

Paramedic- or GP-consultations in primary care: prospective study comparing costs and outcomes

Authors

William Hollingworth, PhD^{1*}, Nouf S. Gadah-Jeynes, PhD², Hazel Taylor, MSc³, Kirsty Garfield, PhD⁴, Sarah Voss, PhD⁵, Matthew Booker¹.

* Corresponding author: Professor William Hollingworth, Department of Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK. william.hollingworth@bristol.ac.uk

ORCIDiDs: 0000-0002-0840-6254 (WH); 0009-0007-3623-2128 (NSG-J); 0000-0003-3430-5278 (HT); 0000-0002-8301-3602 (KG); 0000-0001-5044-5145 (SV); 0000-0002-6680-9887 (MB)

Affiliations

1 Professor of Health Economics, Department of Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK

2 Senior Research Associate, Department of Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK

3 Research Fellow, Centre for Trials Research, Cardiff University, Cardiff, UK

4 Research Fellow, Department of Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK

5 Professor of Emergency Care, School of Health and Social Wellbeing, College of Health, Science and Society, University of the West of England, Bristol, UK

6 Consultant Senior Lecturer in Primary Care, Department of Population Health Sciences, Bristol Medical School, University of Bristol, Bristol, UK

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Data availability:

The participants of this study did not give written consent for their data to be shared publicly, so due to the sensitive nature of the research supporting data is not available.

Competing Interests:

None

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Abstract

Background:

General Practice faces pressures due to increased demand and a shortage of GPs. Paramedics in General Practice (PGPs), increasingly contribute to managing minor illnesses, conducting home visits, and providing urgent consultations.

Aim:

Explore the impact of paramedic-consultations on patient-reported experience, safe management and NHS costs.

Design & Setting:

Prospective cohort study comparing PGP with GP consultations at 34 GP sites in England.

Methods:

Eligible participants had a consultation with a PGP (25 PGP sites) or GP (9 non-PGP sites) between May 2022 and February 2023. Questionnaires were provided after the initial consultation and 30 days later. Questionnaires assessed patient experience, outcomes and perceived safety (PCOQ and PREOS-PC), quality of life (EQ-5D-5L) and health care use.

Results:

Of 715 participants recruited, 489 completed the 30-day questionnaire. We found no evidence that PGP-consultations resulted in greater improvement/deterioration in patient-reported health and wellbeing; confidence in health provision; health knowledge; or confidence in the health plan over the 30-day period. However, the PGP group reported lower confidence in health provision, poorer perceptions of practice engagement in safety promotion and more communication problems with staff immediately after the initial consultation. Patients receiving PGP-consultations reported fewer GP appointments during the 30-day period, however savings to the NHS were offset by higher use of other healthcare professionals.

Conclusion:

Well-designed training and supervision are needed to ensure PGPs have the right knowledge and can clearly convey health care plans to patients. While PGPs may reduce GP workload pressure, they do not necessarily reduce NHS costs.

Key words:

Paramedics; General Practitioners; Primary Health Care; Cost-Benefit-Analysis; Workforce; Patient Reported Outcome Measures.

How this study fits in:

Paramedics are increasingly used in primary care and previous work, although limited, has indicated generally high levels of patient satisfaction.

We found that patients who had a paramedic consultation reported lower confidence in health provision, poorer perceptions of practice engagement in safety promotion and more communication problems with staff after the initial consultation.

While there was evidence that patients receiving paramedic consultations care had fewer subsequent GP appointments, NHS savings were limited due to higher use of other healthcare professionals.

Implications for general practice include improving paramedic training and *in situ* supervision to ensure paramedics have the right level of medical knowledge and communication skills for work in the primary care setting.

Introduction

General Practice services in England are facing significant pressure due to increased healthcare demand ^{1 2}. Consultations have been rising by up to 15% annually ³, costing the NHS £9 billion ⁴, with a shortage of General Practitioners (GPs) to meet demand. To address this, there has been a shift towards utilising Allied Healthcare Professionals to support front-line service delivery ⁵.

Paramedics have been identified as a professional group that can contribute significantly to General Practice, particularly in managing minor illnesses, conducting home visits, and providing urgent consultations ⁶. Primary care initiatives, including the Additional Roles Reimbursement Scheme (ARRS), recognise that the generalist skillset of paramedics may be well suited to a GP setting ⁷. Recent legislation for paramedic prescribing, extends the role of this group. Consequently, there has been a three-fold rise in the numbers of paramedics working in GP services over the last 5 years ⁵. Survey research has noted the wide variation in the education and clinical experience of paramedics working in primary care and in the clinical work and examinations that they provide ⁸.

There is a lack of research on the safety, patient experience, and cost-effectiveness of paramedics working in general practice ⁹. Previous studies have focused on the extended skills needed by paramedics and have made assumptions about their impact on reducing GP workload and costs without empirical evidence ¹⁰⁻¹³. General practice services are configured around a diverse array of local contexts and challenges, meaning the paramedic skillset is utilised differently across the country ⁶.

In the Realist evaluation: Paramedics in general practice (READY) project ¹⁴, we evaluated how different models for using Paramedics in General Practice (PGP) are related to patient and economic outcomes. In this article we report on a component of READY that prospectively recruited a cohort of participants receiving consultations at practices that did or did not use paramedics. This sub-study aimed to compare patient and economic outcomes in the 30 days following PGP- or GP-consultations. Specifically, we explore the impact on patient-reported outcomes, experience and safe management and NHS costs/savings.

Methods

Study design and setting

We conducted a prospective cohort study comparing PGP- with GP-consultations at 34 general practice sites (25 with PGP(s), 9 without PGPs) in England, based on a published protocol ¹⁴. A sampling frame was used to ensure representation of sites that varied according to geographical area, practice size, deprivation, rurality and models of PGP care (see Supplementary materials; Table S1).

Participant recruitment and data collection

Sites recruited participants between May 2022 and February 2023. Participants were eligible if they were aged ≥ 16 years, with capacity to give informed consent, registered with a general practice in England, and with understanding of the English language. Practices were asked to approach eligible participants who had a consultation with a paramedic (PGP sites) or GP (non-PGP sites). Consultations could be face to face (surgery or at home) or by telephone/video call. An information sheet, consent form, initial consultation questionnaire and reply-paid envelope were provided at or soon after the initial consultation. It was planned that participants would be approached by practice administrative staff. However, after feedback from sites, it was agreed that participants could also be approached by clinicians at the time of their appointment. Participants were asked to complete the questionnaire within 24 hours of the initial consultation and were sent a follow-up questionnaire by the research team 30 days later. Participants could complete and return the questionnaire via post, online or by telephone.

Data

Practice-level data (size, indices of multiple deprivation (IMD) decile, ethnicity, urban/rural) and local authority-level age standardised mortality rates were obtained from publicly available data ^{15 16}. The initial consultation questionnaire assessed patient experience and outcomes using the Primary Care Outcomes Questionnaire (PCOQ) ¹⁷, the Patient Reported Experiences and Outcomes of Safety in Primary Care (PREOS-PC compact version) ¹⁸ and the EQ-5D-5L ¹⁹. The 30-day follow up questionnaire included the same measures plus the ModRUM questionnaire ²⁰ to assess use of NHS services.

PCOQ has four domains: health and wellbeing; confidence in usual health provision; health knowledge and understanding; and confidence in health plan. Each domain is scored from 1 (severe problems) to 5 (no problems). The PREOS-PC assesses five domains of participant-perceived safety in the last 12 months: practice activation (the degree to which practices are

perceived to be engaged in promoting safety); patient activation (the degree to which the patient engages in promoting safety); harm severity; harm burden and general perceptions of safety. Domains are scored on a 0 (worst) to 100 (best) scale. The PREOS-PC also contains questions about patient experience of specific safety or communication problems in the last 12 months. The EQ-5D-5L comprises five dimensions: mobility, self-care, usual activities, pain/discomfort and anxiety/depression. EQ-5D-5L responses were mapped ²¹ to a scale anchored at 0 (equivalent to death) and 1 (full health), and quality-adjusted life years (QALYs) over the 30-day period were estimated. Secondary care resource use captured in the ModRUM core questions included the use of accident and emergency (A&E), outpatient, inpatient and day case admissions. It also captured contact with clinicians (e.g., GP or allied health professionals), modality (e.g., face to face, virtual or home visits) and in-depth questions on prescribed medications. Resources were valued in 2021-22 UK prices.

Study Size

The study aimed to recruit 1,104 participants across 24 practices. Given assumptions (50% follow-up; 0.02 intra-cluster correlation coefficient; 0.65 cluster size coefficient of variation; two-sided test; 0.05 significance level), the study was powered to detect differences between 2 different models of PGP care (See Supplementary Material; Table S1) or GP care. This would require 138 participants in each model of care (totalling 552 with 3 PGP models and a GP model with complete data and $\geq 90\%$ power) to identify a 0.5 SD difference between 2 groups on PCOQ change scores. However, due to slow recruitment, 34 sites recruited 715 eligible participants of which 489 (89% of the intended sample size) completed the 30-day questionnaire.

Analytical Methods

In this paper, we focus on the PGP versus GP comparison rather than comparisons between different models of PGP care. Patient data were collected using REDCAP software and statistical analyses were conducted using Stata/ IC version 14.0 or higher (StataCorp).

Baseline characteristics include the practice-level characteristics described above and the participant-level characteristics: age, sex, ethnicity, and appointment mode. Multi-level models were fitted to adjust for potential bias due to differences in practice and participant characteristics. GP practice was fitted as a random effect and all other covariates fitted as fixed effects. Multilevel models included the participant-level variables: initial consultation questionnaire scores, age, sex, ethnicity (white vs non white) and all practice and local authority

level variables. Due to the high skewness of most PREOS-PC scores, a multi-level model was only fitted for the practice activation domain. A multi-level logistic regression model was also fitted for the PREOS-PC general perceptions of safety visual analogue scale (VAS) score dichotomised at < 90 vs 90+. Missing data was imputed according to user guides for the PCOQ and PREOS-PC ^{22 23}.

The primary economic analysis estimated the incremental NHS costs of 30-day episodes of care following PGP and GP consultations. In secondary analyses we conducted a cost-utility analysis (CUA) estimating the incremental net monetary benefit (iNMB) from the NHS perspective at the threshold of £20,000 per QALY gained ²⁴.

Results

Participants and practices

715 participants were eligible and completed the initial consultation questionnaire (Figure 1). PGP sites were substantially larger than non-PGP sites (median size 14,671 vs 7,900 registered patients) and had a lower mean percentage of registered participants recorded as non-white ethnicity (median 3.9% vs 11.2%) (Table 1).

Participants at PGP sites were slightly younger (median age 58 vs 61) with similar gender and ethnicity distributions. The majority of appointments took place face-to-face at the surgery (73% at PGP sites vs 77% at non-PGP sites). Although all participants at PGP sites were seen initially by PGPs, a minority reported having seen a GP (36/481; 7%) or other health care professional (33/481; 7%) at their initial consultation. 489 (68%) participants completed the 30-day questionnaire; response rates were higher at PGP practices (341/487; 70%) than non-PGP practices (148/228; 65%). The median age of respondents to the 30-day questionnaires was marginally older than that of all participants recruited (Table S2).

Initial consultation

PCOQ scores were generally high (median ≥ 4) after the initial consultation with PGPs and GPs in all four domains (Table 2). However, a difference was observed in the “Confidence in Health Provision” domain, with lower scores (i.e. less confidence in the doctors and nurses you usually see) observed in the PGP group (median 4.0 vs 4.5; $p < 0.001$). On three domains (harm severity; harm burden and general perceptions of safety), median PREOS-PC scores were very high (median=100) after the initial consultation with both groups reporting very few concerns about care received at the GP surgery in the last 12 months (Table 2). PREOS-PC practice activation scores after the initial consultation were lower, particularly in the PGP group (median 75 PGP vs 88 GP; $p < 0.001$). Patient activation scores were low in both groups (median 25 PGP vs 38 GP; $P = 0.545$). EQ-5D-5L quality of life scores were lower in the PGP group (mean 0.715 PGP vs 0.770 GP; $p = 0.003$). Reports of specific safety problems in the last 12 months were relatively rare and similar across PGP and GP groups (Table 3). Problems with medications prescribed in the last 12 months (7.8% PGP and 6.1% GP group) were most commonly reported. Communication problems were reported more frequently; for example, 17% of participants in the PGP group and 8% of participants in the GP group reported communication problems between patients and staff in the last 12 months ($p < 0.001$). A slightly

higher percentage of patients in the PGP group reported not being able to get an appointment when they needed one (7% PGP and 3.1% GP; $p=0.031$).

30 days and change between initial consultation and 30 days

Responses to the 30-day questionnaire followed a similar pattern to the initial consultation responses (Table S3). The PCOQ health and wellbeing domain change scores indicated small improvements in both groups. Participant perceptions of practice activation remained lower in the PGP group. Results from the multilevel analyses (Table 4) revealed generally small and statistically insignificant differences between PGP and GP groups in PCOQ change scores from initial consultation to 30 days later. Confidence in the health plan deteriorated slightly more in the PGP group (difference in change score -0.062 ; $p=0.012$). There was a statistically significant difference in the PREOS-PC practice activation scores at day 30, which were lower in the PGP group (adjusted difference in means -4.5 (95% CI: $-7.1, -2.0$), suggesting that the PGP group increasingly felt that their practices were less engaged in promoting safety.

Economic analysis

Mean per participant NHS costs over the 30-day episode of care were marginally higher in the PGP group: £345.41 versus £315.55 (Table 5). Mean reported GP consultations were lower in the PGP group (1.25 versus 1.73), but this saving was largely offset by higher use of other health care professionals (including PGPs). In multilevel regression (Table S4), PGP-consultations were not associated with a statistically significant difference in overall NHS costs. Overall adjusted mean NHS costs were £11.89 more following PGP-consultations (95% CI $-\text{£}160.90, \text{£}184.10$). The GP group reported marginally higher utility scores at the initial consultation and 30 day follow up time points (Tables 2 & S3). However, there was no difference in incremental adjusted QALYs between the groups (0.000 (95% CI: $-0.001, 0.002$; Table S4). At a willingness to pay threshold of £20,000 per QALY gained, the incremental net monetary benefit (iNMB) of a PGP-consultation was $-\text{£}11.61$ (95%CI: $-186.34, 163.13$), suggesting that PGP-consultations were not more cost-effective than GP-consultations.

Discussion

Summary

When compared to GP-consultations, we found no evidence that PGP-consultations resulted in improvements or deterioration in patient-reported health and wellbeing; health knowledge and understanding or confidence in health provision over the 30 days after an initial consultation. However, the PGP group reported lower confidence in health provision, poorer perceptions of practice engagement in safety promotion and more communication problems between patients and staff immediately after the initial consultation. Further work is required to understand whether this reflects care at the practice in general or specifically the care provided during the initial consultation. While there was some evidence that patients receiving PGP-consultations care had fewer GP appointments, savings to the NHS were offset by higher use of other healthcare professionals. Therefore, while PGP-consultations may have reduced GP workload pressure they did not reduce NHS costs.

Strengths and Limitations

We have conducted a large prospective cohort study to describe the association between PGP-consultations and the costs, quality and safety of care. We were able to explore how participant perceptions of care and health-related quality of life changed over time. However, the study did not achieve the sample size target. Conducting the study during the recovery from the Covid-19 pandemic impacted recruitment. We initially aimed to explore the association between different models of PGP care and participant reported outcomes, however small numbers of participants in some model configurations precluded meaningful comparisons. The study recruited English language speakers and therefore findings cannot be extrapolated more broadly.

The appropriate choice of comparator group is challenging as PGPs fulfilled different roles in different practices. We selected GP-consultations as PGPs were often employed to deliver care typically provided by GPs. Despite adjusting for participant and practice characteristics, the observational nature of the study makes it difficult to be certain whether the differences we observed in outcomes were attributable to the initial appointment (with a PGP or GP) or other unobserved factors. We do not have data on the specific conditions seen by PGPs or GPs. However, we note that EQ-5D-5L scores were lower among PGP patients at the initial appointment, indicating that they had, on average, worse health related quality of life. The

PCOQ asks questions about primary care outcomes “at the moment” whereas the PREOS-PC frames questions about safety “in the last 12 months”. Therefore, the PCOQ might be considered more likely to identify immediate concerns with the initial consultation, whereas the PREOS-PC might reflect long-standing views about the safety of care at the practice.

The estimation of NHS resource use relied on participant recall. Furthermore, approximately one third of participants did not respond to the 30-day questionnaire, potentially introducing response bias. PGP and GP booking slot duration typically did not differ within practices, however consultation times were not routinely recorded. Therefore, we do not accurately know whether PGPs spent longer with patients. Our data shed light on the redistribution of patient-facing work between GPs and PGPs, however they do not reflect other work (e.g. provision of training and supervision) that will undoubtedly affect the value of PGPs in relieving GP workload pressures. While we do not have individual patient data on the time between requesting and receiving an appointment, we note that patients in the PGP group were more likely to report problems in getting an appointment when needed.

Comparison with existing literature

A systematic review⁹, identified a small number of studies that evaluated patient satisfaction with paramedic care in primary care home visits. The review concluded that although there were high satisfaction levels with paramedic care, a minority of participants remained keen to be assessed by their GP and/or remained unclear about the purpose of the paramedic assessment. Our study was broader, including PGP-consultations at the surgery and telemedicine, nevertheless our findings that participants who had seen a PGP had lower confidence in health provision after the consultation add to this evidence base. Although this finding raises concerns, we cannot directly attribute it to paramedic consultations because the PCOQ questions typically refer to “doctors and nurses you usually see”.

Previous work by our group has highlighted the need for more evidence on the effect of paramedics on participant safety⁶. Our findings on participant safety are novel and indicate that participants who received care from PGPs had more concerns about *practice activation*. The practice activation domain includes questions about availability of practitioners to talk to and provision of information about the side effects of treatment. Again, these concerns may relate more generally to the practice rather than specifically to the paramedic but are worth further investigation.

It is clear from previous work ^{8 25} that the successful introduction of paramedics into primary care will be dependent upon PGP training and clinical experience; organisational factors such as the provision of clinical supervision and the integration of PGPs within the practice; and the complexity of patients and clinical activities that PGPs are assigned to. In this paper, we describe the overall patient experience, outcomes and NHS costs across a broad spectrum of PGP care models.

Implications for research and/or practice

Additional research to see whether our findings are replicated in other primary care settings is important. Such research might use bespoke questions about the quality and safety of care at the most recent consultation. This would help tease apart practice-related and paramedic-related concerns. Larger studies with longer follow up are needed to more fully evaluate rare outcomes (e.g., hospital admissions) which may ultimately define the safety and cost-effectiveness of PGPs. Further research could also describe in more detail the impact of PGPs on appointment accessibility, consultation times, and requirements for GPs to train and supervise new PGP staff. Future work involving larger numbers of GP practices which employ PGPs with different degrees of integration (e.g. rotational versus full time) and for different clinical caseloads (e.g. from minor illness and routine home visits through to largely autonomous prescribers with few patient restrictions) is needed to better define the appropriate roles of PGPs in general practice.

If our findings are replicated, there are important implications for general practice. These include careful planning in how paramedics are deployed in primary care so that they can quickly gain the trust of the patients that they see. They also include well-designed paramedic training and *in situ* supervision to ensure that they have the right medical knowledge and can clearly convey health care plans to patients. There may also be a place for better communication between the practice and patients about the role of paramedics within their practice to manage expectations and provide reassurance.

Tables and Figures

Figure 1: Patients approached and participating in the study

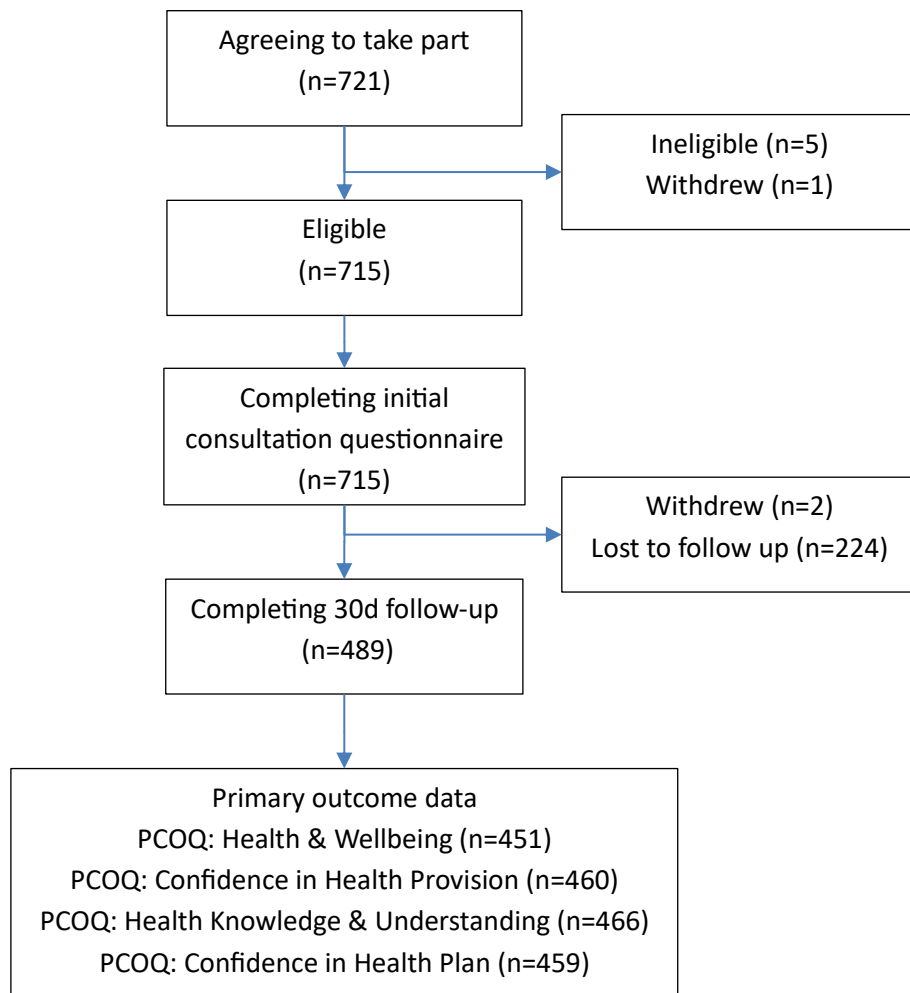


Table 1: Site, Participant and Appointment characteristics. Values are numbers (percentages) unless stated otherwise

	PGP sites (n=25)	non-PGP sites (n=9)
Site Characteristics		
Median (range), Practice size	14671 (3965, 44964)	7900 (4710, 31860)
Median (range), IMD decile	7 (1, 10)	8 (5, 10)
Median (range), ASMR	1057 (761, 1315)	1030 (802, 1065)
Median (range), % Non-white	3.9 (1.1, 27.5)	11.2 (1.4, 49.1)
Urban Sites	21 (84%)	7 (78%)
Participant Characteristics		
	N=487 ¹	N=228 ¹
Participants with 30d follow-up	341 (70%)	148 (65%)
Median (IQR), Age	58 (44, 71)	61 (47, 72)
Male	143 (30%)	59 (26%)
Ethnicity		
White	450 (96%)	206 (92%)
Other	20 (4%)	18 (8%)
Appointment Characteristics²		
	N=481	N=227
Mode of appointment		
Face to face at home	27 (6%)	7 (3%)
Face to face at surgery	351 (73%)	173 (77%)
Telephone/video/text/email	103 (21%)	45 (20%)
Appointment with ²		
Paramedic	412 (86%)	4 (2%)
GP	36 (7%)	208 (92%)
Other	33 (7%)	15 (7%)

¹ Due to missing data, participant characteristics were available for 695 (for ethnicity), 703 (for age) and 706 (for sex) respondents.

² Appointment characteristics were self-reported by participants. Not every participant reported the mode of appointment and some apparently misidentified the profession of the healthcare professional.

Table 2 Participant reported outcomes after the initial consultation: PGP vs GP

	PGP	GP	P-value¹
PCOQ	Median (IQR)	Median (IQR)	
Health and Well-being (N=460, N=218)	4 (3.3, 4.5)	4.1 (3.5, 4.5)	0.030
Confidence in Provision (N=461, N=221)	4 (3.5, 4.8)	4.5 (4, 5)	<0.001
Knowledge & Understanding (N=463, N=221)	4.8 (4, 5)	4.8 (4, 5)	0.779
Confidence in Health Plan (N=457, N=220)	4.3 (3.8, 4.8)	4.3 (4, 4.8)	0.627
PREOS-PC	Median (IQR)	Median (IQR)	
Practice Activation (N=412, N=204)	75 (56, 94)	88 (75, 100)	<0.001
Patient Activation (N=282, N=131)	25 (0, 63)	38 (0, 63)	0.545
Patient Harm Severity (N=411, N = 198)	100 (100, 100)	100 (100, 100)	0.027
Patient Harm Burden (N=409, N = 197)	100 (100, 100)	100 (100, 100)	0.045
General perceptions of safety (N=400, N=201)	100 (90, 100)	100 (90, 100)	0.002
EQ-5D-5L	Mean (SE)	Mean (SE)	
Utility score (N=457, N=225)	0.715 (0.243)	0.770 (0.124)	0.003
VAS score (N=477, N=224)	67.42 (0.966)	70.67 (1.301)	0.052

¹ Using Mann-Whitney U tests for comparison of medians, T-Test for comparison of means

Table 3: Safety and communication problems in the last 12 months reported after initial consultation. Values are numbers (percentages) unless stated otherwise

Visit,	PGP	GP	p-value ¹
Safety problem in the last 12 months	N=487	N=228	
Diagnosis	34 (7.0%)	12(5.2%)	0.419
Medication prescribed	38 (7.8%)	14 (6.1%)	0.537
Other treatments prescribed	14 (2.9%)	5 (2.2%)	0.804
Vaccines prescribed	12 (2.5%)	4 (1.8%)	0.791
Blood and lab tests	21 (4.3%)	8 (3.5%)	0.687
Diagnosis and follow-up tests	18 (3.7%)	6 (2.6%)	0.514
Appointments	34 (7.0%)	7 (3.1%)	0.031
Health records	22 (4.5%)	4 (1.8%)	0.085
Communication problem in the last 12 months	N=487	N=222	
Between you & health care staff	71 (17%)	16 (7.9%)	0.001
Among health care staff in the GP surgery	52 (13%)	14 (6.9%)	0.037
Between GP staff and other professionals	55 (13%)	20 (10%)	1.000

¹ Using Fisher's Exact Test for categorical outcomes.

Table 4: Adjusted¹ difference in mean (95% confidence intervals) PCOQ change scores and PREOS-PC scores between PGP and GP groups

	PGP vs GP	p-value
Change in PCOQ (30d - initial score)	Difference in change scores	
Health and Well-being, n= 433	-0.025 (-0.09, 0.04)	0.465
Confidence in Health Provision, n=441	-0.052 (-0.15, 0.05)	0.302
Health Knowledge and Understanding, n = 447	0.054 (-0.04, 0.15)	0.286
Confidence in Health Plan, n=440	-0.062 (-0.11, -0.01)	0.012
PREOS-PC at day 30	Difference in means	
Practice Activation, n=389	-4.5 (-7.1, -2.0)	<0.001
	Odds ratio	
General perceptions of safety, n=386	1.34 ² (0.73, 2.47)	0.348

¹ Multilevel modelling adjusting for the participant level factors: initial score, age (continuous), sex, ethnicity (white or not white), and for the practice level factors: age standardised mortality rate (continuous), % non-white (continuous), urban vs rural, practice size (small, medium, large) and deprivation decile (1-3, 4-7, 8-10), with site fitted as a random effect.

² Adjusted odds ratio for a VAS < 90 vs 90+ obtained from a multilevel logistic regression model.

Table 5: Participant reported healthcare use during the 30 day episode after the initial consultation

	PGP (N=287) ^a			GP (N=124) ^a		
	Mean resource use	Mean cost, £	SD	Mean resource use	Mean cost, £	SD
Primary health care resource use						
GP	1.25	22.30	27.63	1.73	29.76	24.22
Other HCP ^b	1.10	12.03	17.56	0.67	4.15	6.02
Prescriptions	2.61	22.30	42.66	2.57	23.54	42.21
Secondary health care resource use						
Outpatient	0.73	130.94	217.75	0.69	125.82	206.69
A&E	0.13	38.78	152.56	0.09	27.05	95.33
Admissions ^c	0.19	119.07	662.61	0.16	105.24	742.79
Total NHS Costs		345.41	806.28		315.55	838.43

^a Cases with complete NHS resource-use data.

^b Health Care Professional: includes nurses, paramedics and other non-GP contacts.

^c Includes day cases and overnight stays.

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