average admissions for QOF Somerset  
18 393 practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and dashed (for QOF  
19 394 Somerset practices). All changes between pre- and post-intervention between SPQS and QOF practices are non-  
20 395 significant (see Supplementary File 4).

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## 25 26 397 DISCUSSION

27 398 We observed a variety of responses to de-incentivisation of QOF in Somerset. Some QOF-related  
28 399 components remained mandatory (prevalence reporting). Some 'desirable' features of the QOF  
29 400 system were still used (e.g. prompts during consultation), others were adapted (e.g. patient recall)  
30 401 and some burdensome components dropped altogether (e.g. exception reporting).

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33 402 Practices reported that these alterations had led to time and resource savings in both GP consultations  
34 403 and administration. These time savings were used to increase involvement in implementation projects  
35 404 such as Symphony Test and Learn, Village Agents, Health connections, and the South Somerset  
36 405 Vanguard. These were planned as part of the SPQS contract and associated ongoing healthcare  
37 406 reform. These local implementation projects are actively targeting service redesign for complex  
38 407 patient needs, using person centred coordinated care across practice contexts. These projects have  
39 408 involved stronger federation-level agreements and informal networks, increased multidisciplinary  
40 409 team working, reallocation of resources for health care assistants (including Health and Wellbeing  
41 410 Advisors and Health Coaches), nurses and others, single points of access for the patient, shared  
42 411 electronic record systems, increased use of care planning and changes to structure and timings of GP  
43 412 appointments. The results of our longitudinal P3C-OCT survey confirm significant improvements in  
44 413 P3C, suggesting that SPQS has been successful in its stated aims as a system lever for service redesign  
45 414 aimed at the delivery of greater person centred and coordinated primary care.

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48 415 Whilst there is emerging evidence that P3C approaches can improve outcomes (particularly for  
49 416 complexity/multimorbidity)[36,49], we could not establish that the changes introduced via SPQS are  
50 417 leading to better outcomes for patients. Patient experience is downstream of the organisational  
51 418 changes occurring in Somerset, and any detectable improvement in patient outcomes may be delayed.  
52 419 The results of the patient P3C-EQ experience established a similar experience of care in Somerset  
53 420 compared to the control QOF practices (who represent active, research engaged-organisations,  
54 421 whereas completion of the survey was mandatory for SPQS practices; see methods). Similarly,  
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3 422 comparison of practitioner perspective of P3C to the control group revealed similar experiences in  
4 423 SPQS versus the control practices. These findings are broadly reflective of results from other  
5 424 initiatives, where – for example – patient-centred care for multimorbid patients recently revealed  
6 425 mixed effects on processes of care, but was not associated with measurable improvements in quality  
7 426 of life or other secondary outcomes, with the authors concluding that the initiative “supported  
8 427 changes in organisation more than it supported changing the clinicians' attitudes on which patient-  
9 428 centredness depends.” [50]

12  
13 429 In reference to disbenefits, we could find no evidence of increased admissions associated with SPQS.  
14 430 However, ITS did establish trend changes in admissions in non-SPQS Somerset practices (e.g.  
15 431 those practices that retained the QOF contract). A significant increase was observed in admissions  
16 432 with a primary diagnosis of AMI and Diabetes, and a significant decrease observed for those with a  
17 433 primary diagnosis of Stroke. It is, however, unlikely that relatively minor changes to QOF in the years  
18 434 2014/15 and 2015/16 [51,52] have led to these observed trend changes in emergency admission.

21 435 Whilst the time series did not establish any disbenefits in SPQS practices, earlier evaluation of SPQS  
22 436 established that deincentivisation of QOF leads to inconsistent recording of QOF data. Subsequently,  
23 437 analysis of QOF scores have little utility in assessing the quality of care in Somerset[31]. This paucity  
24 438 of data represents a major disbenefit of QOF deincentivisation: one of the primary benefits of QOF  
25 439 has been the widespread recording of clinical activities[1] and availability of GP data and research[6,7].  
26 440 It is not currently clear how ‘quality’ could be assessed in the post-QOF landscape – a question that  
27 441 has major implications for research, evaluation, healthcare management.

### 31 442 **Limitation of the study**

32 443 The ability to draw firm conclusions from this study were limited by several factors. Due to time and  
33 444 resource pressures on general practice in the UK, we struggled to recruit controls from the within  
34 445 the same county (Somerset) or matched controls from the region. As an alternative, we obtained  
35 446 non-matched controls from the region. These represented a biased cohort of research-engaged  
36 447 practices. We could not detect improvements in experiences of healthcare professionals or patients  
37 448 – this could be because the intervention had no effect on these outcomes, the instruments were not  
38 449 sensitive enough, the controls were unsuitable, or changes to patient/practitioner experiences were  
39 450 somewhat distal to the intervention.

### 43 451 **Implications for the future**

44 452 Whilst previous calls for the removal of QOF in England [53] have not been reiterated, recent policy  
45 453 has seen moves towards a reformed, streamlined version of QOF [54,55]. With QOF continuing to  
46 454 evolve, lessons from SPQS have implications for UK policy. We have previously made a number of  
47 455 suggestions for the future landscape of QOF[47,48]. These include retaining limited components of  
48 456 QOF (e.g. those elements that are desirable by GPs; “QOF-Lite”), the development of novel systematic  
49 457 data-capture (including GP contact data) or collaboration on an overhauled, integrated recall system  
50 458 that is specifically designed for efficient management of multiple LTCs[47,48]. General Practice,  
51 459 however, is under huge time and resource pressures[56]. Any proposed alternatives will have to fulfil  
52 460 the primary requirements of being a streamlined process for supporting coordination of care,  
53 461 especially for those with complex health needs. The recent national review of QOF concluded that  
54 462 QOF should be reformed to become more person-centred, create space for professionalism and  
55 463 optimally impact wider population health and system resource utilisation[57].

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## FIGURE LEGENDS

10 467 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.  
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13 469 **Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP  
14 470 administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

15  
16 471 **Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left  
17 472 to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary  
18 473 Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was live  
19 474 from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of  
20 475 admissions, normalised as admissions per month per practice. Black circles indicate the average number of  
21 476 emergency admissions in each month for SPQS practices; white circles are average admissions for QOF Somerset  
22 477 practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and dashed (for QOF  
23 478 Somerset practices). All changes between pre- and post-intervention between SPQS and QOF practices are non-  
24 479 significant (see Supplementary File 4).  
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## DATA SHARING STATEMENT

38 487  
39 488 All data relevant to the study are included in the article or uploaded as supplementary information.  
40

## COMPETING INTERESTS

41 489  
42 490 None declared.  
43  
44

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45 491  
46 492 Ethical clearance was obtained from the Plymouth University Ethics Committees (FREC). All  
47 493 participants were given an information pack about the study, and gave informed consent.  
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50 496 was provided South West Academic Health Sciences Network (SWAHSN).  
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## CONTRIBUTIONS

53 498  
54 499 **J Close** corresponded with partaking practices, collected data, analysed data and compiled  
55 500 manuscript.  
56  
57

58 501 **B Fosh** input, validated and analysed data.  
59  
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3 502 **H Wheat** corresponded with partaking practices and collected data.  
4  
5 503 **J Horrell** corresponded with partaking practices and collected data.  
6  
7 504 **W Lee** supported the Interrupted Time Series analysis.  
8  
9 505 **R Byng** aided study design and conception.  
10  
11 506 **Bainbridge M** corresponded with partaking practices and data collection.  
12  
13 507 **L Witts** helped with study design, data collection and corresponded with partaking practices.  
14  
15 508 **R Blackwell** collected and analysed data for Hospital Episode Statistics.  
16  
17 509 **L Hall** corresponded with partaking practices and collected data.  
18  
19 510 **Lloyd H** designed and oversaw the study from inception to completion.  
20  
21 511 All authors read, contributed to and approved the manuscript.  
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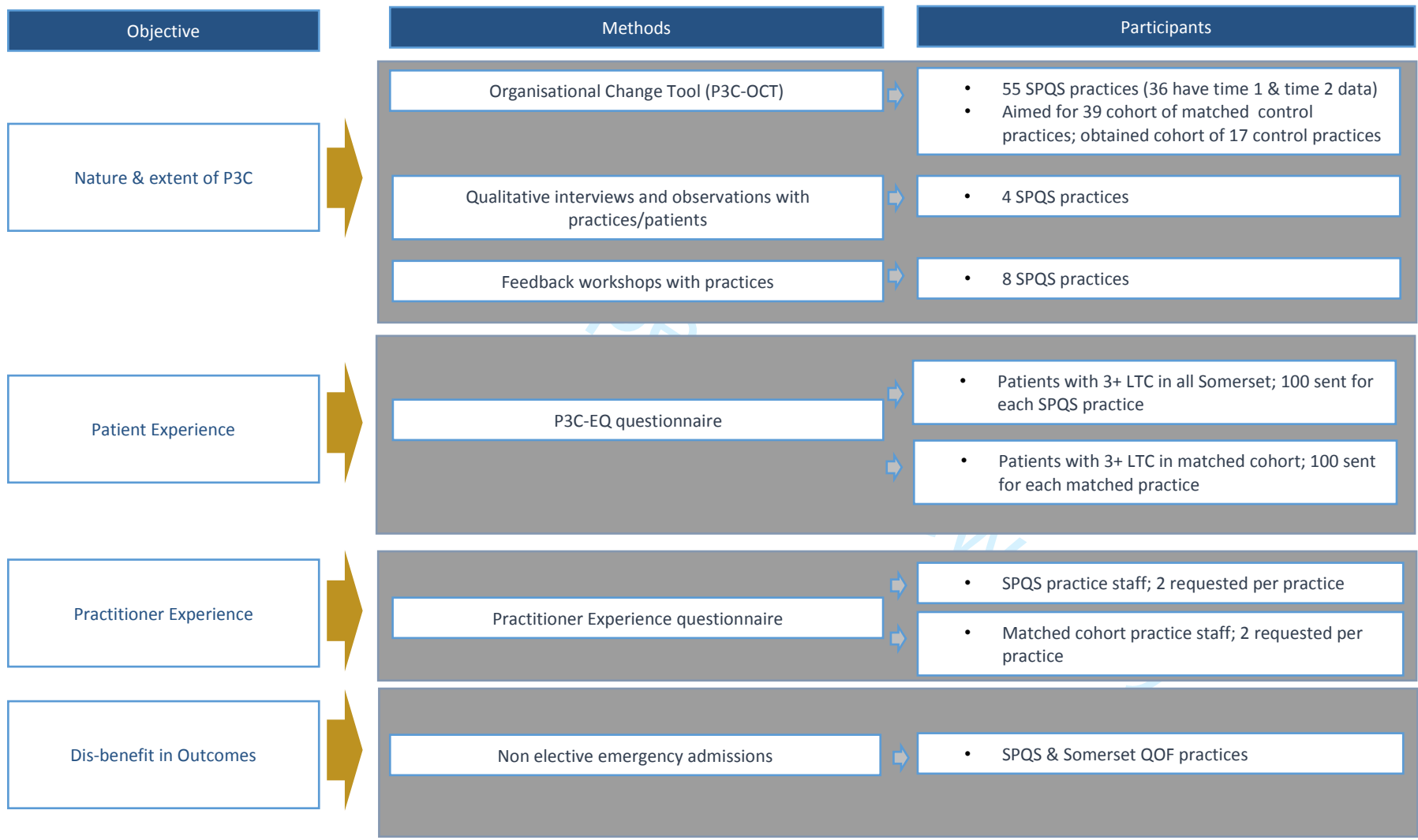
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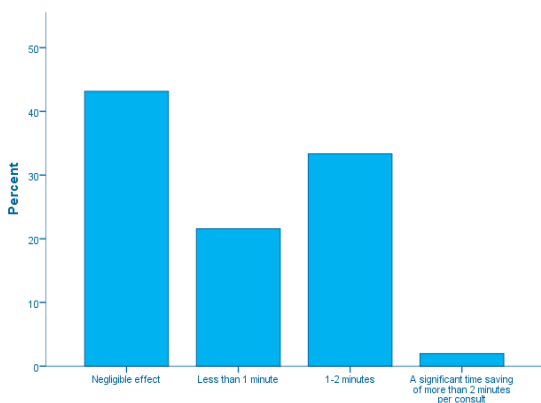
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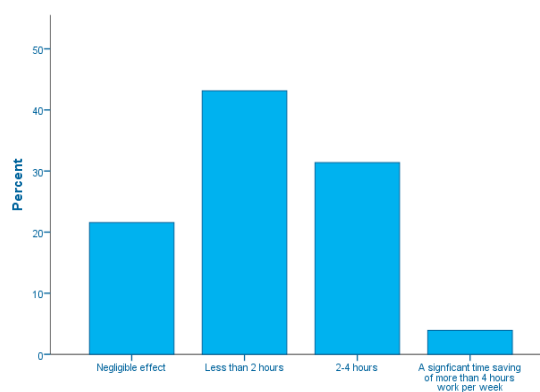


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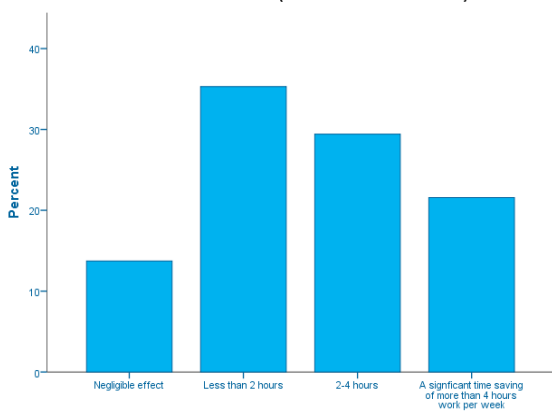
On average, how much time has the removal of QOF freed up per 10 min GP consultation?



On average, how much has been freed up each week from the administrative burden of QOF for GPs (i.e. outside consultation time)?



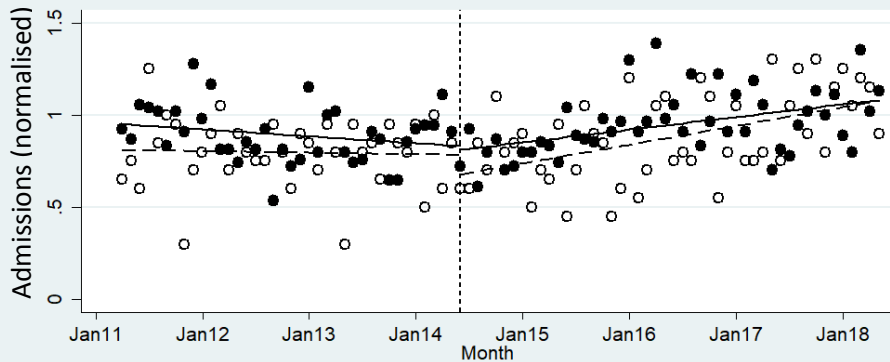
On average, how much time has been freed up in each week from the administrative burden of QOF (for administrators/non-GPs)?



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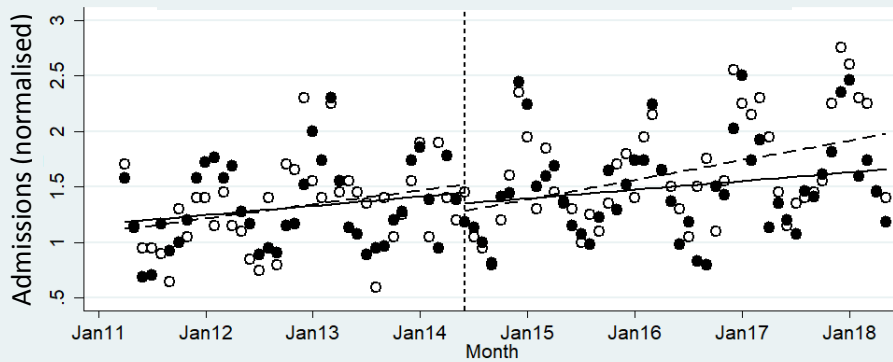
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### Acute Myocardial Infarction



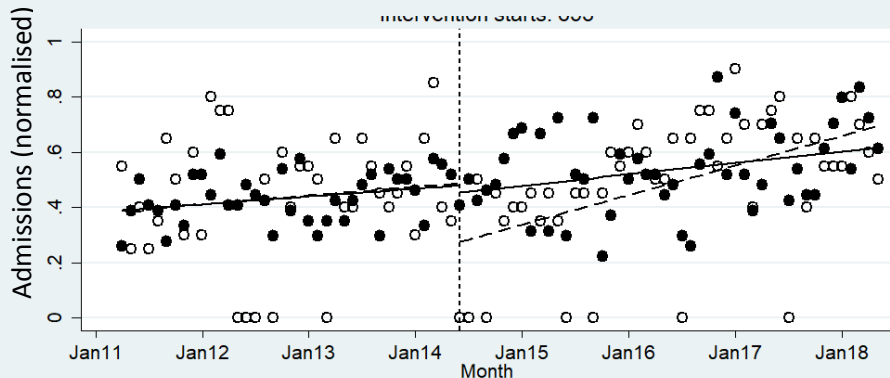
SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Chronic Obstructive Pulmonary Disease (COPD)



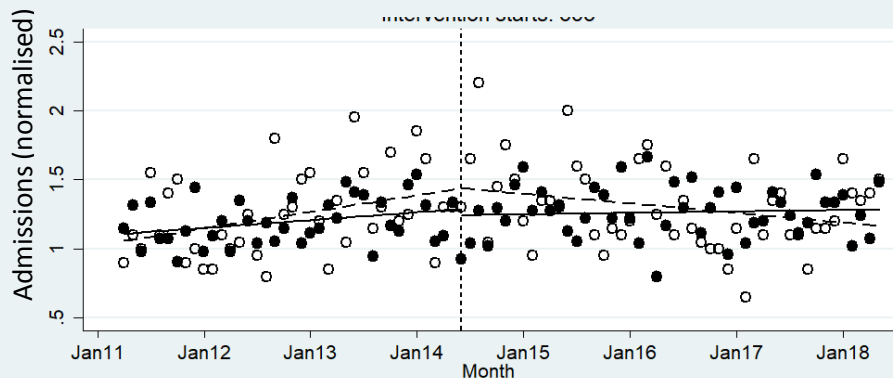
SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Diabetes



SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Stroke



SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

Supplementary File 1: Overview of Sustainability and Transformation Plan (STPs) for 28 of 55 practices enrolled in SPQS; with 2 further STPS (Taunton federation and West Somerset) completed at federation level.

Development area	East Mendip			West Mendip					Central Mendip			North Sedgemore		Bridgewater Bay North Petherton
	Beckington	Frome	Mendip County	Glastonbury Health	Glastonbury Surgery	Vine	Wells City	Wells Health	Grove House	Oakhill	Park Medical	Axbridge & Wedmore	Brent & Burnham	
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Continued/increased involvement in Mendip Your Health & Wellbeing	✓					✓		✓	✓		✓			
Use/development of technology to assist self-management		✓		✓										
Increased use of Health Connectors Mendip		✓				✓			✓	✓				
Investing time in community engagement		✓												
MDTs in care coordination hubs		✓												
MDTs with district nurses at palliative care reviews (weekly)		✓												
Engagement in compassionate communities and network mapping		✓												
Increased or continued participation with Symphony				✓		✓	✓	✓	✓		✓			
Possible division of urgent and routine care & formation of urgent care hub				✓		✓		✓				✓	✓	
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)		✓	✓	✓				✓	✓	✓			✓	
Consideration of practice merger				✓		✓	✓	✓	✓					
Training & upskilling									✓					
Engagement in Somerset together programme											✓			
Development of personalised care planning											✓			
Telephone consultations/ telemedicine														
Use of health coaches														
Engagement in Living Better programme														

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Development area	South Somerset														Taunton Federation	West Somerset
	Bruton	Ilchester	Buttercross	Yeovil	Crewkerne	Hamdon	Oaklands	Ryalls Park	Hendford Lodge & Abbey	Wincanton	Westlake	Martock & S. Petherton	Penn Hill	Preston Grove		
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	✓	✓	✓									✓	✓	✓	✓	✓
Continued/ increased involvement in Mendip Your Health & Wellbeing																
Use/development of technology to assist self-management															✓	
Increased use of Health Connectors Mendip																
Investing time in community engagement												✓				
MDTs in care coordination hubs																
MDTs with district nurses at palliative care reviews (weekly)																
Engagement in compassionate communities and network mapping																
Increased or continued participation with Symphony					✓	✓	✓				✓		✓	✓		
Possible division of urgent and routine care & formation of urgent care hub																✓
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)	✓	✓	✓	✓		✓			□	✓	✓		✓			✓
Consideration of practice merger											✓					✓
Training & upskilling	✓	✓	✓	✓												
Engagement in Somerset together programme																
Development of personalised care planning																
Telephone consultations/ telemedicine	✓	✓														
Use of health coaches	✓	✓				✓		✓	✓	✓		✓	✓	✓		
Engagement in Living Better programme																✓

## Supplementary File 2: Timeline of SPQS scheme and evaluation.

### Development Phase:

April 2012 – March 2013



### Transition year from QOF to SPQS:

April 2013 – March 2014



SPQS contract goes live in June  
2014

### Year 1 - Planning:

April 2014 – March 2015



Phase 1 Evaluation  
Nov 2014 – July 2015

### Year 2 – Transformation:

April 2015 – March 2016



Phase 2 Evaluation  
Nov 2015 – March 2017

### Year 3 - Baseline year:

April 2016 – March 2017





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## Full results of P3C-Practitioner questionnaire

### Selection of P3C-Practitioner

The P3C-practitioner was selected for this study by initially conducting a scoping review to identify measures that included aspects of professional experiences of integrated/coordinated care. This identified 33 measures, four of which were deemed relevant (Safety Net Medical Home Provider Experience Survey; Person-Centred Health Care for Older Adults Survey” (PCHCOA) – which we refer to as the “P3C-practitioner”; Staff Questionnaire - Integrated Care Evaluation Pilots; North West London Integrated Care Pilot - Practitioner Survey). These measures were then presented to workshop attendees (healthcare professionals; managers; senior NHS England representatives; local commissioners; academics) to explore the strengths and weaknesses in terms of applicability and utility as part of routine data collection in respective settings. The PCHCOA was selected due to its established psychometric properties (Briony Dow et al., *Development and initial testing of the Person-Centred Health Care for Older Adults Survey*, 25 *International Psychogeriatrics* 1065–1076 (2013)), its good coverage of domains of P3C and a positive response at the feedback workshop. For the purposes of this evaluation, we have renamed the instrument the P3C-practitioner.

### Scoring of P3C-Practitioner

Whilst previously validated, the authors did not develop an aggregate scoring mechanism for the instrument. Therefore, we generated summary scores by simple addition from the 4-point Likert scale (Never = 0; Rarely = 1; Sometimes = 2; Usually = 3; Always = 4). This allowed us to compare aggregate scores to compare SPQS versus controls over all 29 questions (see table below), with significance tested using MWW test. We also generated sub-scales by addition of question relevant to this aspect of P3C (see following page for questions). No significant differences were detected in practitioner experiences in SPQS or control practices, for either mean scores or the following subscales.

**Sub-Scale: Person Centred Care** = Questions 1.1, 1.3, 1.4, 2.1, 2.2, 5.1, 6.1,6.2,6.3, 7.1, 7.2, 7.3, 8.1 8.2 and 8.3.

**Sub-Scale: Coordinated Care** = Questions 4.1, 4.2, 4.3

**Sub-Scale: Working Environment** = Questions 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

	QOF	SPQS	Sig. (2-tailed)
<b>Mean Score</b>	<b>83.79 (n=29)</b>	<b>86.18 (n=98)</b>	<b>.4</b>
Sub-Scale: Person Centred Care	47.62	49.11	.35
Sub-Scale: Coordinated Care	7.41	8.38	.12
Sub-Scale: Working Environment	22.03	21.11	.24

### P3C-Practitioner instrument

Q1.1 In my work area, service users / patients have an equal say with the rest of the team in the development of the support plan.

Q1.2. In my work area, service users / patients and carers have an equal say with the rest of the team in the development of the discharge plan or exit strategy from the service.

Q1.3. My/our support plans are structured around the service user's/patient's goals.

Q1.4. Where I currently work, we provide services in the location that best suits the needs and preferences of the service user/patient and their carers.

Q2.1. I ask service users/patients what their goals/needs are for their health and wellbeing.

Q2.2 I ask the carer/s what their goals/ needs are for the health and wellbeing of the person they support.

Q3.1. I am supported to develop the skills I need to work with the service user/patient and their carers.

Q3.2. Where I am currently working, I have been exposed to good role models in care/support for service users/patients.

Q3.3. Expectations of my role and how I treat the service users/patients I support are communicated clearly and consistently.

Q3.4. I feel that I work as part of a team with a recognised and valued contribution.

Q3.5. The emotional and physical demands of my work are acknowledged and recognised.

Q3.6. I feel that I am able to fully use my skills in my work with the service users/patients

Q3.7. My work environment values the care/support I provide to the service users/patients.

Q4.1. It is clear to the service user/patient or their carer who their key worker is.

Q4.2. The service user/patient and their carer have ready access to a key identified person (i.e. they are available by phone, messages are returned promptly).

Q4.3. Where I currently work, we know how to direct the service user/patient to the most appropriate service without them having to make another call (single point of contact).

Q4.4. After the service user/patient is discharged/leaves the service, they receive a follow-up phone call or visit.

Q5.1. Where I currently work, adequate transport and parking are provided to ensure access for service users/patients and their families/carers.

Q5.2. Where I currently work, service users'/patients' personal privacy is respected.

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3 Q6.1. I am able to meet the communication needs of service users/patients and their carers when  
4 working with them.  
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6 Q6.2. Written materials are provided by my place of work to service users/patients and their carers  
7 in a language they can understand.  
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10 Q6.3. Information is provided in a variety of ways to ensure all service users/patients and their  
11 carers have access (e.g. written, verbal, visual).  
12

13 Q7.1. I welcome it when service users/patients are informed and question or challenge my advice.  
14

15 Q7.2. The needs and preferences of service users/patients should be central in all services.  
16

17 Q7.3. I like working with the service users/patients I support or care for.  
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19 Q8.1. It is an important part of my job to get to know my service user/patient (e.g. call them by their  
20 preferred name, remember and repeat something they have told me).  
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23 Q8.2. I give service users and their carers adequate time to talk to me (e.g. to discuss their concerns  
24 and their expectations).  
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26 Q8.3. I seek to find out what is important to service users/patients about their health and wellbeing  
27 (e.g. mobility, cognitive function, being part of the family, able to go to the gym).  
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**Supplementary File 4:** Results of interrupted time-series analysis for emergency admissions on four long-term, ambulatory care sensitive conditions (ACSCs). Full results are provided, although the most relevant statistical tests (column “P>|t|”) are for the rows:

“\_z\_x659” the difference between the changes in intercept for SPQS and QOF pre/post intervention)

“\_z\_x\_t659” the difference between the changes in gradient for SPQS and QOF pre/post intervention.

All are non-significant, revealing no excess increases in emergency admissions in SPQS practices for these four ACSCs after the implementation of the SPQS scheme. Significant differences were observed, however, for changes in the *control* slope and/or intercept pre/post intervention for Acute Myocardial Infarction, Stroke and Diabetes . These are highlighted in red below.

#### Acute Myocardial Infarction (AMI)

Description	PRIM_AMI	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	-.0007003	.0025541	-0.27	0.784	-.0057435	.0043429
Difference between control/SPQS pre-intervention intercepts	_z	.1396686	.0801094	1.74	0.083	-.0185102	.2978475
Difference between control/SPQS pre-intervention slopes	_z_t	-.0024182	.0034503	-0.70	0.484	-.009231	.0043946
Change in control intercept	_x653	-.1043759	.0677199	-1.54	0.125	-.2380911	.0293393
<b>Change in control slope</b>	<b>_x_t653</b>	<b>.0091594</b>	<b>.0030779</b>	<b>2.98</b>	<b>0.003</b>	<b>.0030819</b>	<b>.0152369</b>
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.0853708	.0946241	0.90	0.368	-.1014677	.2722093
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0003106	.0040914	-0.08	0.940	-.0083892	.0077679
Intercept of control pre-intervention	_cons	.8103239	.0652408	12.42	0.000	.6815037	.9391441

**Chronic Obstructive Pulmonary Disease (COPD)**

Description	PRIM COPD	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0105427	.0048903	2.16	0.033	.0008867	.0201988
Difference between control/SPQS pre-intervention intercepts	_z	.0619958	.1748488	0.35	0.723	-.2832492	.4072408
Difference between control/SPQS pre-intervention slopes	_z_t	-.0035803	.0077243	-0.46	0.644	-.0188323	.0116717
Change in control intercept	_x653	-.2382072	.1889151	-1.26	0.209	-.6112265	.1348121
Change in control slope	_x_t653	.0041691	.0078257	0.53	0.595	-.011283	.0196211
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.1413474	.2797523	0.51	0.614	-.4110331	.693728
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0046434	.011329	-0.41	0.682	-.0270129	.0177261
Intercept of control pre-intervention	_cons	1.122065	.1089517	10.30	0.000	.9069359	1.337194

**Stroke**

Description	PRIM STRK	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0100503	.0041188	2.44	0.016	.0019176	.0181831
Difference between control/SPQS pre-intervention intercepts	_z	.0528715	.0954745	0.55	0.580	-.1356461	.2413891
Difference between control/SPQS pre-intervention slopes	_z_t	-.0053472	.0047727	-1.12	0.264	-.014771	.0040765
Change in control intercept	_x653	-.0003719	.1374057	-0.00	0.998	-.2716843	.2709404
<b>Change in control slope</b>	<b>_x_t653</b>	<b>-.0158336</b>	<b>.005394</b>	<b>-2.94</b>	<b>0.004</b>	<b>-.0264841</b>	<b>-.005183</b>
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	-.0449425	.1616696	-0.28	0.781	-.3641647	.2742798
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0119868	.0062141	1.93	0.055	-.0002831	.0242568
Intercept of control pre-intervention	_cons	1.05749	.0852406	12.41	0.000	.8891793	1.2258

## Diabetes

Description	PRIM DIAB	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0025823	.0026916	0.96	0.339	-.0027323	.0078969
Difference between control/SPQS pre-intervention intercepts	_z	.0005698	.0759019	0.01	0.994	-.1493012	.1504408
Difference between control/SPQS pre-intervention slopes	_z_t	-.0001994	.0029745	-0.07	0.947	-.0060726	.0056738
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.2114749</b>	<b>.0751425</b>	<b>-2.81</b>	<b>0.005</b>	<b>-.3598463</b>	<b>-.0631036</b>
Change in control slope	_x_t653	.0063408	.0033715	1.88	0.062	-.0003164	.012998
<b>difference between the changes in intercept for SPQS and QOF pre/post intervention</b>	<b>_z_x653</b>	<b>.1864524</b>	<b>.0866148</b>	<b>2.15</b>	<b>0.033</b>	<b>.0154285</b>	<b>.3574763</b>
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0052892	.0038335	-1.38	0.170	-.0128586	.0022802
Intercept of control pre-intervention	_cons	.3890688	.0704267	5.52	0.000	.2500088	.5281288

## Combined (AMI/COPD/Stroke/Diabetes)

Description	SECD_AMI	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0224751	.0064245	3.50	0.001	.0097898	.0351604
Difference between control/SPQS pre-intervention intercepts	_z	.2551058	.227217	1.12	0.263	-.193542	.7037535
Difference between control/SPQS pre-intervention slopes	_z_t	-.0115452	.009923	-1.16	0.246	-.0311385	.0080482
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.5544301</b>	<b>.2489365</b>	<b>-2.23</b>	<b>0.027</b>	<b>-1.045964</b>	<b>-.0628964</b>
Change in control slope	_x_t653	.0038357	.0103935	0.37	0.713	-.0166866	.024358
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.3682284	.3741294	0.98	0.326	-.3705031	1.10696
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0017436	.0148231	0.12	0.907	-.0275252	.0310124
Intercept of control pre-intervention	_cons	3.378947	.1531439	22.06	0.000	3.07656	3.681335

## STROBE Statement—checklist of items that should be included in reports of observational studies

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**Recommendation**

<b>Title and abstract</b>	p2	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
<b>Introduction</b>		
Background/rationale	P3-5	Explain the scientific background and rationale for the investigation being reported
Objectives	L126-132	State specific objectives, including any prespecified hypotheses
<b>Methods</b>		
Study design	L135-145	Present key elements of study design early in the paper
Setting	Setting g L135-145; dates L210-217	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	L148-168	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	L169-198	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	L169-198	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	L158-161	Describe any efforts to address potential sources of bias
Study size	L149-151	Explain how the study size was arrived at



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Quantitative variables	L209- 235	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	L209- 235	<hr/> <i>(a)</i> Describe all statistical methods, including those used to control for confounding <hr/> <i>(b)</i> Describe any methods used to examine subgroups and interactions <hr/> <i>(c)</i> Explain how missing data were addressed <hr/> <i>(d) Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy <hr/> <i>(e)</i> Describe any sensitivity analyses

Continued on next page

For peer review only

**Results**

Participants	L2 39- 247	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed (b) Give reasons for non-participation at each stage (c) Consider use of a flow diagram
Descriptive data	Ta 1	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders (b) Indicate number of participants with missing data for each variable of interest (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)
Outcome data	L2 39- 282	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures
Main results	L2 39- 357	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included (b) Report category boundaries when continuous variables were categorized (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	N/ A	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses

**Discussion**

Key results	L3 60- 397	Summarise key results with reference to study objectives
Limitations	L4 05- 413	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	N/ A	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	N/ A	Discuss the generalisability (external validity) of the study results

**Other information**

Funding	L4 51- 6	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based
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\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## A Longitudinal Evaluation of a Countywide Alternative to the Quality and Outcomes Framework in UK General Practice, Aimed at Improving Person Centred Coordinated Care.

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7 3 **Outcomes Framework in UK General Practice, Aimed at Improving Person**  
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9 4 **Centred Coordinated Care.**  
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## 71 **Evaluation of a Countywide Alternative to the Quality Outcomes Framework,** 72 **Aimed at Improving Person Centred Coordinated Care.**

### 73 **Abstract**

#### 74 **Objectives.**

75 To evaluate a county-wide deincentivisation of the Quality and Outcomes Framework (QOF) payment  
76 scheme for UK General Practice (GP).

#### 77 **Setting**

78 In 2014, NHS England signalled a move towards devolution of QOF to Clinical Commissioning Groups.  
79 Fifty-five GP practices in Somerset established the Somerset Practice Quality Scheme (SPQS) – a de-  
80 incentivisation of QOF – with the goal of redirecting resources towards Person Centred Coordinated  
81 Care (P3C), especially for those with Long Term Conditions (LTCs). We evaluated the impact on  
82 processes and outcomes of care from April 2016 to March 2017.

#### 83 **Participants & Design**

84 The evaluation used matched data from 55 SPQS practices and 17 regional control practices for three  
85 survey instruments. We collected patient experiences ('P3C-EQ'; 2363 returns from patients with 1+  
86 LTC; 36% response rate), staff experiences ('P3C-practitioner'; 127 professionals), and organisational  
87 data ('P3C-OCT'; 36 of 55 practices at two time points, 65% response rate; 17 control practices).  
88 Hospital Episode Statistics emergency admission data were analysed for 2014-2017 for ambulatory-  
89 sensitive conditions across Somerset using interrupted time series.

#### 90 **Results**

91 Patient and practitioner experiences were similar in SPQS versus control practices. However,  
92 discretion from QOF incentives resulted in time savings in the majority of practices and practice data  
93 showed a significant increase in P3C oriented organisational processes, with a moderate effect size  
94 (Wilcoxon signed rank test;  $p=0.01$ ;  $r=0.42$ ). Analysis of transformation plans and organisational data  
95 suggested stronger federation-level agreements and informal networks, increased multidisciplinary  
96 working, reallocation of resources for other health care professionals and changes to the structure  
97 and timings of GP appointments. No disbenefits were detected in admissions data.

#### 98 **Conclusions**

99 The SPQS scheme leveraged time savings and reduced administrative burden via discretionary  
100 removal of QOF incentives, enabling practices to engage actively in a number of schemes aimed at  
101 improving care for people with LTCs. We found no differences in the experiences of patients or  
102 healthcare professionals between SPQS and control practices.

## 103 Article Summary

### 104 Strengths and limitations of this study

105

- 106 ■ This study evaluated changes to service delivery, conducted using two survey tools – offering  
107 a perspective on the experiences of both patients and healthcare professionals.
- 108 ■ These were supplemented with a longitudinal analysis of organisational change (to measure  
109 alterations to service deliver) and a time-series of emergency admissions for ambulatory-  
110 sensitive conditions (to detect disbenefits arising from the scheme).
- 111 ■ Due to time and resource pressures on general practice in the UK, we struggled to recruit  
112 controls from the within the same county (Somerset) or matched controls from the region.  
113 As an alternative, we obtained non-matched controls from the region.
- 114 ■ No detectable improvements were established in experiences of healthcare professionals or  
115 patients – this could be because the intervention had no effect on these outcomes, the  
116 instruments were not sensitive enough, or changes to patient/practitioner experiences were  
117 somewhat distal to the intervention.

## 118 Main Text

### 119 BACKGROUND

120 The Quality and Outcomes Framework (QOF) for UK General Practice (GP) is one of the largest health-  
121 related pay-for-performance (P4P) schemes in the world[1]. Following implementation in 2004, the  
122 scheme initially had a positive impact on quality of care, primarily achieved via establishment of  
123 consistent procedural baselines in the clinical management of incentivised (mostly chronic)  
124 diseases[1–5]. It reduced between-practice inequalities in care delivery[1–3] whilst also leading to  
125 improved disease registers, widespread recording of clinical activities and adoption of electronic  
126 medical record systems[1], leading to growth in GP data and related research[6,7].

127 Since the introduction of QOF, demographic shifts of an ageing population have continued to drive a  
128 shifting clinical landscape[8], with the number of people with three or more long-term conditions  
129 (mLTCs) thought to have risen by one million over the last decade[9]. The subsequent rising demand  
130 for the management of long term conditions (LTCs) and mLTCs – requiring tailored and coordinated  
131 support[10,11] – has led to QOF (with its emphasis on processes for single disease guidelines) being  
132 viewed as increasingly anachronistic[6,12–16]. After introduction of QOF, there was a significant  
133 reduction in the continuity of care[2,17] and the person-centeredness of GP  
134 consultations[13,14,18,19], with a subsequent decline in patients' satisfaction[20]. It has been argued  
135 that QOF does not incentivise appropriate clinical care for people with multimorbidity[6,12–16], who  
136 require individualised support, greater continuity of care and a holistic, biopsychosocial approach that  
137 is responsive and empowering[10,11]. An oft-quoted criticism is that QOF reduces consultations to a  
138 'box-ticking' exercise[21].

139 In response to such criticisms, both the NHS Chief Executive and the General Practitioners Committee  
140 (GPC) Chairman previously backed the removal of QOF[21] and In 2014, NHS England signalled a move  
141 towards devolution of QOF to Clinical Commissioning Groups (CCGs), allowing organisations the  
142 freedom to develop alternatives. Potential advantages included the targeting of local health needs

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3 143 and greater clinical engagement for quality improvement[22]. In response, the Somerset Practice  
4 144 Quality Scheme (SPQS) was established as a de-incentivisation of QOF. It arose because GPs, the CCG  
5 145 and the Local Medical Committee (LMC) felt that QOF was not incentivising the highest value clinical  
6 146 behaviour. The goal was to allow clinicians the freedom to innovate, enable consultations to be more  
7 147 person-centred and increase involvement with a number of concurrent schemes aimed at improving  
8 148 Person Centred Coordinated Care (P3C)[23]. The details of the scheme were included in the SPQS  
9 149 contract[24] and local Sustainability and Transformation Plan (STPs – Plans for reforming healthcare  
10 150 mandated by the Five Year Forward View[25]) of the GPs[26]. (See Supplementary File 1 for a summary  
11 151 of Somerset STPs; box 1 for brief details of the various schemes and references for details). The  
12 152 contract removed incentives from QOF, although CQRS (Calculating Quality Reporting System)  
13 153 remained active in order to collect prevalence data for payment calculations. The SPQS contract stated  
14 154 that the reduced QOF overhead would be exploited to better meet the needs of patients with long  
15 155 term conditions by developing new models of care. Implementation was specified in the locality STPs,  
16 156 which included a patchwork of initiatives, most notably the ‘Test and Learn pilots’, which  
17 157 encompassed three distinct schemes (box 1), all of which had a shared vision of targeting complex  
18 158 patients with care plans, multidisciplinary team input (MDT) and single point of contact [27,28]. Other  
19 159 schemes included a Village Agents service[29] and Health Connections Mendip (HCM)[30] – see box  
20 160 1. Fifty five Somerset practices opted for SPQS, with 18 Somerset practices (initially 20) retaining the  
21 161 existing QOF contract. (The SPQS practices increased to 57 in 2015/16; but two mergers reduced it  
22 162 back to 55).

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**Test & Learn:** Comprises three similar initiatives (South Somerset Symphony Vanguard, Taunton, and Mendip – see below), which share a common goal of targeting complex, multimorbid patients with a suite of approaches including single personalised care plans, multi-disciplinary team input and single point of access to provide person centred coordinated care.

**Test & Learn – South Somerset Symphony Vanguard:** A symphony “hub” system located at Yeovil District Hospital, where complex patients receive extra support from Health Coaches/Key Workers at the Symphony hub service, although they remain under management of GP practice [27,28].

**Test & Learn – Taunton:** Operates under a “virtual hub” model, with complex/frail patients managed by a multidisciplinary team moving between practices, with shared care plans and Wellbeing Advisors.

**Test & Learn – Frome Mendip, including “Health Connections Mendip”.** With loose eligibility criteria and a number of referral routes, Community Practice Nurse and Health Connectors (based at Frome) liaise regularly in MDT meetings. There is a hub telephone line for single point of access. The model advocates utilising existing assets in the community. The Health Connections team lead social prescribing work with a service directory to signpost patients to appropriate resources [30].

**Enhanced Primary Care (EPC):** EPC is a sub-component of the Symphony vanguard scheme that incorporates health coaches (HCs) into primary care, focusing on less complex patients, allowing GPs to focus primarily on medical problems.

**Village Agents Service:** Supports isolated, excluded and vulnerable (including elderly and multimorbid) people by offering a signposting and referral service. The service links with general practices [29].

**Living Better:** A working partnership between the GP practices, AGE UK Somerset, Social Care, Somerset Partnership, West Somerset District Council, and Somerset Clinical Commissioning Group. The project supports people with one or more long-term conditions to better self-manage, helping them build connections to the community and reducing dependency on health and social care.

#### Box 1. Initiative for implementation of SPQS.

166 The initial phase of the scheme was previously evaluated with a retrospective approach[31]. This  
 167 revealed early stages of organisational change, including stronger federation-level agreements and  
 168 informal networks, increased multidisciplinary team working, reallocation of resources towards health  
 169 care assistants, nurses and others, and changes to structure and timings of appointments with GPs.  
 170 From April 2016 to March 2017 we conducted a longitudinal evaluation of the second full year of the  
 171 SPQS programme (see Supplementary File 2 for a timeline of the SPQS scheme and associated  
 172 evaluations). This was commissioned with the aims of establishing the nature and extent of P3C that

173 has been implemented since discretion from QOF, explore staff and patient experiences of care  
174 delivery and examine non-elective hospital admissions before and after inception of the scheme.

175

## 176 METHODS

177 We conducted a mixed-methods evaluation of SPQS which included a suite of quantitative and  
178 qualitative tools. Analysis of quantitative data is described in this paper. In-depth qualitative findings  
179 will be published in a subsequent paper (including semi-structured interviews with practitioners;  
180 observations of consultations and facilitation workshops with practices). A schematic overview of the  
181 full SPQS evaluation framework is provided in figure 1. The quantitative evaluation included  
182 completion of survey tools targeting patient experiences (P3C-EQ), staff experiences (P3C-  
183 practitioner) and organisational perspectives (P3C-OCT tool), alongside time series of Hospital Episode  
184 Statistics (HES) for ambulatory-sensitive conditions across Somerset. We chose not to use national  
185 measures of General Practice (i.e. GP Patient Survey (GPPS) and Friends and Family Test (FFT)): they  
186 have a broad sample and do not target the patient group (i.e. patients with LTCs) that are the focus of  
187 SPQS. Furthermore, they do not target the construct of interest (i.e. P3C).

188 <figure 1 here>

189 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.

## 190 Samples

191 The 55 participating Somerset practices (mean list size = 7,695; median = 6515.5; smallest = 1834;  
192 largest = 29,078) completed our evaluation tools (see below). Whilst these 55 practices were  
193 incentivised to take part in our evaluation (i.e. by being part of SPQS), the non-SPQS Somerset  
194 practices had no incentive to act as controls and did not participate in this study. Therefore, for control  
195 practices, we initially identified a cohort of non-Somerset control practices matched for staffing data,  
196 list size, population density, indices of multiple deprivation, QOF scores and disease prevalence.  
197 However, the incentives available for this evaluation (£200 per practice) were only sufficient to recruit  
198 six practices by this method. We therefore supplemented this group with 11 unmatched practices  
199 from across the Southwest, making a total of 17 control practices (mean list size = 6,714; median =  
200 4878; smallest = 2678; largest = 4878). The control group therefore represents a self-selected sample  
201 of practices that are likely to represent engaged, active practices (i.e. with the resources to engage  
202 with research). In contrast, completion of our evaluation was mandatory for all SPQS practices.

## 203 Patient and Public Involvement

204 Patients were involved via the peninsula CLAHRC patient involvement group (PenPig), who set  
205 priorities for research objectives. Patients, public and healthcare professionals were also involved in  
206 co-design workshops to develop the measurement framework and individual questionnaires (see  
207 papers for details [23,32–37]). Patients also reviewed drafts of ethics approval applications and all  
208 patient-facing communication. The work was co-presented with patients at the South West Society  
209 for Academic Primary Care Regional Meeting 2018.

## 210 Survey Tools

211 **The P3C-Patient Experience Questionnaire (P3C-EQ)** is a brief, 11-item patient-completed measure  
212 of patient experiences of person centred coordinated care delivery, which we have previously

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3 213 validated[32,38,39]. The tool can be used to generate an aggregate score of patient experience[32],  
4 214 with a range of score from 0-30, where a higher score indicates better experiences of care [39]. It can  
5 215 also be sub-scored to previously described sub-domains of P3C[23,32,34–37].  
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8 216 **The P3C-Practitioner Experience Survey** is a 29-item instrument that measures individual and  
9 217 managerial experience of delivering person centred and coordinated care. Via a workshop with  
10 218 healthcare professionals, we selected the previously validated P3C-Practitioner questionnaire (also  
11 219 known as the Person-Centred Health Care for Older Adults Survey[40]) as the most suitable instrument  
12 220 to examine practitioners' perspectives of P3C (see Supplementary File 3). A minimum of two  
13 221 practitioners from each practice were requested to respond. The instrument generates an aggregate  
14 222 score with a range of 29-145, where a higher score indicates better experiences of care.  
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18 223 **The P3C-Organisational Change Tool (P3C-OCT)** is an evidenced-based measure of progress towards  
19 224 delivering person centred coordinated care from an organisational perspective[33]. It was developed  
20 225 to support and measure P3C in line with Year of Care[34] and RCGP principles of Collaborative Care  
21 226 and Support Planning[41], thus providing a way to monitor changes in line with policy directives which  
22 227 improve P3C. The tool was designed to measure all core P3C routines which have been identified  
23 228 through research[42,43], patients' accounts, policy documents[34] and our own work[23,33]. The  
24 229 design of the P3C-OCT is based on a shared consensus of the components of person-centred  
25 230 coordinated care (e.g. [35,36,44]), which broadly correspond to six domains: Information and  
26 231 Communication; Care Planning; Goals and Outcomes; Transitions; Organisational Process Activities;  
27 232 and Decision Making. These domains have been mapped to real-world actions that support the  
28 233 delivery of P3C (e.g. multi-disciplinary team meetings, care planning, provisions for information etc.)  
29 234 This allows the tool to translate concepts which are often abstract, and may be drawn from academic  
30 235 literature and policy documents, into actionable, tangible processes which a practice can implement.  
31 236 The result is a unique 29-question instrument with over 500 different possible responses, which  
32 237 provides a detailed and practical interrogation of P3C delivery. An equally-weighted scoring system  
33 238 allows results of the P3C-OCT to be aggregated into a single composite score, or alternatively by sub-  
34 239 domains of P3C – generating a score of 0-20, with higher scores indicating more P3C related activity.  
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40 240 The P3C-OCT provides a detailed profile of care delivery and organisation through 29 core questions.  
41 241 All questions ask about objective activities (e.g. processes in place to deliver P3C) and subjective  
42 242 responses (e.g. how well these are working). Scores are given out of a theoretical maximum of 20  
43 243 points. The P3C-OCT was also prepended by a series of SPQS-related questions about administrative  
44 244 and consultation time savings from discretion from QOF. Each SPQS practice was requested to  
45 245 complete the P3C-OCT at two time points (from Feb-Aug 2016 and Dec 2016-Mar 2017). In contrast,  
46 246 control practices only completed the P3C-OCT once (at Time 2).  
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## 50 247 **Data Collection**

51 248 All participating practices supported data collection of the three survey tools. With the P3C-EQ, from  
52 249 each practice, 100 patients with one or more LTCs, randomly sampled from the practice list (using a  
53 250 customised EMIS script), were invited to complete a postal questionnaire at a single time point.  
54 251 Patients received an information pack, consent sheet, demographic questionnaire and P3C-EQ. All  
55 252 returned questionnaires were entered into a Microsoft Access database prior to statistical analyses.  
56 253 For the P3C-Practitioner, we obtained an opportunity sample via both written and email  
57 254 communication with all participating practices. For the P3C-OCT, all participating practices were  
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3 255 offered an electronic or paper version, and we requested that the tool was completed by a  
4 256 combination of General Practitioner and Practice Manager (PM), thus ensuring representation of  
5 257 front-facing and backend operations of GP surgeries. Completion of the tool was mandatory as part  
6 258 of the SPQS evaluation.  
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### 9 259 **Analysis**

10 260 SPQS and control practices were compared on the P3C-Patient Experience survey and the P3C-  
11 261 Practitioner Experience Survey (at time 2; 6-12 months after initiation of second year/phase 2 of SPQS),  
12 262 with significance tested using the non-parametric unmatched Mann–Whitney–Wilcoxon (MWW) test  
13 263 taking into account within-practice clustering by calculating Somers' D statistic (non-parametric tests  
14 264 were used, as the scoring is a summation of Likert responses i.e. data was ordinal). For the P3C-  
15 265 Organisational Change Tool, we compared Time 1 (immediately after implementation of second  
16 266 year/phase 2 of SPQS) and Time 2 (6-12 months later), with significance evaluated by Wilcoxon signed  
17 267 rank test.  
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### 22 268 **Time Series of emergency admissions to hospital**

23 269 A multi-group interrupted time-series analysis (ITS) was conducted to identify whether de-  
24 270 incentivisation of QOF and the introduction of SPQS was associated with changes in emergency  
25 271 admissions to acute hospitals with a primary diagnoses for four long-term, ambulatory care sensitive  
26 272 conditions (ACSCs). Hospital episode statistics were obtained for patients from all 55 GP practices  
27 273 enrolled in the SPQS scheme (actually 56 practices in 2015/15) and 18 Somerset QOF practices (i.e.  
28 274 Somerset practices not enrolled in SPQS; initially 20). Data was obtained for a 70 month period from  
29 275 April 2011 to May 2018. This time period is divided into 38 months pre-intervention (Apr 2011 – May  
30 276 2014) and 48 months post intervention (June 2014 – May 2018; SPQS contract went live in June 2014,  
31 277 month 39). Data include monthly admission counts for four ACSCs: Acute Myocardial Infarction (AMI),  
32 278 Chronic Obstructive Pulmonary Disease (COPD), Diabetes, and Stroke. We selected these ACSCs as a  
33 279 proxy for preventable admissions and an indicator of any deteriorating quality of care associated with  
34 280 SPQS. Due to the difference in number of practices between SPQS and QOF practices, admissions were  
35 281 divided by the number of practices, thus providing an average of emergency admissions (expressed as  
36 282 admissions per month per practice). Analysis was performed using the *itsa* command[45] on STATA  
37 283 (StataCorp Ltd). This uses regression-based model with Newey-West standard errors. Pre- and post-  
38 284 intervention slopes/intercepts of the sample (SPQS practices) were compared to controls (QOF  
39 285 practices). Lag period was set to 1 month.  
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## 288 RESULTS

### 289 P3C-EQ

290 There were 1,752 responses received from 49 (89%) of the 55 practices enrolled in SPQS, and 611  
 291 responses from patients enrolled in the 17 control (QOF) practices (36% response rate and similar to  
 292 other similar other studies[46]). The responses of the two groups compared in Table 1.

293

294 **Table 1:** Demographic profile of responses to P3C-EQ as percentages.

	Participant demographics as a percentage										
	Age		Education			Gender			Multi-morbidity		
	QOF	SPQS		QOF	SPQS		QOF	SPQS	No. LTCs	QOF	SPQS
<=24	0.3	0.4	None	1.0	1.3	Male	44.0	43.4	1	19.6	20.1
25-34	2.5	1.3	Primary	3.1	2.1	Female	53.8	53.9	2	19.6	23.8
35-44	2.5	2.6	Secondary	33.7	34.6	Non-response	2.2	2.7	3	20.6	17.8
45-54	8.8	5.3	College/Vocational	26.4	28.1				4	11.3	13.7
55-64	18.3	13.3	Undergraduate	11.5	10.8				5	9.3	7.5
65-74	25.7	29.2	Postgraduate	8.2	7.8				6	4.7	5.1
75-84	29.3	32.7	Non-response	16.2	15.3				7	2.8	2.8
>=85	12.1	14.1							>=8	4.2	2.8
Non-response	0.5	1.0							Non-response	7.9	6.4

295

296 The mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1,752) and QOF controls (23.68,  
 297 n. 611) were not significantly different (MWW U test;  $p=0.346$ ), and indicate generally positive  
 298 experiences of care across both samples.

### 299 P3C-Practitioner results

300 Full results of the P3C-Practitioner are provided in Supplementary File 3. We received 98 responses  
 301 from 55 SPQS practices and 29 responses from 18 control practices from a mix of healthcare  
 302 professionals – 62 GPs (49%); 35 Nurses (27%); 12 Wellbeing Advisors; 7 LTC nurse; 11 others. The  
 303 mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1752) and QOF controls (23.68, n.  
 304 611) were not significantly different (MWW test;  $p=0.405$ ). Return rates are not applicable, as this was  
 305 a convenience sample where we requested response from at least two different professionals at each  
 306 practice.

### 307 P3C-OCT Results

308 To evaluate changes to P3C during the SPQS scheme we undertook an analysis of the organisation and  
 309 delivery of care using the P3C-OCT. Of 55 practices enrolled in the scheme, 36 practices provided  
 310 admissible data (i.e. complete and timely) at the two evaluation time-points (Time 1: 2/2016–8/2016  
 311 and Time 2 was 12/2016-5/2017; 65% response rate). This revealed an increase (0.9;  $p=0.034$ ) in  
 312 aggregate scores on the P3C-OCT between T1 (5.8) to T2 (6.7). This therefore represents a measurable  
 313 increase in activity towards person centred coordinated care delivery and organisation (see table 2),  
 314 with a moderate effect size ( $r=0.42$ ). To determine the specific areas of person centred coordinated  
 315 care (P3C) that improved during the evaluation, this was examined by domains of P3C[34–36]. When

316 broken into subdomains of P3C, significant improvements were delivered in areas related to 'Goals  
317 and Outcomes' (e.g. goal setting with patients; 1.7 increase,  $p=0.00$ ; large effect size  $r=0.61$ ).

318

319 **Table 2:** Mean changes in P3C-OCT scores between time 1 and time 2 for 36 paired practices. The top row  
320 provides the total OCT score (out of a maximum of 20), followed by domains of P3C. The OCT score for each  
321 domain is given for time 1, time 2 and the difference between time 1 and 2. The statistical significant of these  
322 differences is indicated by  $p$ -value from Wilcoxon signed rank test. Statistically significant results (at the level  
323  $p<0.008$ ; corresponding to a Bonferroni adjustment for 6 tests at the  $p<0.05$  significance level) are indicated in  
324 bold font and with an asterisk next to the  $p$ -value. Effect sizes were calculated as test statistic  $z$  by the square  
325 root of the number of pairs.

	Time 1	Time 2	Change T1→ T2 ( $p$ -value; effect size)
<b>Total OCT Score:</b>	<b>5.8</b>	<b>6.7</b>	<b>0.9 (<math>p=0.01</math>; <math>r=0.42</math>)*</b>
<b>Information &amp; Communication</b>	7.4	8.1	0.7 ( $p=0.25$ ; $r=0.19$ )
<b>Care Planning</b>	6.6	7.2	0.6 ( $p=0.14$ ; $r=0.25$ )
<b>Goals &amp; Outcomes</b>	6.1	7.8	<b>1.7 (<math>p&lt;0.001</math>; <math>r=0.61</math>)*</b>
<b>Transitions</b>	4.9	5.2	0.3 ( $p=0.43$ ; $r=0.13$ )
<b>Organisational Process Activities</b>	4.3	5.2	0.9 ( $p=0.03$ ; $r=0.36$ )
<b>Decision Making</b>	3.8	4.4	0.6 ( $p=0.07$ ; $r=0.3$ )

326

327 Further to the longitudinal analysis, SPQS practices were also compared to a cohort of 17 non-SPQS  
328 practices from the South West (all control practices returned data at Time 2). Aggregate results for  
329 the P3C-OCT revealed that control practices had an aggregate score of 6.2 on the P3C-OCT, with no  
330 significant difference between SPQS and control practices either before (a score of 5.8 versus 6.2;  
331  $p=0.64$ ) or after (6.7 versus 6.2;  $p=0.41$ ) the intervention.

### 332 **Discretion from QOF and time savings**

333 When asking SPQS practices to complete the P3C-OCT, we also included a number of additional  
334 questions related to the SPQS scheme. We asked SPQS practices a subjective appraisal of time savings  
335 (both in GP consultations and administration) from enrolment in the scheme. These are shown in  
336 figure 2. More than half (55%) of the practices (28 of 51 practices that completed these questions)  
337 agreed that time had been freed up within the 10 minute standard consultation time.

338 <figure 2 here>

339 **Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP  
 340 administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

341

342 With regard to administrative time savings, more than three quarters of SPQS practices (40/51; 78 %) reported administrative (non-consultation time for practitioners) time savings since initiation of the scheme, with just over one third of these practices (14/51; 27%) reporting gains of more than 2 hours per week. For administrators and non-clinical staff, SPQS was reported to free up time for more than 86% (44/51) of practices with only 13 % (7/51) reporting a negligible effect. Free text response boxes confirmed the plans of the STPs (see introduction and Supplementary File 1), stating that efficiency had been leveraged for increased collaborative and federation-level working, including engagement with a number of schemes in Somerset designed to improve person centred and coordinated care e.g. “Better use of Symphony”, “Engagement with EPC”, “Rural Practice Network”, “Health coaches”, “Huddles”, “P3C relevant training”, “Replaced by other work such as Symphony/health coaching etc”, “This hasn't shown a reduction in workload but rather a change in workload.” In this manner, the time savings leveraged from QOF were not hypothesised to lead to an improvement of experiences for practitioners, but instead a shift in workload.

### 355 *Retention of QOF elements*

356 When asking SPQS practices to complete the P3C-OCT, we also included a number of questions specific to the implementation of SPQS. When asked ‘Are you still using components of the QOF?’, nearly all practices enrolled in SPQS continued to use at least some aspects of QOF (only 1 out of 51 respondents to this question stated “none”; 86% of practices used “Some”, “Most” or “All”). We further investigated the continued utilisation of QOF via a free-text response in the P3C-OCT questionnaire. This revealed that QOF was still (according to one practice) utilised by “applying individually, not 'point scoring'”. A common aspect that was dropped was exception reporting, with time also being saved by avoiding “target chasing”. Elements of QOF were also contractually retained such as the CQRS (Calculating Quality Reporting System). This remained active under the SPQS contract to allow data on prevalence and key indicators to be collected from practices via GPES (GP Extraction System), where prevalence figures are utilised in the SPQS payments calculation.

367 QOF also continued to be utilised for the monitoring of LTCs and recall of patients with LTCs for routine check-ups. Around a half of SPQS practices (n=25) still use QOF for recall of at least some (or all) conditions (e.g. checking for recall requirements for patients with LTCs and the management of specific chronic diseases). Free text responses suggested that whilst recall was an essential function, the implementation under QOF was overly burdensome and not tailored for multiple morbidities. Some practices countered this by running in-house developed searches with a priority to “concentrate on an integrated LTC system”. This suggests that there is scope for collaboration to design an overhauled, integrated recall system that is specifically designed for efficient management of multiple LTCs (as previously proposed[47,48]).

### 376 **Time Series of Hospital Episode Statistics**

377 Results of the ITS are shown in figure 3. No significant increases were detected in the slope post-intervention (i.e. after the initiation of the SPQS contract in June 2014) in emergency admissions for patients with a primary diagnosis of four ACSCs in SPQS practices. Full results of significance tests are provided in Supplementary File 4. The removal of QOF has had no significant effect on emergency

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3 381 admissions for these four ACSCs at the time of intervention, or in the two years following. However,  
4 382 for the non-SPQS Somerset practices, a significant slope change (increase) in admissions for AMI and  
5 383 Diabetes was observed, and a significant slope change (decrease) for admissions for Stroke was  
6 384 observed. These changes in admissions are therefore unrelated to the SPQS contract (see discussion  
7 385 below).

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10 386 <figure 3 here>

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12 387 **Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left  
13 388 to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary  
14 389 Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was live  
15 390 from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of  
16 391 admissions, normalised as admissions per month per practice. Black circles indicate the average number of  
17 392 emergency admissions in each month for SPQS practices; white circles are average admissions for QOF Somerset  
18 393 practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and dashed (for QOF  
19 394 Somerset practices). All changes between pre- and post-intervention between SPQS and QOF practices are non-  
20 395 significant (see Supplementary File 4).

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## 25 26 397 DISCUSSION

27 398 We observed a variety of responses to de-incentivisation of QOF in Somerset. Some QOF-related  
28 399 components remained mandatory (prevalence reporting). Some 'desirable' features of the QOF  
29 400 system were still used (e.g. prompts during consultation), others were adapted (e.g. patient recall)  
30 401 and some burdensome components dropped altogether (e.g. exception reporting).

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33 402 Practices reported that these alterations had led to time and resource savings in both GP consultations  
34 403 and administration. These time savings were used to increase involvement in implementation projects  
35 404 such as Symphony Test and Learn, Village Agents, Health connections, and the South Somerset  
36 405 Vanguard. These were planned as part of the SPQS contract and associated ongoing healthcare  
37 406 reforms. These local implementation projects are actively targeting service redesign for complex  
38 407 patient needs, using person centred coordinated care across practice contexts. These projects have  
39 408 involved stronger federation-level agreements and informal networks, increased multidisciplinary  
40 409 team working, reallocation of resources for health care assistants (including Health and Wellbeing  
41 410 Advisors and Health Coaches), nurses and others, single points of access for the patient, shared  
42 411 electronic record systems, increased use of care planning and changes to structure and timings of GP  
43 412 appointments. The results of our longitudinal P3C-OCT survey confirm significant improvements in  
44 413 P3C, suggesting that SPQS has been successful in its stated aims as a system lever for service redesign  
45 414 aimed at the delivery of greater person centred and coordinated primary care.

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48 415 Whilst there is emerging evidence that P3C approaches can improve outcomes (particularly for  
49 416 complexity/multimorbidity)[36,49], we could not establish that the changes introduced via SPQS are  
50 417 leading to better outcomes for patients. Patient experience is downstream of the organisational  
51 418 changes occurring in Somerset, and any detectable improvement in patient outcomes may be delayed.  
52 419 The results of the patient P3C-EQ experience established a similar experience of care in Somerset  
53 420 compared to the control QOF practices (who represent active, research engaged-organisations,  
54 421 whereas completion of the survey was mandatory for SPQS practices; see methods). Similarly,  
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3 422 comparison of practitioner perspective of P3C to the control group revealed similar experiences in  
4 423 SPQS versus the control practices. These findings are broadly reflective of results from other  
5 424 initiatives, where – for example – patient-centred care for multimorbid patients recently revealed  
6 425 mixed effects on processes of care, but was not associated with measurable improvements in quality  
7 426 of life or other secondary outcomes, with the authors concluding that the initiative “supported  
8 427 changes in organisation more than it supported changing the clinicians' attitudes on which patient-  
9 428 centredness depends.” [50]

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13 429 In reference to disbenefits, we could find no evidence of increased admissions associated with SPQS.  
14 430 However, ITS did establish trend changes in admissions in non-SPQS Somerset practices (e.g.  
15 431 those practices that retained the QOF contract). A significant increase was observed in admissions  
16 432 with a primary diagnosis of AMI and Diabetes, and a significant decrease observed for those with a  
17 433 primary diagnosis of Stroke. It is, however, unlikely that relatively minor changes to QOF in the years  
18 434 2014/15 and 2015/16 [51,52] have led to these observed trend changes in emergency admission.

21 435 Whilst the time series did not establish any disbenefits in SPQS practices, earlier evaluation of SPQS  
22 436 established that deincentivisation of QOF leads to inconsistent recording of QOF data. Subsequently,  
23 437 analysis of QOF scores have little utility in assessing the quality of care in Somerset[31]. This paucity  
24 438 of data represents a major disbenefit of QOF deincentivisation: one of the primary benefits of QOF  
25 439 has been the widespread recording of clinical activities[1] and availability of GP data and research[6,7].  
26 440 It is not currently clear how ‘quality’ could be assessed in the post-QOF landscape – a question that  
27 441 has major implications for research, evaluation, healthcare management.

### 31 442 **Limitation of the study**

32 443 The ability to draw firm conclusions from this study were limited by several factors. Due to time and  
33 444 resource pressures on general practice in the UK, we struggled to recruit controls from the within  
34 445 the same county (Somerset) or matched controls from the region. As an alternative, we obtained  
35 446 non-matched controls from the region. These represented a biased cohort of research-engaged  
36 447 practices. We could not detect improvements in experiences of healthcare professionals or patients  
37 448 – this could be because the intervention had no effect on these outcomes, the instruments were not  
38 449 sensitive enough, the controls were unsuitable, or changes to patient/practitioner experiences were  
39 450 somewhat distal to the intervention. A further limitation of the study methods was that P3C-OCT  
40 451 was only administered to control practices at the second time-point, meaning that we cannot  
41 452 determine if significant improvements of P3C-OCT score in SPQS practices might also have been  
42 453 present in controls.

### 47 454 **Implications for the future**

48 455 Whilst previous calls for the removal of QOF in England [53] have not been reiterated, recent policy  
49 456 has moved towards a reformed, streamlined version of QOF [54,55]. With QOF continuing to evolve,  
50 457 lessons from SPQS have implications for UK policy. We have previously made a number of suggestions  
51 458 for the future landscape of QOF[47,48]. These include retaining limited components of QOF (e.g. those  
52 459 elements that are desirable by GPs; “QOF-Lite”), the development of novel systematic data-capture  
53 460 (including GP contact data) or collaboration on an overhauled, integrated recall system that is  
54 461 specifically designed for efficient management of multiple LTCs[47,48]. General Practice, however, is  
55 462 under huge time and resource pressures[56]. Any proposed alternatives will have to fulfil the primary  
56 463 requirements of being a streamlined process for supporting coordination of care, especially for those

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3 464 with complex health needs. The recent national review of QOF concluded that QOF should be  
4 465 reformed to become more person-centred, create space for professionalism and optimally impact  
5 466 wider population health and system resource utilisation[57].  
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## 13 14 470 **FIGURE LEGENDS**

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16 471 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.

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18 472 **Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP  
19 473 administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

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21 474 **Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left  
22 475 to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary  
23 476 Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was live  
24 477 from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of  
25 478 admissions, normalised as admissions per month per practice. Black circles indicate the average number of  
26 479 emergency admissions in each month for SPQS practices; white circles are average admissions for QOF Somerset  
27 480 practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and dashed (for QOF  
28 481 Somerset practices). All changes between pre- and post-intervention between SPQS and QOF practices are non-  
29 482 significant (see Supplementary File 4).  
30  
31

## 32 33 483 **ACKNOWLEDGMENTS**

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36 486 those of the author(s) and not necessarily those of the NHS, the NIHR or the Department of Health  
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39 489 professionals and patients who gave their precious time to support this evaluation.  
40  
41

## 42 43 490 **DATA SHARING STATEMENT**

44 491 All data relevant to the study are included in the article or uploaded as supplementary information.  
45

## 46 492 **COMPETING INTERESTS**

47  
48 493 None declared.  
49

## 50 494 **ETHICS AND FUNDING**

51 495 Ethical clearance was obtained from the Plymouth University Ethics Committees (FREC). All  
52 496 participants were given an information pack about the study, and gave informed consent.  
53 497 This research was supported by the National Institute for Health Research (NIHR) Collaboration for  
54 498 Leadership in Applied Health Research and Care South West Peninsula. Funding for this evaluation  
55 499 was provided South West Academic Health Sciences Network (SWAHSN).  
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57 500

## 501 CONTRIBUTIONS

- 502 **J Close** corresponded with partaking practices, collected data, analysed data and compiled  
503 manuscript.
- 504 **B Fosh** input, validated and analysed data.
- 505 **H Wheat** corresponded with partaking practices and collected data.
- 506 **J Horrell** corresponded with partaking practices and collected data.
- 507 **W Lee** supported the Interrupted Time Series analysis.
- 508 **R Byng** aided study design and conception.
- 509 **Bainbridge M** corresponded with partaking practices and data collection.
- 510 **L Witts** helped with study design, data collection and corresponded with partaking practices.
- 511 **R Blackwell** collected and analysed data for Hospital Episode Statistics.
- 512 **L Hall** corresponded with partaking practices and collected data.
- 513 **Lloyd H** designed and oversaw the study from inception to completion.
- 514 All authors read, contributed to and approved the manuscript.

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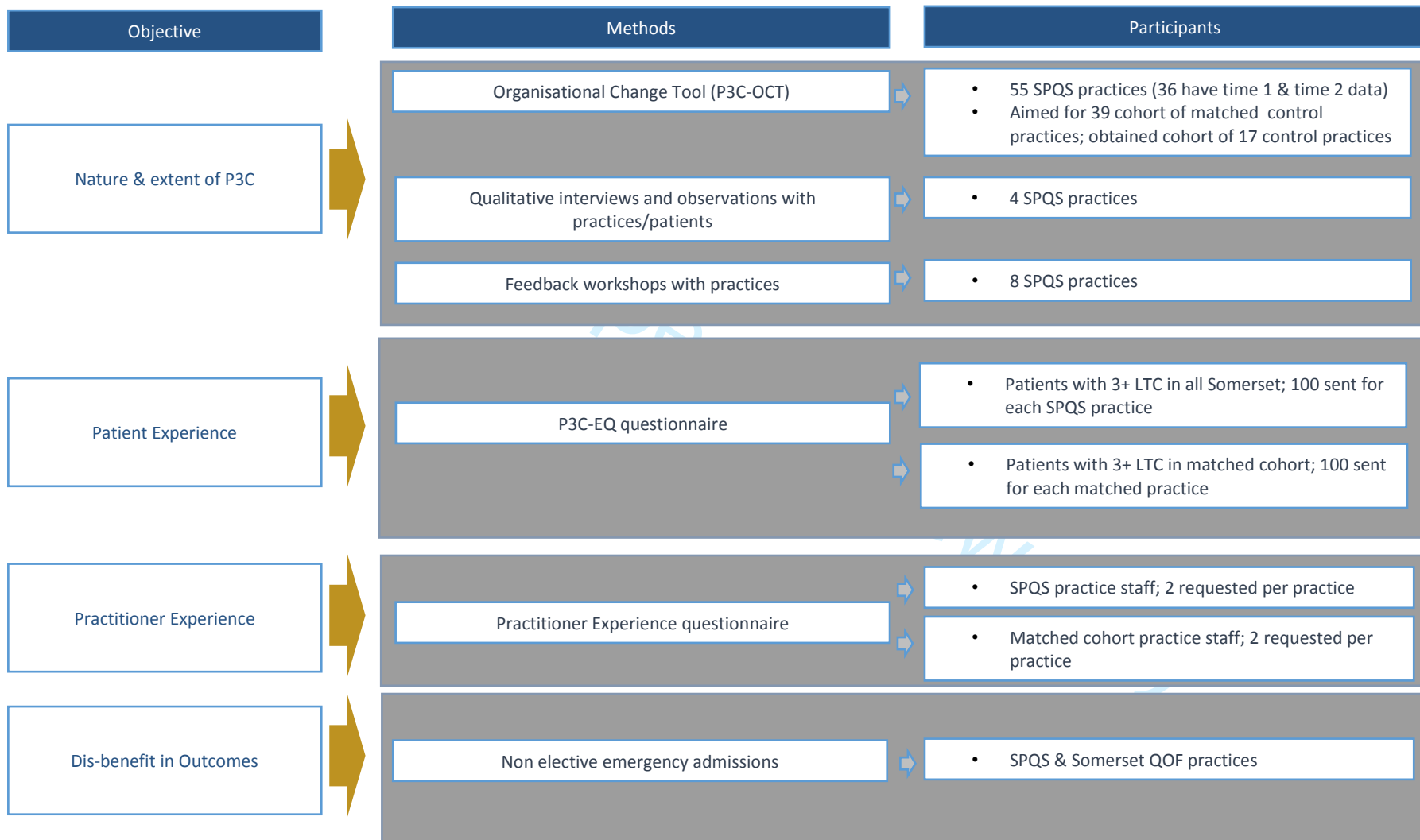
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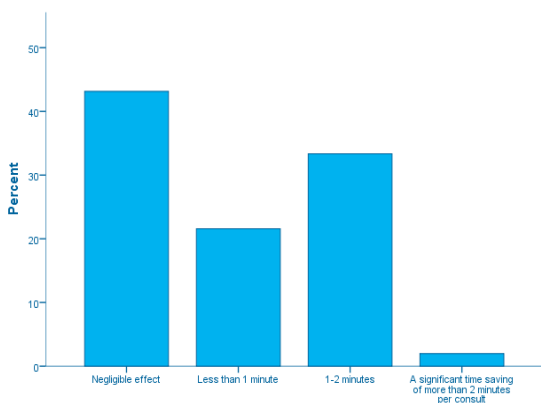
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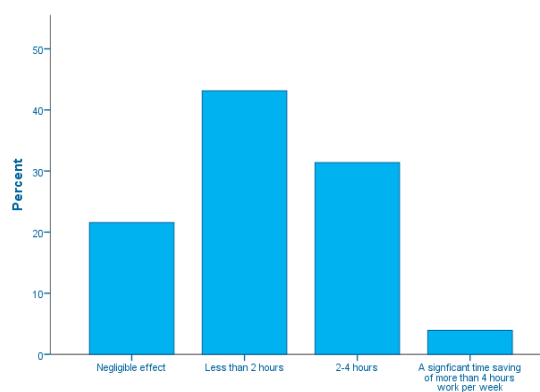


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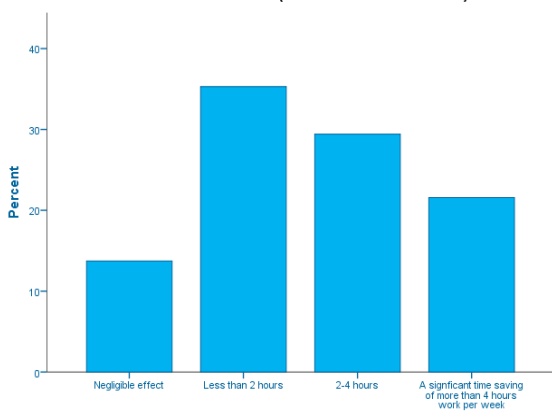
On average, how much time has the removal of QOF freed up per 10 min GP consultation?



On average, how much has been freed up each week from the administrative burden of QOF for GPs (i.e. outside consultation time)?



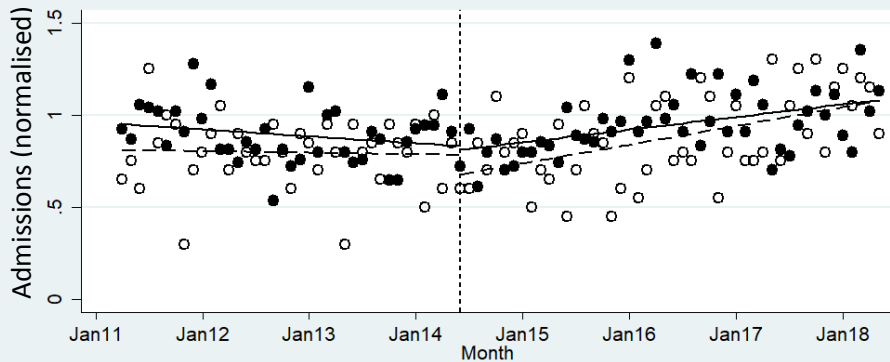
On average, how much time has been freed up in each week from the administrative burden of QOF (for administrators/non-GPs)?



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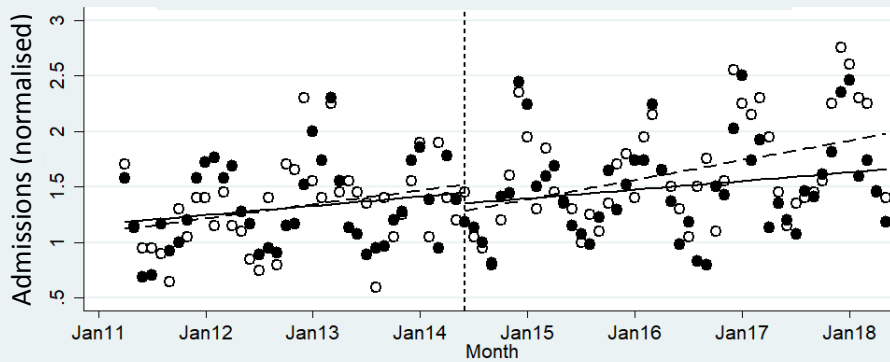
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### Acute Myocardial Infarction



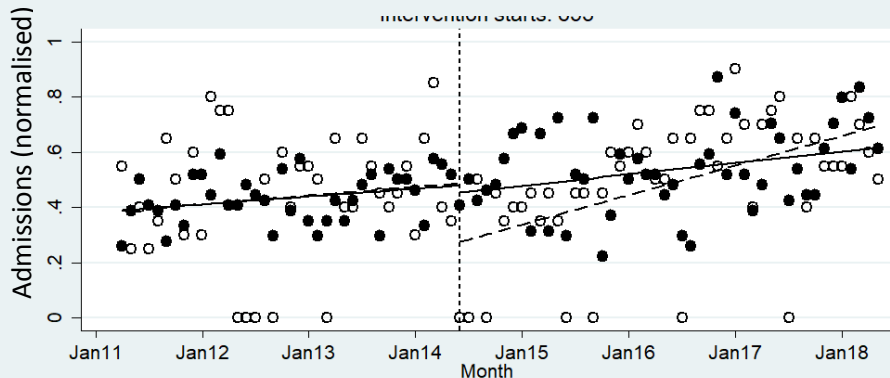
SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Chronic Obstructive Pulmonary Disease (COPD)



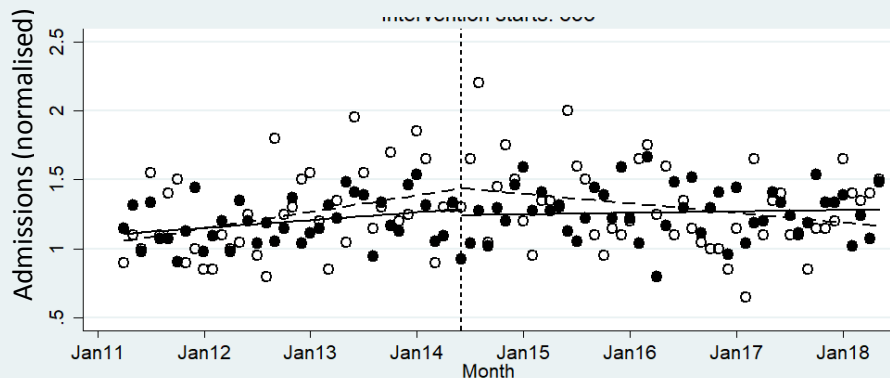
SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Diabetes



SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Stroke



SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

Supplementary File 1: Overview of Sustainability and Transformation Plan (STPs) for 28 of 55 practices (anonymised) enrolled in SPQs; with 2 further STPs completed at federation level.

Activities:	TOTAL for each activity (from a total of 30 STPs):	Practice 1	Practice 2	Practice 3	Practice 4	Practice 5	Practice 6	Practice 7	Practice 8	Practice 9	Practice 10	Practice 11	Practice 12	Practice 13	Practice 14
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	20 (66.6%)	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Continued/increased involvement in Mendip Your Health & Wellbeing	5 (16.7%)	✓					✓		✓	✓		✓			
Use/development of technology to assist self-management	3 (10%)		✓		✓										
Increased use of Health Connectors Mendip	4 (13.3%)		✓				✓			✓	✓				
Investing time in community engagement	2 (6.7%)		✓												
MDTs in care coordination hubs	1 (3.3%)		✓												
MDTs with district nurses at palliative care reviews (weekly)	1 (3.3%)		✓												
Engagement in compassionate communities and network mapping	1 (3.3%)		✓												
Increased or continued participation with Symphony	12 (40%)				✓		✓	✓	✓	✓		✓			
Possible division of urgent and routine care & formation of urgent care hub	6 (20%)				✓		✓		✓				✓	✓	
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)	17 (56.6%)		✓	✓	✓				✓	✓		✓		✓	
Consideration of practice merger	7 (23.3%)				✓		✓	✓	✓	✓					
Training & upskilling	5 (16.7%)									✓					
Engagement in Somerset together programme	1 (3.3%)											✓			
Development of personalised care planning	1 (3.3%)											✓			
Telephone consultations/ telemedicine	2 (6.7%)														
Use of health coaches	9 (30%)														
Engagement in Living Better programme	1 (3.3%)														

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	Practice 15	Practice 16	Practice 17	Practice 18	Practice 19	Practice 20	Practice 21	Practice 22	Practice 23	Practice 24	Practice 25	Practice 26	Practice 27	Practice 28	Federation 1	Federation 2
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	✓	✓	✓									✓	✓	✓	✓	✓
Continued/ increased involvement in Mendip Your Health & Wellbeing																
Use/development of technology to assist self-management															✓	
Increased use of Health Connectors Mendip																
Investing time in community engagement												✓				
MDTs in care coordination hubs																
MDTs with district nurses at palliative care reviews (weekly)																
Engagement in compassionate communities and network mapping																
Increased or continued participation with Symphony					✓	✓	✓				✓		✓	✓		
Possible division of urgent and routine care & formation of urgent care hub																✓
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)	✓	✓	✓	✓		✓		✓	✓	✓			✓			✓
Consideration of practice merger											✓					✓
Training & upskilling	✓	✓	✓	✓												
Engagement in Somerset together programme																
Development of personalised care planning																
Telephone consultations/ telemedicine	✓	✓														
Use of health coaches	✓	✓				✓		✓	✓	✓		✓	✓	✓		
Engagement in Living Better programme																✓

## Supplementary File 2: Timeline of SPQS scheme and evaluation.

### Development Phase:

April 2012 – March 2013



### Transition year from QOF to SPQS:

April 2013 – March 2014



SPQS contract goes live in June  
2014

### Year 1 - Planning:

April 2014 – March 2015



Phase 1 Evaluation  
Nov 2014 – July 2015

### Year 2 – Transformation:

April 2015 – March 2016



Phase 2 Evaluation  
Nov 2015 – March 2017

### Year 3 - Baseline year:

April 2016 – March 2017



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## Full results of P3C-Practitioner questionnaire

### Selection of P3C-Practitioner

The P3C-practitioner was selected for this study by initially conducting a scoping review to identify measures that included aspects of professional experiences of integrated/coordinated care. This identified 33 measures, four of which were deemed relevant (Safety Net Medical Home Provider Experience Survey; Person-Centred Health Care for Older Adults Survey” (PCHCOA) – which we refer to as the “P3C-practitioner”; Staff Questionnaire - Integrated Care Evaluation Pilots; North West London Integrated Care Pilot - Practitioner Survey). These measures were then presented to workshop attendees (healthcare professionals; managers; senior NHS England representatives; local commissioners; academics) to explore the strengths and weaknesses in terms of applicability and utility as part of routine data collection in respective settings. The PCHCOA was selected due to its established psychometric properties (Briony Dow et al., *Development and initial testing of the Person-Centred Health Care for Older Adults Survey*, 25 *International Psychogeriatrics* 1065–1076 (2013)), its good coverage of domains of P3C and a positive response at the feedback workshop. For the purposes of this evaluation, we have renamed the instrument the P3C-practitioner.

### Scoring of P3C-Practitioner

Whilst previously validated, the authors did not develop an aggregate scoring mechanism for the instrument. Therefore, we generated summary scores by simple addition from the 4-point Likert scale (Never = 0; Rarely = 1; Sometimes = 2; Usually = 3; Always = 4). This allowed us to compare aggregate scores to compare SPQS versus controls over all 29 questions (see table below), with significance tested using MWW test. We also generated sub-scales by addition of question relevant to this aspect of P3C (see following page for questions). No significant differences were detected in practitioner experiences in SPQS or control practices, for either mean scores or the following subscales.

**Sub-Scale: Person Centred Care** = Questions 1.1, 1.3, 1.4, 2.1, 2.2, 5.1, 6.1,6.2,6.3, 7.1, 7.2, 7.3, 8.1 8.2 and 8.3.

**Sub-Scale: Coordinated Care** = Questions 4.1, 4.2, 4.3

**Sub-Scale: Working Environment** = Questions 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

	QOF	SPQS	Sig. (2-tailed)
<b>Mean Score</b>	<b>83.79 (n=29)</b>	<b>86.18 (n=98)</b>	<b>.4</b>
Sub-Scale: Person Centred Care	47.62	49.11	.35
Sub-Scale: Coordinated Care	7.41	8.38	.12
Sub-Scale: Working Environment	22.03	21.11	.24

### P3C-Practitioner instrument

Q1.1 In my work area, service users / patients have an equal say with the rest of the team in the development of the support plan.

Q1.2. In my work area, service users / patients and carers have an equal say with the rest of the team in the development of the discharge plan or exit strategy from the service.

Q1.3. My/our support plans are structured around the service user's/patient's goals.

Q1.4. Where I currently work, we provide services in the location that best suits the needs and preferences of the service user/patient and their carers.

Q2.1. I ask service users/patients what their goals/needs are for their health and wellbeing.

Q2.2 I ask the carer/s what their goals/ needs are for the health and wellbeing of the person they support.

Q3.1. I am supported to develop the skills I need to work with the service user/patient and their carers.

Q3.2. Where I am currently working, I have been exposed to good role models in care/support for service users/patients.

Q3.3. Expectations of my role and how I treat the service users/patients I support are communicated clearly and consistently.

Q3.4. I feel that I work as part of a team with a recognised and valued contribution.

Q3.5. The emotional and physical demands of my work are acknowledged and recognised.

Q3.6. I feel that I am able to fully use my skills in my work with the service users/patients

Q3.7. My work environment values the care/support I provide to the service users/patients.

Q4.1. It is clear to the service user/patient or their carer who their key worker is.

Q4.2. The service user/patient and their carer have ready access to a key identified person (i.e. they are available by phone, messages are returned promptly).

Q4.3. Where I currently work, we know how to direct the service user/patient to the most appropriate service without them having to make another call (single point of contact).

Q4.4. After the service user/patient is discharged/leaves the service, they receive a follow-up phone call or visit.

Q5.1. Where I currently work, adequate transport and parking are provided to ensure access for service users/patients and their families/carers.

Q5.2. Where I currently work, service users'/patients' personal privacy is respected.



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3 Q6.1. I am able to meet the communication needs of service users/patients and their carers when  
4 working with them.  
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6 Q6.2. Written materials are provided by my place of work to service users/patients and their carers  
7 in a language they can understand.  
8

9 Q6.3. Information is provided in a variety of ways to ensure all service users/patients and their  
10 carers have access (e.g. written, verbal, visual).  
11

12 Q7.1. I welcome it when service users/patients are informed and question or challenge my advice.  
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14 Q7.2. The needs and preferences of service users/patients should be central in all services.  
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16 Q7.3. I like working with the service users/patients I support or care for.  
17

18 Q8.1. It is an important part of my job to get to know my service user/patient (e.g. call them by their  
19 preferred name, remember and repeat something they have told me).  
20

21 Q8.2. I give service users and their carers adequate time to talk to me (e.g. to discuss their concerns  
22 and their expectations).  
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24 Q8.3. I seek to find out what is important to service users/patients about their health and wellbeing  
25 (e.g. mobility, cognitive function, being part of the family, able to go to the gym).  
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**Supplementary File 4:** Results of interrupted time-series analysis for emergency admissions on four long-term, ambulatory care sensitive conditions (ACSCs). Full results are provided, although the most relevant statistical tests (column “P>|t|”) are for the rows:

“\_z\_x659” the difference between the changes in intercept for SPQS and QOF pre/post intervention)

“\_z\_x\_t659” the difference between the changes in gradient for SPQS and QOF pre/post intervention.

All are non-significant, revealing no excess increases in emergency admissions in SPQS practices for these four ACSCs after the implementation of the SPQS scheme. Significant differences were observed, however, for changes in the *control* slope and/or intercept pre/post intervention for Acute Myocardial Infarction, Stroke and Diabetes . These are highlighted in red below.

#### Acute Myocardial Infarction (AMI)

Description	PRIM_AMI	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	-.0007003	.0025541	-0.27	0.784	-.0057435	.0043429
Difference between control/SPQS pre-intervention intercepts	_z	.1396686	.0801094	1.74	0.083	-.0185102	.2978475
Difference between control/SPQS pre-intervention slopes	_z_t	-.0024182	.0034503	-0.70	0.484	-.009231	.0043946
Change in control intercept	_x653	-.1043759	.0677199	-1.54	0.125	-.2380911	.0293393
<b>Change in control slope</b>	<b>_x_t653</b>	<b>.0091594</b>	<b>.0030779</b>	<b>2.98</b>	<b>0.003</b>	<b>.0030819</b>	<b>.0152369</b>
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.0853708	.0946241	0.90	0.368	-.1014677	.2722093
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0003106	.0040914	-0.08	0.940	-.0083892	.0077679
Intercept of control pre-intervention	_cons	.8103239	.0652408	12.42	0.000	.6815037	.9391441

**Chronic Obstructive Pulmonary Disease (COPD)**

Description	PRIM COPD	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0105427	.0048903	2.16	0.033	.0008867	.0201988
Difference between control/SPQS pre-intervention intercepts	_z	.0619958	.1748488	0.35	0.723	-.2832492	.4072408
Difference between control/SPQS pre-intervention slopes	_z_t	-.0035803	.0077243	-0.46	0.644	-.0188323	.0116717
Change in control intercept	_x653	-.2382072	.1889151	-1.26	0.209	-.6112265	.1348121
Change in control slope	_x_t653	.0041691	.0078257	0.53	0.595	-.011283	.0196211
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.1413474	.2797523	0.51	0.614	-.4110331	.693728
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0046434	.011329	-0.41	0.682	-.0270129	.0177261
Intercept of control pre-intervention	_cons	1.122065	.1089517	10.30	0.000	.9069359	1.337194

**Stroke**

Description	PRIM STRK	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0100503	.0041188	2.44	0.016	.0019176	.0181831
Difference between control/SPQS pre-intervention intercepts	_z	.0528715	.0954745	0.55	0.580	-.1356461	.2413891
Difference between control/SPQS pre-intervention slopes	_z_t	-.0053472	.0047727	-1.12	0.264	-.014771	.0040765
Change in control intercept	_x653	-.0003719	.1374057	-0.00	0.998	-.2716843	.2709404
<b>Change in control slope</b>	<b>_x_t653</b>	<b>-.0158336</b>	<b>.005394</b>	<b>-2.94</b>	<b>0.004</b>	<b>-.0264841</b>	<b>-.005183</b>
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	-.0449425	.1616696	-0.28	0.781	-.3641647	.2742798
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0119868	.0062141	1.93	0.055	-.0002831	.0242568
Intercept of control pre-intervention	_cons	1.05749	.0852406	12.41	0.000	.8891793	1.2258

## Diabetes

Description	PRIM DIAB	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0025823	.0026916	0.96	0.339	-.0027323	.0078969
Difference between control/SPQS pre-intervention intercepts	_z	.0005698	.0759019	0.01	0.994	-.1493012	.1504408
Difference between control/SPQS pre-intervention slopes	_z_t	-.0001994	.0029745	-0.07	0.947	-.0060726	.0056738
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.2114749</b>	<b>.0751425</b>	<b>-2.81</b>	<b>0.005</b>	<b>-.3598463</b>	<b>-.0631036</b>
Change in control slope	_x_t653	.0063408	.0033715	1.88	0.062	-.0003164	.012998
<b>difference between the changes in intercept for SPQS and QOF pre/post intervention</b>	<b>_z_x653</b>	<b>.1864524</b>	<b>.0866148</b>	<b>2.15</b>	<b>0.033</b>	<b>.0154285</b>	<b>.3574763</b>
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0052892	.0038335	-1.38	0.170	-.0128586	.0022802
Intercept of control pre-intervention	_cons	.3890688	.0704267	5.52	0.000	.2500088	.5281288

## Combined (AMI/COPD/Stroke/Diabetes)

Description	SECD_AMI	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0224751	.0064245	3.50	0.001	.0097898	.0351604
Difference between control/SPQS pre-intervention intercepts	_z	.2551058	.227217	1.12	0.263	-.193542	.7037535
Difference between control/SPQS pre-intervention slopes	_z_t	-.0115452	.009923	-1.16	0.246	-.0311385	.0080482
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.5544301</b>	<b>.2489365</b>	<b>-2.23</b>	<b>0.027</b>	<b>-1.045964</b>	<b>-.0628964</b>
Change in control slope	_x_t653	.0038357	.0103935	0.37	0.713	-.0166866	.024358
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.3682284	.3741294	0.98	0.326	-.3705031	1.10696
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0017436	.0148231	0.12	0.907	-.0275252	.0310124
Intercept of control pre-intervention	_cons	3.378947	.1531439	22.06	0.000	3.07656	3.681335

## STROBE Statement—checklist of items that should be included in reports of observational studies

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**Recommendation**

<b>Title and abstract</b>	p2	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
<b>Introduction</b>		
Background/rationale	P3-5	Explain the scientific background and rationale for the investigation being reported
Objectives	L126-132	State specific objectives, including any prespecified hypotheses
<b>Methods</b>		
Study design	L135-145	Present key elements of study design early in the paper
Setting	Setting g L135-145; dates L210-217	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	L148-168	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	L169-198	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	L169-198	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	L158-161	Describe any efforts to address potential sources of bias
Study size	L149-151	Explain how the study size was arrived at

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Quantitative variables	L209- 235	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	L209- 235	<hr/> <i>(a)</i> Describe all statistical methods, including those used to control for confounding <hr/> <i>(b)</i> Describe any methods used to examine subgroups and interactions <hr/> <i>(c)</i> Explain how missing data were addressed <hr/> <i>(d) Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy <hr/> <i>(e)</i> Describe any sensitivity analyses

Continued on next page

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<b>Results</b>		
Participants	L2 39- 247	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed <hr/> (b) Give reasons for non-participation at each stage <hr/> (c) Consider use of a flow diagram
Descriptive data	Ta 1	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders <hr/> (b) Indicate number of participants with missing data for each variable of interest <hr/> (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)
Outcome data	L2 39- 282	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <hr/> <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <hr/> <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures
Main results	L2 39- 357	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included <hr/> (b) Report category boundaries when continuous variables were categorized <hr/> (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	N/ A	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
<b>Discussion</b>		
Key results	L3 60- 397	Summarise key results with reference to study objectives
Limitations	L4 05- 413	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	N/ A	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	N/ A	Discuss the generalisability (external validity) of the study results
<b>Other information</b>		
Funding	L4 51- 6	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).

# BMJ Open

## A Longitudinal Evaluation of a Countywide Alternative to the Quality and Outcomes Framework in UK General Practice, Aimed at Improving Person Centred Coordinated Care.

Journal:	<i>BMJ Open</i>
Manuscript ID	bmjopen-2019-029721.R3
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Date Submitted by the Author:	23-May-2019
Complete List of Authors:	Close, James; University of Plymouth, Community and Primary Care research group Fosh, Ben ; University of Plymouth, Community and Primary Care Research Group Wheat, Hannah; University of Exeter, Sociology, Philosophy and Anthropology department Horrell, Jane; University of Plymouth, Community and Primary Care Research Group Lee, William; University of Plymouth, Community and Primary Care research group Byng, Richard; University of Plymouth, Peninsula Schools of Medicine and Dentistry Bainbridge, Michael ; NHS Somerset Clinical Commissioning Group Blackwell, Richard; South West Academic Health Science Network Witts, Louise; South West Academic Health Science Network Hall, Louise; South West Academic Health Science Network Lloyd, Helen; University of Plymouth, Psychology
<b>Primary Subject Heading</b>:	General practice / Family practice
Secondary Subject Heading:	Public health, Patient-centred medicine, Health services research, Health policy, Evidence based practice
Keywords:	Organisational development < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Organisation of health services < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, Quality in health care < HEALTH SERVICES ADMINISTRATION & MANAGEMENT, PRIMARY CARE

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Manuscripts



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7 3 **Outcomes Framework in UK General Practice, Aimed at Improving Person**  
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9 4 **Centred Coordinated Care.**  
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## 71 **Evaluation of a Countywide Alternative to the Quality and Outcomes** 72 **Framework, Aimed at Improving Person Centred Coordinated Care.**

### 73 **Abstract**

#### 74 **Objectives.**

75 To evaluate a county-wide deincentivisation of the Quality and Outcomes Framework (QOF) payment  
76 scheme for UK General Practice (GP).

#### 77 **Setting**

78 In 2014, NHS England signalled a move towards devolution of QOF to Clinical Commissioning Groups.  
79 Fifty-five GP practices in Somerset established the Somerset Practice Quality Scheme (SPQS) – a de-  
80 incentivisation of QOF – with the goal of redirecting resources towards Person Centred Coordinated  
81 Care (P3C), especially for those with Long Term Conditions (LTCs). We evaluated the impact on  
82 processes and outcomes of care from April 2016 to March 2017.

#### 83 **Participants & Design**

84 The evaluation used data from 55 SPQS practices and 17 regional control practices for three survey  
85 instruments. We collected patient experiences ('P3C-EQ'; 2363 returns from patients with 1+ LTC; 36%  
86 response rate), staff experiences ('P3C-practitioner'; 127 professionals), and organisational data ('P3C-  
87 OCT'; 36 of 55 practices at two time points, 65% response rate; 17 control practices). Hospital Episode  
88 Statistics emergency admission data were analysed for 2014-2017 for ambulatory-sensitive conditions  
89 across Somerset using interrupted time series.

#### 90 **Results**

91 Patient and practitioner experiences were similar in SPQS versus control practices. However,  
92 discretion from QOF incentives resulted in time savings in the majority of practices and SPQS practice  
93 data showed a significant increase in P3C oriented organisational processes, with a moderate effect  
94 size (Wilcoxon signed rank test;  $p=0.01$ ;  $r=0.42$ ). Analysis of transformation plans and organisational  
95 data suggested stronger federation-level agreements and informal networks, increased  
96 multidisciplinary working, reallocation of resources for other health care professionals and changes to  
97 the structure and timings of GP appointments. No disbenefits were detected in admissions data.

#### 98 **Conclusions**

99 The SPQS scheme leveraged time savings and reduced administrative burden via discretionary  
100 removal of QOF incentives, enabling practices to engage actively in a number of schemes aimed at  
101 improving care for people with LTCs. We found no differences in the experiences of patients or  
102 healthcare professionals between SPQS and control practices.

## 103 Article Summary

### 104 Strengths and limitations of this study

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- 106 ■ This study evaluated changes to service delivery, conducted using two survey tools – offering  
107 a perspective on the experiences of both patients and healthcare professionals.
- 108 ■ These were supplemented with a longitudinal analysis of organisational change (to measure  
109 alterations to service deliver) and a time-series of emergency admissions for ambulatory-  
110 sensitive conditions (to detect disbenefits arising from the scheme).
- 111 ■ Due to time and resource pressures on general practice in the UK, we struggled to recruit  
112 controls from the within the same county (Somerset) or matched controls from the region.  
113 As an alternative, we obtained non-matched controls from the region.
- 114 ■ No detectable improvements were established in experiences of healthcare professionals or  
115 patients – this could be because the intervention had no effect on these outcomes, the  
116 instruments were not sensitive enough, or changes to patient/practitioner experiences were  
117 somewhat distal to the intervention.

## 118 Main Text

### 119 BACKGROUND

120 The Quality and Outcomes Framework (QOF) for UK General Practice (GP) is one of the largest health-  
121 related pay-for-performance (P4P) schemes in the world[1]. Following implementation in 2004, the  
122 scheme initially had a positive impact on quality of care, primarily achieved via establishment of  
123 consistent procedural baselines in the clinical management of incentivised (mostly chronic)  
124 diseases[1–5]. It reduced between-practice inequalities in care delivery[1–3] whilst also leading to  
125 improved disease registers, widespread recording of clinical activities and adoption of electronic  
126 medical record systems[1], leading to growth in GP data and related research[6,7].

127 Since the introduction of QOF, demographic shifts of an ageing population have continued to drive a  
128 shifting clinical landscape[8], with the number of people with three or more long-term conditions  
129 (mLTCs) thought to have risen by one million over the last decade[9]. The subsequent rising demand  
130 for the management of long term conditions (LTCs) and mLTCs – requiring tailored and coordinated  
131 support[10,11] – has led to QOF (with its emphasis on processes for single disease guidelines) being  
132 viewed as increasingly anachronistic[6,12–16]. After introduction of QOF, there was a significant  
133 reduction in the continuity of care[2,17] and the person-centeredness of GP  
134 consultations[13,14,18,19], with a subsequent decline in patients' satisfaction[20]. It has been argued  
135 that QOF does not incentivise appropriate clinical care for people with multimorbidity[6,12–16], who  
136 require individualised support, greater continuity of care and a holistic, biopsychosocial approach that  
137 is responsive and empowering[10,11]. An oft-quoted criticism is that QOF reduces consultations to a  
138 'box-ticking' exercise[21].

139 In response to such criticisms, both the NHS Chief Executive and the General Practitioners Committee  
140 (GPC) Chairman previously backed the removal of QOF[21] and In 2014, NHS England signalled a move  
141 towards devolution of QOF to Clinical Commissioning Groups (CCGs), allowing organisations the  
142 freedom to develop alternatives. Potential advantages included the targeting of local health needs

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3 143 and greater clinical engagement for quality improvement[22]. In response, the Somerset Practice  
4 144 Quality Scheme (SPQS) was established as a de-incentivisation of QOF. It arose because GPs, the CCG  
5 145 and the Local Medical Committee (LMC) felt that QOF was not incentivising the highest value clinical  
6 146 behaviour. The goal was to allow clinicians the freedom to innovate, enable consultations to be more  
7 147 person-centred and increase involvement with a number of concurrent schemes aimed at improving  
8 148 Person Centred Coordinated Care (P3C)[23]. The details of the scheme were included in the SPQS  
9 149 contract[24] and local Sustainability and Transformation Plan (STPs – Plans for reforming healthcare  
10 150 mandated by the Five Year Forward View[25]) of the GPs[26]. (See Supplementary File 1 for a summary  
11 151 of Somerset STPs; box 1 for brief details of the various schemes and references for details). The  
12 152 contract removed incentives from QOF, although CQRS (Calculating Quality Reporting System)  
13 153 remained active in order to collect prevalence data for payment calculations. The SPQS contract stated  
14 154 that the reduced QOF overhead would be exploited to better meet the needs of patients with long  
15 155 term conditions by developing new models of care. Implementation was specified in the locality STPs,  
16 156 which included a patchwork of initiatives, most notably the ‘Test and Learn pilots’, which  
17 157 encompassed three distinct schemes (box 1), all of which had a shared vision of targeting complex  
18 158 patients with care plans, multidisciplinary team input (MDT) and single point of contact [27,28]. Other  
19 159 schemes included a Village Agents service[29] and Health Connections Mendip (HCM)[30] – see box  
20 160 1. Fifty five Somerset practices opted for SPQS, with 18 Somerset practices (initially 20) retaining the  
21 161 existing QOF contract. (The SPQS practices increased to 57 in 2015/16; but two mergers reduced it  
22 162 back to 55).

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**Test & Learn:** Comprises three similar initiatives (South Somerset Symphony Vanguard, Taunton, and Mendip – see below), which share a common goal of targeting complex, multimorbid patients with a suite of approaches including single personalised care plans, multi-disciplinary team input and single point of access to provide person centred coordinated care.

**Test & Learn – South Somerset Symphony Vanguard:** A symphony “hub” system located at Yeovil District Hospital, where complex patients receive extra support from Health Coaches/Key Workers at the Symphony hub service, although they remain under management of GP practice [27,28].

**Test & Learn – Taunton:** Operates under a “virtual hub” model, with complex/frail patients managed by a multidisciplinary team moving between practices, with shared care plans and Wellbeing Advisors.

**Test & Learn – Frome Mendip, including “Health Connections Mendip”.** With loose eligibility criteria and a number of referral routes, Community Practice Nurse and Health Connectors (based at Frome) liaise regularly in MDT meetings. There is a hub telephone line for single point of access. The model advocates utilising existing assets in the community. The Health Connections team lead social prescribing work with a service directory to signpost patients to appropriate resources [30].

**Enhanced Primary Care (EPC):** EPC is a sub-component of the Symphony vanguard scheme that incorporates health coaches (HCs) into primary care, focusing on less complex patients, allowing GPs to focus primarily on medical problems.

**Village Agents Service:** Supports isolated, excluded and vulnerable (including elderly and multimorbid) people by offering a signposting and referral service. The service links with general practices [29].

**Living Better:** A working partnership between the GP practices, AGE UK Somerset, Social Care, Somerset Partnership, West Somerset District Council, and Somerset Clinical Commissioning Group. The project supports people with one or more long-term conditions to better self-manage, helping them build connections to the community and reducing dependency on health and social care.

#### Box 1. Initiative for implementation of SPQS.

166 The initial phase of the scheme was previously evaluated with a retrospective approach[31]. This  
 167 revealed early stages of organisational change, including stronger federation-level agreements and  
 168 informal networks, increased multidisciplinary team working, reallocation of resources towards health  
 169 care assistants, nurses and others, and changes to structure and timings of appointments with GPs.  
 170 From April 2016 to March 2017 we conducted a longitudinal evaluation of the second full year of the  
 171 SPQS programme (see Supplementary File 2 for a timeline of the SPQS scheme and associated  
 172 evaluations). This was commissioned with the aims of establishing the nature and extent of P3C that

173 has been implemented since discretion from QOF, explore staff and patient experiences of care  
174 delivery and examine non-elective hospital admissions before and after inception of the scheme.

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## 176 METHODS

177 We conducted a mixed-methods evaluation of SPQS which included a suite of quantitative and  
178 qualitative tools. Analysis of quantitative data is described in this paper. In-depth qualitative findings  
179 will be published in a subsequent paper (including semi-structured interviews with practitioners;  
180 observations of consultations and facilitation workshops with practices). A schematic overview of the  
181 full SPQS evaluation framework is provided in figure 1. The quantitative evaluation included  
182 completion of survey tools targeting patient experiences (P3C-EQ), staff experiences (P3C-  
183 practitioner) and organisational perspectives (P3C-OCT tool), alongside time series of Hospital Episode  
184 Statistics (HES) for ambulatory-sensitive conditions across Somerset. We chose not to use national  
185 measures of General Practice (i.e. GP Patient Survey (GPPS) and Friends and Family Test (FFT)): they  
186 have a broad sample and do not target the patient group (i.e. patients with LTCs) that are the focus of  
187 SPQS. Furthermore, they do not target the construct of interest (i.e. P3C).

188 <figure 1 here>

189 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.

## 190 Samples

191 The 55 participating Somerset practices (mean list size = 7,695; median = 6515.5; smallest = 1834;  
192 largest = 29,078) completed our evaluation tools (see below). Whilst these 55 practices were  
193 incentivised to take part in our evaluation (i.e. by being part of SPQS), the non-SPQS Somerset  
194 practices had no incentive to act as controls and did not participate in this study. Therefore, for control  
195 practices, we initially identified a cohort of non-Somerset control practices matched for staffing data,  
196 list size, population density, indices of multiple deprivation, QOF scores and disease prevalence.  
197 However, the incentives available for this evaluation (£200 per practice) were only sufficient to recruit  
198 six practices by this method. We therefore supplemented this group with 11 unmatched practices  
199 from across the Southwest, making a total of 17 control practices (mean list size = 6,714; median =  
200 4878; smallest = 2678; largest = 4878). The control group therefore represents a self-selected sample  
201 of practices that are likely to represent engaged, active practices (i.e. with the resources to engage  
202 with research). In contrast, completion of our evaluation was mandatory for all SPQS practices.

## 203 Patient and Public Involvement

204 Patients were involved via the peninsula CLAHRC patient involvement group (PenPig), who set  
205 priorities for research objectives. Patients, public and healthcare professionals were also involved in  
206 co-design workshops to develop the measurement framework and individual questionnaires (see  
207 papers for details [23,32–37]). Patients also reviewed drafts of ethics approval applications and all  
208 patient-facing communication. The work was co-presented with patients at the South West Society  
209 for Academic Primary Care Regional Meeting 2018.

## 210 Survey Tools

211 **The P3C-Patient Experience Questionnaire (P3C-EQ)** is a brief, 11-item patient-completed measure  
212 of patient experiences of person centred coordinated care delivery, which we have previously

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3 213 validated[32,38,39]. The tool can be used to generate an aggregate score of patient experience[32],  
4 214 with a range of score from 0-30, where a higher score indicates better experiences of care [39]. It can  
5 215 also be sub-scored to previously described sub-domains of P3C[23,32,34–37].  
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8 216 **The P3C-Practitioner Experience Survey** is a 29-item instrument that measures individual and  
9 217 managerial experience of delivering person centred and coordinated care. Via a workshop with  
10 218 healthcare professionals, we selected the previously validated P3C-Practitioner questionnaire (also  
11 219 known as the Person-Centred Health Care for Older Adults Survey[40]) as the most suitable instrument  
12 220 to examine practitioners' perspectives of P3C (see Supplementary File 3). A minimum of two  
13 221 practitioners from each practice were requested to respond. The instrument generates an aggregate  
14 222 score with a range of 29-145, where a higher score indicates better experiences of care.  
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17 223 **The P3C-Organisational Change Tool (P3C-OCT)** is an evidenced-based measure of progress towards  
18 224 delivering person centred coordinated care from an organisational perspective[33]. It was developed  
19 225 to support and measure P3C in line with Year of Care[34] and RCGP principles of Collaborative Care  
20 226 and Support Planning[41], thus providing a way to monitor changes in line with policy directives which  
21 227 improve P3C. The tool was designed to measure all core P3C routines which have been identified  
22 228 through research[42,43], patients' accounts, policy documents[34] and our own work[23,33]. The  
23 229 design of the P3C-OCT is based on a shared consensus of the components of person-centred  
24 230 coordinated care (e.g. [35,36,44]), which broadly correspond to six domains: Information and  
25 231 Communication; Care Planning; Goals and Outcomes; Transitions; Organisational Process Activities;  
26 232 and Decision Making. These domains have been mapped to real-world actions that support the  
27 233 delivery of P3C (e.g. multi-disciplinary team meetings, care planning, provisions for information etc.)  
28 234 This allows the tool to translate concepts which are often abstract, and may be drawn from academic  
29 235 literature and policy documents, into actionable, tangible processes which a practice can implement.  
30 236 The result is a unique 29-question instrument with over 500 different possible responses, which  
31 237 provides a detailed and practical interrogation of P3C delivery. An equally-weighted scoring system  
32 238 allows results of the P3C-OCT to be aggregated into a single composite score, or alternatively by sub-  
33 239 domains of P3C – generating a score of 0-20, with higher scores indicating more P3C related activity.  
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40 240 The P3C-OCT provides a detailed profile of care delivery and organisation through 29 core questions.  
41 241 All questions ask about objective activities (e.g. processes in place to deliver P3C) and subjective  
42 242 responses (e.g. how well these are working). Scores are given out of a theoretical maximum of 20  
43 243 points. The P3C-OCT was also prepended by a series of SPQS-related questions about administrative  
44 244 and consultation time savings from discretion from QOF. Each SPQS practice was requested to  
45 245 complete the P3C-OCT at two time points (from Feb-Aug 2016 and Dec 2016-Mar 2017). In contrast,  
46 246 control practices only completed the P3C-OCT once (at Time 2).  
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## 50 247 **Data Collection**

51 248 All participating practices supported data collection of the three survey tools. With the P3C-EQ, from  
52 249 each practice, 100 patients with one or more LTCs, randomly sampled from the practice list (using a  
53 250 customised EMIS script), were invited to complete a postal questionnaire at a single time point.  
54 251 Patients received an information pack, consent sheet, demographic questionnaire and P3C-EQ. All  
55 252 returned questionnaires were entered into a Microsoft Access database prior to statistical analyses.  
56 253 For the P3C-Practitioner, we obtained an opportunity sample via both written and email  
57 254 communication with all participating practices. For the P3C-OCT, all participating practices were  
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3 255 offered an electronic or paper version, and we requested that the tool was completed by a  
4 256 combination of General Practitioner and Practice Manager (PM), thus ensuring representation of  
5 257 front-facing and backend operations of GP surgeries. Completion of the tool was mandatory as part  
6 258 of the SPQS evaluation.  
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### 9 259 **Analysis**

10 260 SPQS and control practices were compared on the P3C-Patient Experience survey and the P3C-  
11 261 Practitioner Experience Survey (at time 2; 6-12 months after initiation of second year/phase 2 of SPQS),  
12 262 with significance tested using the non-parametric unmatched Mann–Whitney–Wilcoxon (MWW) test  
13 263 taking into account within-practice clustering by calculating Somers' D statistic (non-parametric tests  
14 264 were used, as the scoring is a summation of Likert responses i.e. data was ordinal). For the P3C-  
15 265 Organisational Change Tool, we compared Time 1 (immediately after implementation of second  
16 266 year/phase 2 of SPQS) and Time 2 (6-12 months later), with significance evaluated by Wilcoxon signed  
17 267 rank test.  
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### 22 268 **Time Series of emergency admissions to hospital**

23 269 A multi-group interrupted time-series analysis (ITS) was conducted to identify whether de-  
24 270 incentivisation of QOF and the introduction of SPQS was associated with changes in emergency  
25 271 admissions to acute hospitals with a primary diagnoses for four long-term, ambulatory care sensitive  
26 272 conditions (ACSCs). Hospital episode statistics were obtained for patients from all 55 GP practices  
27 273 enrolled in the SPQS scheme (actually 56 practices in 2015/15) and 18 Somerset QOF practices (i.e.  
28 274 Somerset practices not enrolled in SPQS; initially 20). Data was obtained for a 70 month period from  
29 275 April 2011 to May 2018. This time period is divided into 38 months pre-intervention (Apr 2011 – May  
30 276 2014) and 48 months post intervention (June 2014 – May 2018; SPQS contract went live in June 2014,  
31 277 month 39). Data include monthly admission counts for four ACSCs: Acute Myocardial Infarction (AMI),  
32 278 Chronic Obstructive Pulmonary Disease (COPD), Diabetes, and Stroke. We selected these ACSCs as a  
33 279 proxy for preventable admissions and an indicator of any deteriorating quality of care associated with  
34 280 SPQS. Due to the difference in number of practices between SPQS and QOF practices, admissions were  
35 281 divided by the number of practices, thus providing an average of emergency admissions (expressed as  
36 282 admissions per month per practice). Analysis was performed using the *itsa* command[45] on STATA  
37 283 (StataCorp Ltd). This uses regression-based model with Newey-West standard errors. Pre- and post-  
38 284 intervention slopes/intercepts of the sample (SPQS practices) were compared to controls (QOF  
39 285 practices). Lag period was set to 1 month.  
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## 288 RESULTS

### 289 P3C-EQ

290 There were 1,752 responses received from 49 (89%) of the 55 practices enrolled in SPQS, and 611  
 291 responses from patients enrolled in the 17 control (QOF) practices (36% response rate and similar to  
 292 other similar other studies[46]). The responses of the two groups compared in Table 1.

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294 **Table 1:** Demographic profile of responses to P3C-EQ as percentages.

	Participant demographics as a percentage										
	Age		Education			Gender			Multi-morbidity		
	QOF	SPQS		QOF	SPQS		QOF	SPQS	No. LTCs	QOF	SPQS
<=24	0.3	0.4	None	1.0	1.3	Male	44.0	43.4	1	19.6	20.1
25-34	2.5	1.3	Primary	3.1	2.1	Female	53.8	53.9	2	19.6	23.8
35-44	2.5	2.6	Secondary	33.7	34.6	Non-response	2.2	2.7	3	20.6	17.8
45-54	8.8	5.3	College/Vocational	26.4	28.1				4	11.3	13.7
55-64	18.3	13.3	Undergraduate	11.5	10.8				5	9.3	7.5
65-74	25.7	29.2	Postgraduate	8.2	7.8				6	4.7	5.1
75-84	29.3	32.7	Non-response	16.2	15.3				7	2.8	2.8
>=85	12.1	14.1							>=8	4.2	2.8
Non-response	0.5	1.0							Non-response	7.9	6.4

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296 The mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1,752) and QOF controls (23.68,  
 297 n. 611) were not significantly different (MWW U test;  $p=0.346$ ), and indicate generally positive  
 298 experiences of care across both samples.

### 299 P3C-Practitioner results

300 Full results of the P3C-Practitioner are provided in Supplementary File 3. We received 98 responses  
 301 from 55 SPQS practices and 29 responses from 18 control practices from a mix of healthcare  
 302 professionals – 62 GPs (49%); 35 Nurses (27%); 12 Wellbeing Advisors; 7 LTC nurse; 11 others. The  
 303 mean global aggregated scores for the P3C-EQ for SPQS (23.39, n.1752) and QOF controls (23.68, n.  
 304 611) were not significantly different (MWW test;  $p=0.405$ ). Return rates are not applicable, as this was  
 305 a convenience sample where we requested response from at least two different professionals at each  
 306 practice.

### 307 P3C-OCT Results

308 To evaluate changes to P3C during the SPQS scheme we undertook an analysis of the organisation and  
 309 delivery of care using the P3C-OCT. Of 55 practices enrolled in the scheme, 36 practices provided  
 310 admissible data (i.e. complete and timely) at the two evaluation time-points (Time 1: 2/2016–8/2016  
 311 and Time 2 was 12/2016-5/2017; 65% response rate). This revealed an increase (0.9;  $p=0.034$ ) in  
 312 aggregate scores on the P3C-OCT between T1 (5.8) to T2 (6.7). This therefore represents a measurable  
 313 increase in activity towards person centred coordinated care delivery and organisation (see table 2),  
 314 with a moderate effect size ( $r=0.42$ ). To determine the specific areas of person centred coordinated  
 315 care (P3C) that improved during the evaluation, this was examined by domains of P3C[34–36]. When

316 broken into subdomains of P3C, significant improvements were delivered in areas related to 'Goals  
317 and Outcomes' (e.g. goal setting with patients; 1.7 increase,  $p=0.00$ ; large effect size  $r=0.61$ ).

318

319 **Table 2:** Mean changes in P3C-OCT scores between time 1 and time 2 for 36 paired practices. The top row  
320 provides the total OCT score (out of a maximum of 20), followed by domains of P3C. The OCT score for each  
321 domain is given for time 1, time 2 and the difference between time 1 and 2. The statistical significant of these  
322 differences is indicated by  $p$ -value from Wilcoxon signed rank test. Statistically significant results (at the level  
323  $p<0.008$ ; corresponding to a Bonferroni adjustment for 6 tests at the  $p<0.05$  significance level) are indicated in  
324 bold font and with an asterisk next to the  $p$ -value. Effect sizes were calculated as test statistic  $z$  by the square  
325 root of the number of pairs.

	Time 1	Time 2	Change T1→ T2 ( $p$ -value; effect size)
<b>Total OCT Score:</b>	<b>5.8</b>	<b>6.7</b>	<b>0.9 (<math>p=0.01</math>; <math>r=0.42</math>)*</b>
<b>Information &amp; Communication</b>	7.4	8.1	0.7 ( $p=0.25$ ; $r=0.19$ )
<b>Care Planning</b>	6.6	7.2	0.6 ( $p=0.14$ ; $r=0.25$ )
<b>Goals &amp; Outcomes</b>	6.1	7.8	<b>1.7 (<math>p&lt;0.001</math>; <math>r=0.61</math>)*</b>
<b>Transitions</b>	4.9	5.2	0.3 ( $p=0.43$ ; $r=0.13$ )
<b>Organisational Process Activities</b>	4.3	5.2	0.9 ( $p=0.03$ ; $r=0.36$ )
<b>Decision Making</b>	3.8	4.4	0.6 ( $p=0.07$ ; $r=0.3$ )

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327 Further to the longitudinal analysis, SPQS practices were also compared to a cohort of 17 non-SPQS  
328 practices from the South West (all control practices returned data at Time 2). Aggregate results for  
329 the P3C-OCT revealed that control practices had an aggregate score of 6.2 on the P3C-OCT, with no  
330 significant difference between SPQS and control practices either before (a score of 5.8 versus 6.2;  
331  $p=0.64$ ) or after (6.7 versus 6.2;  $p=0.41$ ) the intervention.

### 332 **Discretion from QOF and time savings**

333 When asking SPQS practices to complete the P3C-OCT, we also included a number of additional  
334 questions related to the SPQS scheme. We asked SPQS practices a subjective appraisal of time savings  
335 (both in GP consultations and administration) from enrolment in the scheme. These are shown in  
336 figure 2. More than half (55%) of the practices (28 of 51 practices that completed these questions)  
337 agreed that time had been freed up within the 10 minute standard consultation time.

338 <figure 2 here>

339 **Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP  
 340 administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

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342 With regard to administrative time savings, more than three quarters of SPQS practices (40/51; 78 %) reported administrative (non-consultation time for practitioners) time savings since initiation of the scheme, with just over one third of these practices (14/51; 27%) reporting gains of more than 2 hours per week. For administrators and non-clinical staff, SPQS was reported to free up time for more than 86% (44/51) of practices with only 13 % (7/51) reporting a negligible effect. Free text response boxes confirmed the plans of the STPs (see introduction and Supplementary File 1), stating that efficiency had been leveraged for increased collaborative and federation-level working, including engagement with a number of schemes in Somerset designed to improve person centred and coordinated care e.g. “Better use of Symphony”, “Engagement with EPC”, “Rural Practice Network”, “Health coaches”, “Huddles”, “P3C relevant training”, “Replaced by other work such as Symphony/health coaching etc”, “This hasn't shown a reduction in workload but rather a change in workload.” In this manner, the time savings leveraged from QOF were not hypothesised to lead to an improvement of experiences for practitioners, but instead a shift in workload.

### 355 *Retention of QOF elements*

356 When asking SPQS practices to complete the P3C-OCT, we also included a number of questions specific to the implementation of SPQS. When asked ‘Are you still using components of the QOF?’, nearly all practices enrolled in SPQS continued to use at least some aspects of QOF (only 1 out of 51 respondents to this question stated “none”; 86% of practices used “Some”, “Most” or “All”). We further investigated the continued utilisation of QOF via a free-text response in the P3C-OCT questionnaire. This revealed that QOF was still (according to one practice) utilised by “applying individually, not 'point scoring'”. A common aspect that was dropped was exception reporting, with time also being saved by avoiding “target chasing”. Elements of QOF were also contractually retained such as the CQRS (Calculating Quality Reporting System). This remained active under the SPQS contract to allow data on prevalence and key indicators to be collected from practices via GPES (GP Extraction System), where prevalence figures are utilised in the SPQS payments calculation.

367 QOF also continued to be utilised for the monitoring of LTCs and recall of patients with LTCs for routine check-ups. Around a half of SPQS practices (n=25) still use QOF for recall of at least some (or all) conditions (e.g. checking for recall requirements for patients with LTCs and the management of specific chronic diseases). Free text responses suggested that whilst recall was an essential function, the implementation under QOF was overly burdensome and not tailored for multiple morbidities. Some practices countered this by running in-house developed searches with a priority to “concentrate on an integrated LTC system”. This suggests that there is scope for collaboration to design an overhauled, integrated recall system that is specifically designed for efficient management of multiple LTCs (as previously proposed[47,48]).

### 376 **Time Series of Hospital Episode Statistics**

377 Results of the ITS are shown in figure 3. No significant increases were detected in the slope post-intervention (i.e. after the initiation of the SPQS contract in June 2014) in emergency admissions for patients with a primary diagnosis of four ACSCs in SPQS practices. Full results of significance tests are provided in Supplementary File 4. The removal of QOF has had no significant effect on emergency

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3 381 admissions for these four ACSCs at the time of intervention, or in the two years following. However,  
4 382 for the non-SPQS Somerset practices, a significant slope change (increase) in admissions for AMI and  
5 383 Diabetes was observed, and a significant slope change (decrease) for admissions for Stroke was  
6 384 observed. These changes in admissions are therefore unrelated to the SPQS contract (see discussion  
7 385 below).

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10 386 <figure 3 here>

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12 387 **Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left  
13 388 to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary  
14 389 Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was live  
15 390 from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of  
16 391 admissions, normalised as admissions per month per practice. Black circles indicate the average number of  
17 392 emergency admissions in each month for SPQS practices; white circles are average admissions for QOF Somerset  
18 393 practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and dashed (for QOF  
19 394 Somerset practices). All changes between pre- and post-intervention between SPQS and QOF practices are non-  
20 395 significant (see Supplementary File 4).

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## 25 26 397 DISCUSSION

27 398 We observed a variety of responses to de-incentivisation of QOF in Somerset. Some QOF-related  
28 399 components remained mandatory (prevalence reporting). Some 'desirable' features of the QOF  
29 400 system were still used (e.g. prompts during consultation), others were adapted (e.g. patient recall)  
30 401 and some burdensome components dropped altogether (e.g. exception reporting).

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33 402 Practices reported that these alterations had led to time and resource savings in both GP consultations  
34 403 and administration. These time savings were used to increase involvement in implementation projects  
35 404 such as Symphony Test and Learn, Village Agents, Health connections, and the South Somerset  
36 405 Vanguard. These were planned as part of the SPQS contract and associated ongoing healthcare  
37 406 reforms. These local implementation projects are actively targeting service redesign for complex  
38 407 patient needs, using person centred coordinated care across practice contexts. These projects have  
39 408 involved stronger federation-level agreements and informal networks, increased multidisciplinary  
40 409 team working, reallocation of resources for health care assistants (including Health and Wellbeing  
41 410 Advisors and Health Coaches), nurses and others, single points of access for the patient, shared  
42 411 electronic record systems, increased use of care planning and changes to structure and timings of GP  
43 412 appointments. The results of our longitudinal P3C-OCT survey confirm significant improvements in  
44 413 P3C, suggesting that SPQS has been successful in its stated aims as a system lever for service redesign  
45 414 aimed at the delivery of greater person centred and coordinated primary care.

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48 415 Whilst there is emerging evidence that P3C approaches can improve outcomes (particularly for  
49 416 complexity/multimorbidity)[36,49], we could not establish that the changes introduced via SPQS are  
50 417 leading to better outcomes for patients. Patient experience is downstream of the organisational  
51 418 changes occurring in Somerset, and any detectable improvement in patient outcomes may be delayed.  
52 419 The results of the patient P3C-EQ experience established a similar experience of care in Somerset  
53 420 compared to the control QOF practices (who represent active, research engaged-organisations,  
54 421 whereas completion of the survey was mandatory for SPQS practices; see methods). Similarly,  
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3 422 comparison of practitioner perspective of P3C to the control group revealed similar experiences in  
4 423 SPQS versus the control practices. These findings are broadly reflective of results from other  
5 424 initiatives, where – for example – patient-centred care for multimorbid patients recently revealed  
6 425 mixed effects on processes of care, but was not associated with measurable improvements in quality  
7 426 of life or other secondary outcomes, with the authors concluding that the initiative “supported  
8 427 changes in organisation more than it supported changing the clinicians' attitudes on which patient-  
9 428 centredness depends.” [50]

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13 429 In reference to disbenefits, we could find no evidence of increased admissions associated with SPQS.  
14 430 However, ITS did establish trend changes in admissions in non-SPQS Somerset practices (e.g.  
15 431 those practices that retained the QOF contract). A significant increase was observed in admissions  
16 432 with a primary diagnosis of AMI and Diabetes, and a significant decrease observed for those with a  
17 433 primary diagnosis of Stroke. It is, however, unlikely that relatively minor changes to QOF in the years  
18 434 2014/15 and 2015/16 [51,52] have led to these observed trend changes in emergency admission.

21 435 Whilst the time series did not establish any disbenefits in SPQS practices, earlier evaluation of SPQS  
22 436 established that deincentivisation of QOF leads to inconsistent recording of QOF data. Subsequently,  
23 437 analysis of QOF scores have little utility in assessing the quality of care in Somerset[31]. This paucity  
24 438 of data represents a major disbenefit of QOF deincentivisation: one of the primary benefits of QOF  
25 439 has been the widespread recording of clinical activities[1] and availability of GP data and research[6,7].  
26 440 It is not currently clear how ‘quality’ could be assessed in the post-QOF landscape – a question that  
27 441 has major implications for research, evaluation, healthcare management.

### 31 442 **Limitation of the study**

32 443 The ability to draw firm conclusions from this study were limited by several factors. Due to time and  
33 444 resource pressures on general practice in the UK, we struggled to recruit controls from the within  
34 445 the same county (Somerset) or matched controls from the region. As an alternative, we obtained  
35 446 non-matched controls from the region. These represented a biased cohort of research-engaged  
36 447 practices. We could not detect improvements in experiences of healthcare professionals or patients  
37 448 – this could be because the intervention had no effect on these outcomes, the instruments were not  
38 449 sensitive enough, the controls were unsuitable, or changes to patient/practitioner experiences were  
39 450 somewhat distal to the intervention. A further limitation of the study methods was that P3C-OCT  
40 451 was only administered to control practices at the second time-point, meaning that we cannot  
41 452 determine if significant improvements of P3C-OCT score in SPQS practices might also have been  
42 453 present in controls.

### 47 454 **Implications for the future**

48 455 Whilst previous calls for the removal of QOF in England [53] have not been reiterated, recent policy  
49 456 has moved towards a reformed, streamlined version of QOF [54,55]. With QOF continuing to evolve,  
50 457 lessons from SPQS have implications for UK policy. We have previously made a number of suggestions  
51 458 for the future landscape of QOF[47,48]. These include retaining limited components of QOF (e.g. those  
52 459 elements that are desirable by GPs; “QOF-Lite”), the development of novel systematic data-capture  
53 460 (including GP contact data) or collaboration on an overhauled, integrated recall system that is  
54 461 specifically designed for efficient management of multiple LTCs[47,48]. General Practice, however, is  
55 462 under huge time and resource pressures[56]. Any proposed alternatives will have to fulfil the primary  
56 463 requirements of being a streamlined process for supporting coordination of care, especially for those

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3 464 with complex health needs. The recent national review of QOF concluded that QOF should be  
4 465 reformed to become more person-centred, create space for professionalism and optimally impact  
5 466 wider population health and system resource utilisation[57].  
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## 13 14 470 **FIGURE LEGENDS**

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16 471 **Figure 1:** Our P3C mixed methods evaluation framework for SPQS2.

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18 472 **Figure 2:** consultation time savings (top left), administrative GP time savings (top right) and non-GP  
19 473 administrative time savings (bottom left). Percent responses for 51 practices enrolled in SPQS

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21 474 **Figure 3:** Results of interrupted time-series analysis. The four graphs show the ITS for the four ACSCs (from left  
22 475 to right, top to bottom, the graphs are: Acute Myocardial Infarction (AMI), Chronic Obstructive Pulmonary  
23 476 Disease (COPD), Diabetes and Stroke). Data starts at April 2011 and ends at Jan 2017. The SPQS contract was live  
24 477 from June 2014 (i.e. intervention start time, indicated by vertical dashed line). Y-axis gives the number of  
25 478 admissions, normalised as admissions per month per practice. Black circles indicate the average number of  
26 479 emergency admissions in each month for SPQS practices; white circles are average admissions for QOF Somerset  
27 480 practices. The Regression lines pre- and post-intervention are shown unbroken (for SPQS) and dashed (for QOF  
28 481 Somerset practices). All changes between pre- and post-intervention between SPQS and QOF practices are non-  
29 482 significant (see Supplementary File 4).  
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39 489 professionals and patients who gave their precious time to support this evaluation.  
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## 42 43 490 **DATA SHARING STATEMENT**

44 491 All data relevant to the study are included in the article or uploaded as supplementary information.  
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## 46 492 **COMPETING INTERESTS**

47 493 None declared.  
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## 50 494 **ETHICS AND FUNDING**

51 495 Ethical clearance was obtained from the Plymouth University Ethics Committees (FREC). All  
52 496 participants were given an information pack about the study, and gave informed consent.  
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54 498 Leadership in Applied Health Research and Care South West Peninsula. Funding for this evaluation  
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## 502 CONTRIBUTIONS

- 503 **J Close** corresponded with partaking practices, collected data, analysed data and compiled  
504 manuscript.
- 505 **B Fosh** input, validated and analysed data.
- 506 **H Wheat** corresponded with partaking practices and collected data.
- 507 **J Horrell** corresponded with partaking practices and collected data.
- 508 **W Lee** supported the Interrupted Time Series analysis.
- 509 **R Byng** aided study design and conception.
- 510 **Bainbridge M** corresponded with partaking practices and data collection.
- 511 **L Witts** helped with study design, data collection and corresponded with partaking practices.
- 512 **R Blackwell** collected and analysed data for Hospital Episode Statistics.
- 513 **L Hall** corresponded with partaking practices and collected data.
- 514 **Lloyd H** designed and oversaw the study from inception to completion.
- 515 All authors read, contributed to and approved the manuscript.

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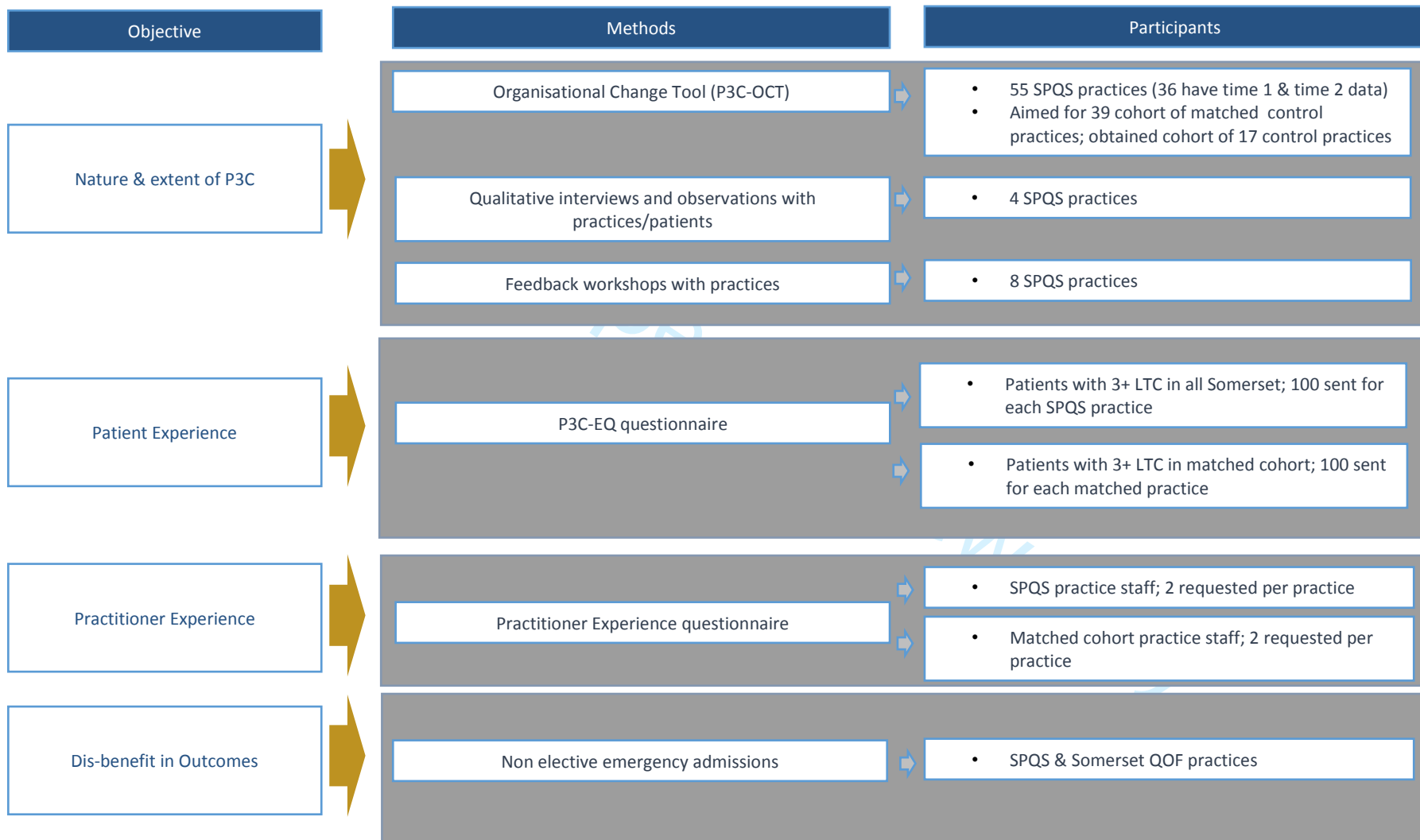
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50 643 52 Changes to QOF 2015/16. [http://www.nhsemployers.org/-](http://www.nhsemployers.org/-/media/Employers/Documents/Primary-care-contracts/QOF/2014-15/Summary-of-changes-to-QOF-1516.pdf?la=en&hash=9125229983CF5DE44134D5EFDA70A58BE7E76658)  
51 644 [/media/Employers/Documents/Primary-care-contracts/QOF/2014-15/Summary-of-changes-to-](http://www.nhsemployers.org/-/media/Employers/Documents/Primary-care-contracts/QOF/2014-15/Summary-of-changes-to-QOF-1516.pdf?la=en&hash=9125229983CF5DE44134D5EFDA70A58BE7E76658)  
52 645 [QOF-1516.pdf?la=en&hash=9125229983CF5DE44134D5EFDA70A58BE7E76658](http://www.nhsemployers.org/-/media/Employers/Documents/Primary-care-contracts/QOF/2014-15/Summary-of-changes-to-QOF-1516.pdf?la=en&hash=9125229983CF5DE44134D5EFDA70A58BE7E76658)  
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14 655 [framework-in-england/](https://www.england.nhs.uk/publication/report-of-the-review-of-the-quality-and-outcomes-)  
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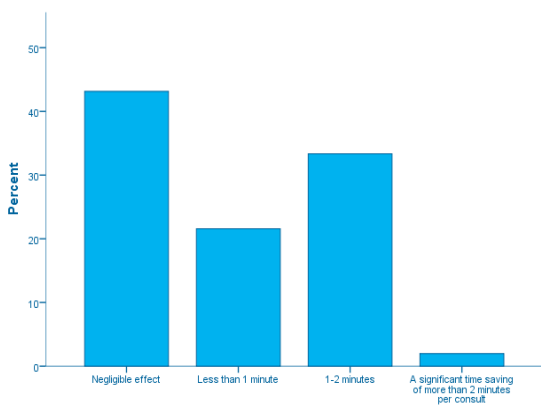
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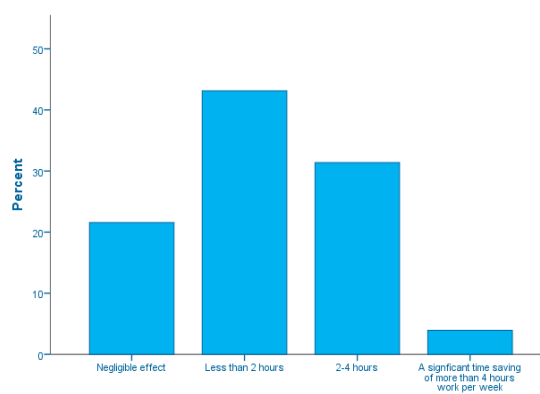


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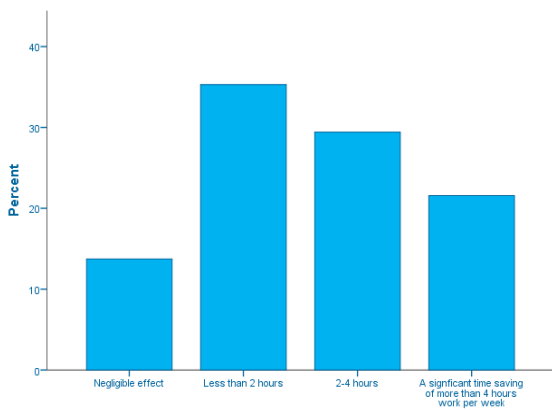
On average, how much time has the removal of QOF freed up per 10 min GP consultation?



On average, how much has been freed up each week from the administrative burden of QOF for GPs (i.e. outside consultation time)?



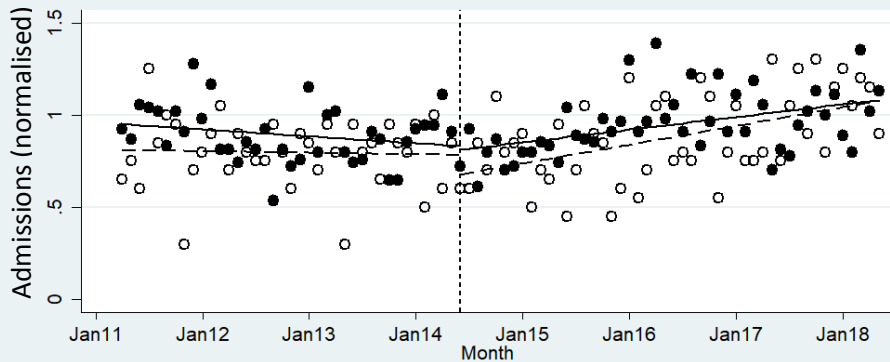
On average, how much time has been freed up in each week from the administrative burden of QOF (for administrators/non-GPs)?



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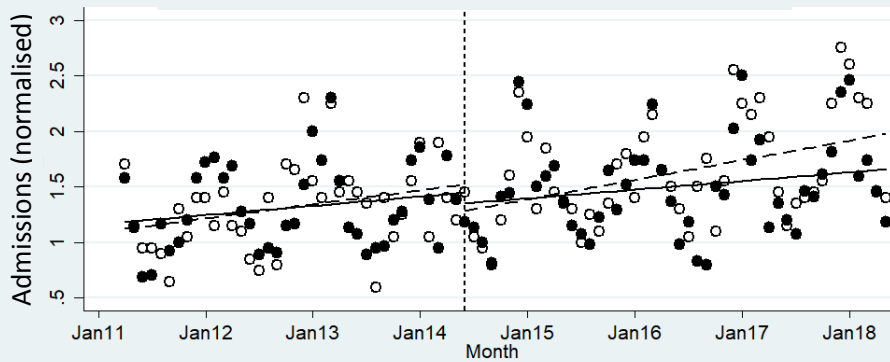
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### Acute Myocardial Infarction



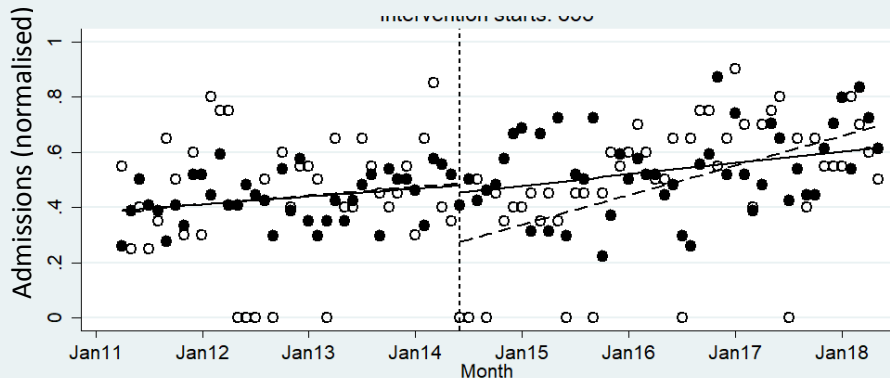
SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Chronic Obstructive Pulmonary Disease (COPD)



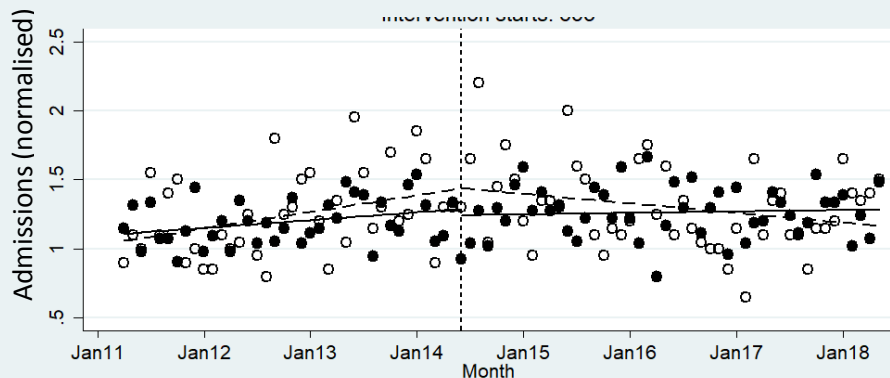
SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Diabetes



SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

### Stroke



SPQS: ● Actual — Predicted  
 Controls average: ○ Actual - - - Predicted

Supplementary File 1: Overview of Sustainability and Transformation Plan (STPs) for 28 of 55 practices (anonymised) enrolled in SPQs; with 2 further STPs completed at federation level.

Activities:	TOTAL for each activity (from a total of 30 STPs):	Practice 1	Practice 2	Practice 3	Practice 4	Practice 5	Practice 6	Practice 7	Practice 8	Practice 9	Practice 10	Practice 11	Practice 12	Practice 13	Practice 14
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	20 (66.6%)	✓	✓		✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Continued/increased involvement in Mendip Your Health & Wellbeing	5 (16.7%)	✓					✓		✓	✓		✓			
Use/development of technology to assist self-management	3 (10%)		✓		✓										
Increased use of Health Connectors Mendip	4 (13.3%)		✓				✓			✓	✓				
Investing time in community engagement	2 (6.7%)		✓												
MDTs in care coordination hubs	1 (3.3%)		✓												
MDTs with district nurses at palliative care reviews (weekly)	1 (3.3%)		✓												
Engagement in compassionate communities and network mapping	1 (3.3%)		✓												
Increased or continued participation with Symphony	12 (40%)				✓		✓	✓	✓	✓		✓			
Possible division of urgent and routine care & formation of urgent care hub	6 (20%)				✓		✓		✓				✓	✓	
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)	17 (56.6%)		✓	✓	✓				✓	✓		✓		✓	
Consideration of practice merger	7 (23.3%)				✓		✓	✓	✓	✓					
Training & upskilling	5 (16.7%)									✓					
Engagement in Somerset together programme	1 (3.3%)											✓			
Development of personalised care planning	1 (3.3%)											✓			
Telephone consultations/ telemedicine	2 (6.7%)														
Use of health coaches	9 (30%)														
Engagement in Living Better programme	1 (3.3%)														



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	Practice 15	Practice 16	Practice 17	Practice 18	Practice 19	Practice 20	Practice 21	Practice 22	Practice 23	Practice 24	Practice 25	Practice 26	Practice 27	Practice 28	Federation 1	Federation 2
Collaborative working with other practices (e.g. sharing workforce, resources etc.)	✓	✓	✓									✓	✓	✓	✓	✓
Continued/ increased involvement in Mendip Your Health & Wellbeing																
Use/development of technology to assist self-management															✓	
Increased use of Health Connectors Mendip																
Investing time in community engagement												✓				
MDTs in care coordination hubs																
MDTs with district nurses at palliative care reviews (weekly)																
Engagement in compassionate communities and network mapping																
Increased or continued participation with Symphony					✓	✓	✓				✓		✓	✓		
Possible division of urgent and routine care & formation of urgent care hub																✓
Coping with staff resourcing issues via new ways of working (e.g. pharmacist, paramedics, GP training)	✓	✓	✓	✓		✓		✓	✓	✓			✓			✓
Consideration of practice merger											✓					✓
Training & upskilling	✓	✓	✓	✓												
Engagement in Somerset together programme																
Development of personalised care planning																
Telephone consultations/ telemedicine	✓	✓														
Use of health coaches	✓	✓				✓		✓	✓	✓		✓	✓	✓		
Engagement in Living Better programme																✓

## Supplementary File 2: Timeline of SPQS scheme and evaluation.

### Development Phase:

April 2012 – March 2013



### Transition year from QOF to SPQS:

April 2013 – March 2014



SPQS contract goes live in June  
2014

### Year 1 - Planning:

April 2014 – March 2015



Phase 1 Evaluation  
Nov 2014 – July 2015

### Year 2 – Transformation:

April 2015 – March 2016



Phase 2 Evaluation  
Nov 2015 – March 2017

### Year 3 - Baseline year:

April 2016 – March 2017



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## Full results of P3C-Practitioner questionnaire

### Selection of P3C-Practitioner

The P3C-practitioner was selected for this study by initially conducting a scoping review to identify measures that included aspects of professional experiences of integrated/coordinated care. This identified 33 measures, four of which were deemed relevant (Safety Net Medical Home Provider Experience Survey; Person-Centred Health Care for Older Adults Survey” (PCHCOA) – which we refer to as the “P3C-practitioner”; Staff Questionnaire - Integrated Care Evaluation Pilots; North West London Integrated Care Pilot - Practitioner Survey). These measures were then presented to workshop attendees (healthcare professionals; managers; senior NHS England representatives; local commissioners; academics) to explore the strengths and weaknesses in terms of applicability and utility as part of routine data collection in respective settings. The PCHCOA was selected due to its established psychometric properties (Briony Dow et al., *Development and initial testing of the Person-Centred Health Care for Older Adults Survey*, 25 *International Psychogeriatrics* 1065–1076 (2013)), its good coverage of domains of P3C and a positive response at the feedback workshop. For the purposes of this evaluation, we have renamed the instrument the P3C-practitioner.

### Scoring of P3C-Practitioner

Whilst previously validated, the authors did not develop an aggregate scoring mechanism for the instrument. Therefore, we generated summary scores by simple addition from the 4-point Likert scale (Never = 0; Rarely = 1; Sometimes = 2; Usually = 3; Always = 4). This allowed us to compare aggregate scores to compare SPQS versus controls over all 29 questions (see table below), with significance tested using MWW test. We also generated sub-scales by addition of question relevant to this aspect of P3C (see following page for questions). No significant differences were detected in practitioner experiences in SPQS or control practices, for either mean scores or the following subscales.

**Sub-Scale: Person Centred Care** = Questions 1.1, 1.3, 1.4, 2.1, 2.2, 5.1, 6.1,6.2,6.3, 7.1, 7.2, 7.3, 8.1 8.2 and 8.3.

**Sub-Scale: Coordinated Care** = Questions 4.1, 4.2, 4.3

**Sub-Scale: Working Environment** = Questions 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7

	QOF	SPQS	Sig. (2-tailed)
<b>Mean Score</b>	<b>83.79 (n=29)</b>	<b>86.18 (n=98)</b>	<b>.4</b>
Sub-Scale: Person Centred Care	47.62	49.11	.35
Sub-Scale: Coordinated Care	7.41	8.38	.12
Sub-Scale: Working Environment	22.03	21.11	.24

### P3C-Practitioner instrument

Q1.1 In my work area, service users / patients have an equal say with the rest of the team in the development of the support plan.

Q1.2. In my work area, service users / patients and carers have an equal say with the rest of the team in the development of the discharge plan or exit strategy from the service.

Q1.3. My/our support plans are structured around the service user's/patient's goals.

Q1.4. Where I currently work, we provide services in the location that best suits the needs and preferences of the service user/patient and their carers.

Q2.1. I ask service users/patients what their goals/needs are for their health and wellbeing.

Q2.2 I ask the carer/s what their goals/ needs are for the health and wellbeing of the person they support.

Q3.1. I am supported to develop the skills I need to work with the service user/patient and their carers.

Q3.2. Where I am currently working, I have been exposed to good role models in care/support for service users/patients.

Q3.3. Expectations of my role and how I treat the service users/patients I support are communicated clearly and consistently.

Q3.4. I feel that I work as part of a team with a recognised and valued contribution.

Q3.5. The emotional and physical demands of my work are acknowledged and recognised.

Q3.6. I feel that I am able to fully use my skills in my work with the service users/patients

Q3.7. My work environment values the care/support I provide to the service users/patients.

Q4.1. It is clear to the service user/patient or their carer who their key worker is.

Q4.2. The service user/patient and their carer have ready access to a key identified person (i.e. they are available by phone, messages are returned promptly).

Q4.3. Where I currently work, we know how to direct the service user/patient to the most appropriate service without them having to make another call (single point of contact).

Q4.4. After the service user/patient is discharged/leaves the service, they receive a follow-up phone call or visit.

Q5.1. Where I currently work, adequate transport and parking are provided to ensure access for service users/patients and their families/carers.

Q5.2. Where I currently work, service users'/patients' personal privacy is respected.

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3 Q6.1. I am able to meet the communication needs of service users/patients and their carers when  
4 working with them.  
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6 Q6.2. Written materials are provided by my place of work to service users/patients and their carers  
7 in a language they can understand.  
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10 Q6.3. Information is provided in a variety of ways to ensure all service users/patients and their  
11 carers have access (e.g. written, verbal, visual).  
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13 Q7.1. I welcome it when service users/patients are informed and question or challenge my advice.  
14

15 Q7.2. The needs and preferences of service users/patients should be central in all services.  
16

17 Q7.3. I like working with the service users/patients I support or care for.  
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19 Q8.1. It is an important part of my job to get to know my service user/patient (e.g. call them by their  
20 preferred name, remember and repeat something they have told me).  
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23 Q8.2. I give service users and their carers adequate time to talk to me (e.g. to discuss their concerns  
24 and their expectations).  
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26 Q8.3. I seek to find out what is important to service users/patients about their health and wellbeing  
27 (e.g. mobility, cognitive function, being part of the family, able to go to the gym).  
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**Supplementary File 4:** Results of interrupted time-series analysis for emergency admissions on four long-term, ambulatory care sensitive conditions (ACSCs). Full results are provided, although the most relevant statistical tests (column “P>|t|”) are for the rows:

“\_z\_x659” the difference between the changes in intercept for SPQS and QOF pre/post intervention)

“\_z\_x\_t659” the difference between the changes in gradient for SPQS and QOF pre/post intervention.

All are non-significant, revealing no excess increases in emergency admissions in SPQS practices for these four ACSCs after the implementation of the SPQS scheme. Significant differences were observed, however, for changes in the *control* slope and/or intercept pre/post intervention for Acute Myocardial Infarction, Stroke and Diabetes . These are highlighted in red below.

#### Acute Myocardial Infarction (AMI)

Description	PRIM_AMI	Coef.	Newey-West		t	P> t	[95% Conf. Interval]	
			Std. Err.					
Pre-intervention control gradient	_t	-.0007003	.0025541		-0.27	0.784	-.0057435	.0043429
Difference between control/SPQS pre-intervention intercepts	_z	.1396686	.0801094		1.74	0.083	-.0185102	.2978475
Difference between control/SPQS pre-intervention slopes	_z_t	-.0024182	.0034503		-0.70	0.484	-.009231	.0043946
Change in control intercept	_x653	-.1043759	.0677199		-1.54	0.125	-.2380911	.0293393
<b>Change in control slope</b>	<b>_x_t653</b>	<b>.0091594</b>	<b>.0030779</b>		<b>2.98</b>	<b>0.003</b>	<b>.0030819</b>	<b>.0152369</b>
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.0853708	.0946241		0.90	0.368	-.1014677	.2722093
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0003106	.0040914		-0.08	0.940	-.0083892	.0077679
Intercept of control pre-intervention	_cons	.8103239	.0652408		12.42	0.000	.6815037	.9391441

**Chronic Obstructive Pulmonary Disease (COPD)**

Description	PRIM COPD	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0105427	.0048903	2.16	0.033	.0008867	.0201988
Difference between control/SPQS pre-intervention intercepts	_z	.0619958	.1748488	0.35	0.723	-.2832492	.4072408
Difference between control/SPQS pre-intervention slopes	_z_t	-.0035803	.0077243	-0.46	0.644	-.0188323	.0116717
Change in control intercept	_x653	-.2382072	.1889151	-1.26	0.209	-.6112265	.1348121
Change in control slope	_x_t653	.0041691	.0078257	0.53	0.595	-.011283	.0196211
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.1413474	.2797523	0.51	0.614	-.4110331	.693728
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0046434	.011329	-0.41	0.682	-.0270129	.0177261
Intercept of control pre-intervention	_cons	1.122065	.1089517	10.30	0.000	.9069359	1.337194

**Stroke**

Description	PRIM STRK	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0100503	.0041188	2.44	0.016	.0019176	.0181831
Difference between control/SPQS pre-intervention intercepts	_z	.0528715	.0954745	0.55	0.580	-.1356461	.2413891
Difference between control/SPQS pre-intervention slopes	_z_t	-.0053472	.0047727	-1.12	0.264	-.014771	.0040765
Change in control intercept	_x653	-.0003719	.1374057	-0.00	0.998	-.2716843	.2709404
<b>Change in control slope</b>	<b>_x_t653</b>	<b>-.0158336</b>	<b>.005394</b>	<b>-2.94</b>	<b>0.004</b>	<b>-.0264841</b>	<b>-.005183</b>
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	-.0449425	.1616696	-0.28	0.781	-.3641647	.2742798
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0119868	.0062141	1.93	0.055	-.0002831	.0242568
Intercept of control pre-intervention	_cons	1.05749	.0852406	12.41	0.000	.8891793	1.2258



## Diabetes

Description	PRIM DIAB	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0025823	.0026916	0.96	0.339	-.0027323	.0078969
Difference between control/SPQS pre-intervention intercepts	_z	.0005698	.0759019	0.01	0.994	-.1493012	.1504408
Difference between control/SPQS pre-intervention slopes	_z_t	-.0001994	.0029745	-0.07	0.947	-.0060726	.0056738
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.2114749</b>	<b>.0751425</b>	<b>-2.81</b>	<b>0.005</b>	<b>-.3598463</b>	<b>-.0631036</b>
Change in control slope	_x_t653	.0063408	.0033715	1.88	0.062	-.0003164	.012998
<b>difference between the changes in intercept for SPQS and QOF pre/post intervention</b>	<b>_z_x653</b>	<b>.1864524</b>	<b>.0866148</b>	<b>2.15</b>	<b>0.033</b>	<b>.0154285</b>	<b>.3574763</b>
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	-.0052892	.0038335	-1.38	0.170	-.0128586	.0022802
Intercept of control pre-intervention	_cons	.3890688	.0704267	5.52	0.000	.2500088	.5281288

## Combined (AMI/COPD/Stroke/Diabetes)

Description	SECD_AMI	Newey-West					
		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Pre-intervention control gradient	_t	.0224751	.0064245	3.50	0.001	.0097898	.0351604
Difference between control/SPQS pre-intervention intercepts	_z	.2551058	.227217	1.12	0.263	-.193542	.7037535
Difference between control/SPQS pre-intervention slopes	_z_t	-.0115452	.009923	-1.16	0.246	-.0311385	.0080482
<b>Change in control intercept</b>	<b>_x653</b>	<b>-.5544301</b>	<b>.2489365</b>	<b>-2.23</b>	<b>0.027</b>	<b>-1.045964</b>	<b>-.0628964</b>
Change in control slope	_x_t653	.0038357	.0103935	0.37	0.713	-.0166866	.024358
difference between the changes in intercept for SPQS and QOF pre/post intervention	_z_x653	.3682284	.3741294	0.98	0.326	-.3705031	1.10696
difference between the changes in gradient for SPQS and QOF pre/post intervention	_z_x_t653	.0017436	.0148231	0.12	0.907	-.0275252	.0310124
Intercept of control pre-intervention	_cons	3.378947	.1531439	22.06	0.000	3.07656	3.681335

## STROBE Statement—checklist of items that should be included in reports of observational studies

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**Recommendation**

<b>Title and abstract</b>	p2	(a) Indicate the study's design with a commonly used term in the title or the abstract (b) Provide in the abstract an informative and balanced summary of what was done and what was found
<b>Introduction</b>		
Background/rationale	P3-5	Explain the scientific background and rationale for the investigation being reported
Objectives	L126-132	State specific objectives, including any prespecified hypotheses
<b>Methods</b>		
Study design	L135-145	Present key elements of study design early in the paper
Setting	Setting g L135-145; dates L210-217	Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection
Participants	L148-168	(a) <i>Cohort study</i> —Give the eligibility criteria, and the sources and methods of selection of participants. Describe methods of follow-up <i>Case-control study</i> —Give the eligibility criteria, and the sources and methods of case ascertainment and control selection. Give the rationale for the choice of cases and controls <i>Cross-sectional study</i> —Give the eligibility criteria, and the sources and methods of selection of participants (b) <i>Cohort study</i> —For matched studies, give matching criteria and number of exposed and unexposed <i>Case-control study</i> —For matched studies, give matching criteria and the number of controls per case
Variables	L169-198	Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable
Data sources/ measurement	L169-198	For each variable of interest, give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group
Bias	L158-161	Describe any efforts to address potential sources of bias
Study size	L149-151	Explain how the study size was arrived at

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Quantitative variables	L209- 235	Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen and why
Statistical methods	L209- 235	<hr/> <i>(a)</i> Describe all statistical methods, including those used to control for confounding <hr/> <i>(b)</i> Describe any methods used to examine subgroups and interactions <hr/> <i>(c)</i> Explain how missing data were addressed <hr/> <i>(d) Cohort study</i> —If applicable, explain how loss to follow-up was addressed <i>Case-control study</i> —If applicable, explain how matching of cases and controls was addressed <i>Cross-sectional study</i> —If applicable, describe analytical methods taking account of sampling strategy <hr/> <i>(e)</i> Describe any sensitivity analyses

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<b>Results</b>		
Participants	L2 39- 247	(a) Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed <hr/> (b) Give reasons for non-participation at each stage <hr/> (c) Consider use of a flow diagram
Descriptive data	Ta 1	(a) Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders <hr/> (b) Indicate number of participants with missing data for each variable of interest <hr/> (c) <i>Cohort study</i> —Summarise follow-up time (eg, average and total amount)
Outcome data	L2 39- 282	<i>Cohort study</i> —Report numbers of outcome events or summary measures over time <hr/> <i>Case-control study</i> —Report numbers in each exposure category, or summary measures of exposure <hr/> <i>Cross-sectional study</i> —Report numbers of outcome events or summary measures
Main results	L2 39- 357	(a) Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included <hr/> (b) Report category boundaries when continuous variables were categorized <hr/> (c) If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period
Other analyses	N/ A	Report other analyses done—eg analyses of subgroups and interactions, and sensitivity analyses
<b>Discussion</b>		
Key results	L3 60- 397	Summarise key results with reference to study objectives
Limitations	L4 05- 413	Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias
Interpretation	N/ A	Give a cautious overall interpretation of results considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence
Generalisability	N/ A	Discuss the generalisability (external validity) of the study results
<b>Other information</b>		
Funding	L4 51- 6	Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based

\*Give information separately for cases and controls in case-control studies and, if applicable, for exposed and unexposed groups in cohort and cross-sectional studies.

**Note:** An Explanation and Elaboration article discusses each checklist item and gives methodological background and published examples of transparent reporting. The STROBE checklist is best used in conjunction with this article (freely available on the Web sites of PLoS Medicine at <http://www.plosmedicine.org/>, Annals of Internal Medicine at <http://www.annals.org/>, and Epidemiology at <http://www.epidem.com/>). Information on the STROBE Initiative is available at [www.strobe-statement.org](http://www.strobe-statement.org).