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FULL/LONG TITLE OF THE STUDY: Skill mixes in primary care: a mixed methods study of the deployment of new and extended roles in Primary Care Networks (PCNs) in England

SHORT STUDY TITLE / ACRONYM: PCN Teams

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SIGNATURE PAGE

The undersigned confirm that the following protocol has been agreed and accepted and that the Chief Investigator agrees to conduct the study in compliance with the approved protocol and will adhere to the principles outlined in the Declaration of Helsinki, the Sponsor's SOPs, and other regulatory requirement.

I agree to ensure that the confidential information contained in this document will not be used for any other purpose other than the evaluation or conduct of the investigation without the prior written consent of the Sponsor

I also confirm that I will make the findings of the study publically available through publication or other dissemination tools without any unnecessary delay and that an honest accurate and transparent account of the study will be given; and that any discrepancies from the study as planned in this protocol will be explained.

For and on behalf of the Study Sponsor:

Signature: .... Date: ....../....../......

Name (please print): ....

Position: ....

Chief Investigator:

Signature: .... Date: ....../....../......

Name: (please print): ....

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1. SCIENTIFIC SUMMARY

Background: The Additional Roles Reimbursement Scheme (ARRS) funding for new and extended roles in general practice introduced in 2020 was a policy response to a workforce crisis that has been building for many years. The ARRS funding is delivered through networks of general practices – Primary Care Networks (PCNs) - to provide a wider range of services (e.g. physiotherapy, paramedic, social prescribing) and integrated care to local populations (around 50,000 people in up to six practices per PCN). National data indicate that there are differences between PCNs in how the funding is used but evidence is lacking on what this means for patient care and how decisions about skill-mix are made within PCNs.

Aim: To improve understanding of the variability in skill-mixes among PCNs in England, how this relates to performance, and how decisions are made regarding the deployment of the new and extended roles in England, to inform future planning and policy.

Design: Pragmatic, multistage, mixed methods.

Research plan: Four linked work packages (WPs) over 27 months

WP1: Assessment of variability amongst PCNs in workforce skill mix. Data on staff employed by PCNs (n~1252) and general practices (n~6300) from NHS England openly available sources will be used to describe differences in staffing FTE (overall, and by role) controlling for population size. Proportions of total staff FTE provided by PCNs vs general practices will be compared. Regression modelling will explore associations between workforce costs per 1000 patients and PCN characteristics (e.g. size, demography, morbidity).

WP2: Associations between PCN workforce and performance. Data on PCN outcome measures will be drawn from the Fingertips public health data collection. The primary outcome will be the proportion of total available QOF points achieved in a PCN on the Quality and Outcomes Framework (QOF) pay-for-performance measure; secondary outcomes will be selected from other QOF outcomes where a link to ARRS roles might be expected. Regression modelling will explore associations between ARRS skill-mix variables and outcomes, controlling for local characteristics. Cost impacts will be calculated where skill mix changes are associated with significant changes in outcome.

WP3: Decision making in PCNs. Information will be sought from the Directors of PCNs in England about the process and influences on the hiring decisions of PCNs by means of an online survey. Survey responses will help select six varied (by region, size, demography, deprivation) case-study PCNs for in-depth analysis. Desk analysis will collate contextual information about each PCN (national and supplied locally). Semi-structured interviews with staff (6 from practices, 4 from the regional Integrated Care Board, per PCN) and consultations with patient representatives to explore factors affecting hiring decisions and operational implications for staff and patients will be analysed thematically.

WP4: Expert consensus building. Recommendations for PCN decision makers regarding deployment of ARRS roles will be agreed through an online consensus event involving 50 stakeholders (patients, public, staff in primary care, service planners, policy makers).

Dissemination and impact: Outputs will be produced in a relevant format for all audiences (public, service planners, general practice teams, policy makers, academics). Recommendations will inform workforce planning in PCNs to the benefit of service users and staff.

2. BACKGROUND AND RATIONALE:

2.1 The problem being addressed

There are differences between Primary Care Networks (PCNs) in how the funding for new and extended roles is being used. Research is needed (i) to improve understanding of how these differences affect patient experiences, care and equality of access, and (ii) to explore decision making processes within PCNs that underlie the skill mix choices that are made.

2.2 The importance of the research in terms of improving the health and / or wellbeing of the public and / or patients and health and care services?

Health / Care need

The funding for new and extended roles was a policy response to a workforce crisis in general practice that has been building for many years (1-3) and was exacerbated by the COVID-19 pandemic. With the population increasing and ageing, and presenting with greater medical and social complexity, alongside the prevalence of long-term conditions, the demand for primary care services outstripped capacity (2,4). Workload pressures created retention and recruitment problems that also served to intensify the staff shortages, worsen morale, reduce job satisfaction and increase burnout resulting in a vicious cycle that urgently needed to be broken (4-8). Stressed working environments and exhausted staff negatively affect service delivery, quality of care and the patient experience (9-13) making it imperative to increase the workforce in general practice.

Expressed need

A series of policy initiatives sought to address the workforce crisis. In 2016, the General Practice Forward View increased training places for general practitioners (GPs) and provided funds for new non-medical roles that would extend the clinical skill mix within practices beyond the traditional model of GPs working with nurses and health care assistants (HCAs) (14). Further funding was provided in the 2019 Long-Term Plan for the NHS (15), namely the Additional Roles Reimbursement Scheme (ARRS). This initiative enabled the employment of new and extended roles with skills that would not otherwise be available to patients within primary care settings so that more services could be provided in the community. As well as improving access for patients and relieving the workload of staff, it was expected that the additional staff would enable a reduction in the need for onward referrals and hospitalisations (15,16).

Sustained interest and intent

The ARRS funding is delivered through networks of general practices – Primary Care Networks (PCNs) – to provide a wider range of services and integrated care across local populations (17,18). Whilst originally expected to cover populations of 30,000-50,000 people, many PCNs are now larger. In May 2024, there were 1252 PCNs in England, with a mean/ median (SD) of

4.86/ 4 (2.65) practices per PCN, and a mean/ median (SD) of 49,438/ 45,897 (20,307) patients per PCN (19).

Since the introduction of ARRS funding in 2020, the number of new roles covered by the scheme has increased to 18. By July 2024 there were some 37,000 funded posts, exceeding the original target to recruit 26,000 new roles by 2024 (20). ARRS roles support practices through, amongst other things, chronic disease management, medication reviews, counselling, social prescribing and providing lifestyle advice. Some ARRS roles such as first contact physiotherapists and community pharmacists have front line roles, freeing up time for GPs to concentrate on more complex cases.

National data indicate that there is variability amongst the PCNs in how the ARRS funds are used. In May 2024, of the 18 different roles funded, 97 PCNs (7.7%) reported providing less than 5 different roles, 549 (43.8%) between 5 and 9, 573 (45.8%) between 10 and 14, and 33 (2.6%) 15 or more; mean/ median (SD) 9.2/ 9 (3.0) different roles per PCN. Although most PCNs reported significant investment in pharmacy and social prescribing (as contracts require), other roles appeared to be less widely provided. For example, first contact physiotherapy was provided by 69.4% of PCNs, paramedics by 47.4%, physicians associates by 39.8% and dieticians by11.1%) (19); in some cases this represents a deviation from contractual requirements. With the new and extended roles at the core of ongoing workforce policies for primary care, and no upper limit placed by NHS England on the number of staff employed through the ARRS scheme (20), it is important to understand how and why these differences arise and how they impact care delivery and equality in access to care.

Capacity to generate new knowledge

PCNs work closely with other health and care providers and the voluntary sector under the strategic direction of Integrated Care Boards (ICBs). However, both the PCNs, and the constituent general practices, have autonomy to decide which roles to employ and how to deploy them (e.g. which patient group they focus on). While individual general practices retain their own contracts with NHS England to provide general medical services; PCNs are supported by separate Direct Enhanced Service contracts that provide funds for the additional workforce in return for working as part of an integrated neighbourhood team (INT) to improve outcomes and reduce health inequalities. This includes providing a range of services, including enhanced access (out of hours), enhanced services to care homes and proactive care and medication reviews for high-risk patients) (20,21).

The proposed research will address a lack of evidence on how decisions about skill mix are made within PCNs, why different PCNs choose to employ specific roles (and not others), how PCNs design their skill mixes and what variability in deployment of ARRS roles means for equality of access, care quality and experiences in different contexts. As the number of people employed across the various ARRS roles continues to increase, the findings will inform PCNs about how best to allocate the funding they receive for this policy.

Generalisable findings

All PCNs in England work within a standard mandated framework that requires a formal network agreement, the appointment of a lead organisation and a director, and the establishment of a network board comprising key members of the constituent organisations. The Board is responsible for decision making about choice of roles, delivery of the extra care and financial arrangements. Improving understanding of the collaborative processes that underly local decision making about the composition of the workforce, the interaction between hiring decisions of individual practices and the PCN, and how this is influenced by local population needs and contexts, will inform policy related to PCNs and planning within PCNs going forward.

Building on existing work

Members of the research team have track records of research on the primary care workforce. Gage (PI), Williams and Jones are writing up a study of skill mix in general practice (HSDR 17/06/34); Walsh (PI) with Williams and Gage has completed a study on front line physiotherapy (HSDR 16/116/03); Gage (co-I) collaborated in a project on physicians' associates in general practice (HSDR 09-1801-1066); Walsh (co-I) collaborated in a project on paramedics in general practice (NIHR 132736); Walsh (co-lead) and Gage (co-I) are part of SURGE, an NIHR workforce hub focused on same day and urgent care (NIHR 159864).

2.3 Review of existing evidence. How does the existing literature support the proposal?

Since the ARRS roles were introduced relatively recently, evidence might be expected to be limited and this is confirmed by a recent search of PubMed. Analyses of the introduction of ARRS roles have indicated challenges associated with integrating skill mix changes (23). Implementation was impeded by a lack of shared understanding, inadequate space for the additional staff, the disruption to service delivery caused by the covid-19 pandemic and uncertainty about future funding (24, 25). Studies showed that when PCNs were formed around pre-existing relationships, and there was good management and leadership, the transition was smoother (26).

A report on the impact of ARRS for the general practice nursing workforce points out that the deployment of new roles was based on funding and availability, rather than demand, and resulted in unplanned increases in supervisory tasks and 'role creep' (27). It has similarly been noted that the scheme lacked the planning needed to ensure successful adoption, including consideration of the challenges associated with introducing new roles into the existing organisational culture; moreover, the ARRS funding did not cover the support costs required over the period of change (28). Despite difficulties integrating the new roles, investigations report that the increased number of staff has started to address long-term issues in general practice (29) including improved access for patients, better collaboration across local services and the expansion of activities such as extended hours access, services for care homes and medication reviews (20.25,30).

Focus groups with patients, however, have highlighted a lack of understanding of the new roles and a need to build trust (31). More generally, concerns have been expressed about unintended consequences for patients through fragmentation, delays and lack of continuity of care; for staff, the worries are task duplication, ineffective working and adverse effects on career progression (32,33). Disparity of funding within PCNs that disadvantages small practices has also been reported as threatening the more personal patient experience that such practices offer and the partnership model of general practice provision (33).

Analyses of workforce data have confirmed the variability in scale, structure and configuration of the deployment of ARRS roles (26,34). One study comparing 2018 (pre ARRS) with 2022 identified that ARRS roles tend to be adopted more frequently in larger general practices with fewer GPs and more internationally trained doctors. This study also found that use of ARRS roles was significantly associated with lower prescribing and better patient experiences (35). Higher quality and lower cost prescribing was reported by another study in association with having more clinical pharmacists in a practice, although the effect of the increase of ARRS FTE was found to have a mixed effect on hospital activity (23).

Two recent studies have reported fewer ARRS roles in more deprived areas of the country, raising concerns that the funding is not achieving the objective of reducing inequalities (30,36). One of these specifically reported the highest lack of social prescribing link workers in urban, more deprived areas with high proportions of people from minority ethnic groups (36). These findings are corroborated by an in-depth investigation in three varied ICSs (by co-applicant Walsh) that identified problems of recruiting staff in areas of high deprivation (37). This study also found ongoing issues around training, supervision, career progression, workloads and feelings of isolation amongst ARRS staff.

Studies to date were mostly conducted in the early years of the ARRS introduction and during or shortly after the covid-19 pandemic during which time PCNs and practices were learning to share funding and work together. Evidence is limited on the impact of ARRS roles and studies have not explored how or why variability in deployment of ARRS roles arises amongst and within PCNs. The proposed study seeks to address these gaps by investigating how hiring decisions are made and why skill mixes vary, as well as how the additional roles affect the performance of PCNs and constituent general practices. It will be conducted some five years after the introduction of ARRS and after initial adjustments to services have been made. The findings will address an acknowledged research priority namely to improve understanding of the long-standing problems of staff retention, recruitment, stress and burnout in general practice (38).

3. Aims and objectives

The overall aim is to improve understanding of the variability in skill mixes among PCNs in England, how this relates to performance, and how decisions are made regarding the deployment of the new and extended roles in England, to inform future planning and policy.

The objectives, which align with work packages (WPs) are to:

1 Explore differences amongst PCNs in the size and composition (skill mix) of the workforces taking account of both general practice staffing and the additional roles provided by PCNs with ARRS funding, whilst controlling for differences in deprivation, ethnicity and rurality (WP1)

2a. Explore associations between measures of PCN skill mix and nationally published indicators of performance at the PCN level (WP2)

2b. Investigate the availability of locally produced indicators of PCN performance and possibilities for repeating the national analysis in selected regions

3 Investigate the processes and reasons underlying decisions regarding skill mix with particular focus on the deployment of new and extended roles through a national survey of PCNs and in-depth qualitative analysis in a sample of PCNs (WP3)

4 To consolidate the findings through diverse expert consensus building, and produce recommendations for practice (WP4)

Advisory groups

Participatory methods will be used throughout to ensure the project is grounded and relevant. Two reference panels (representing service users and decision makers in primary care – professionals and commissioners/ service planners) have informed the development of this application and will work with the research team at all stages of project delivery. We are committed to ensuring EDI is at the centre of our research, including advisory panels. As such, diverse groups of professionals and service users have been recruited to advise throughout. Further information about these panels is given below.

The project will also have an External Steering Group of experts (also described below).

4. Design and theoretical/conceptual framework

The design and timing of the work packages are shown in the Flow Chart at the end of this document; a Gantt chart / project management plan is uploaded separately.

The aims and objectives will be addressed through a pragmatic, multistage, mixed methods design, involving data analysis, an embedded survey and intensive case study (39). Mixed methods draw on the advantages of both quantitative and qualitative approaches (40) to enable a comprehensive understanding of multilevel processes and systems such as those involved in primary care (41,42).

The project comprises four linked WPs conducted over 27 months. Each WP is mapped to a study objective. WP1 and WP2 (quantitative) involve desk-based analysis of routinely available large datasets and contextual information about PCNs to explore variability across England in deployment of ARRS roles and association with performance measures. WP3 will use mixed methods to explore decision making about ARRS deployment in-depth at local level through a national survey of PCNs (WP3a), and a comparative case study of six PCNs with varied characteristics (WP3b). WP4 involves online consensus building to identify staffing recommendations.

The WPs will be delivered sequentially with quantitative and qualitative approaches occurring concurrently and integration at several points using methods of connecting, building and merging (39). The selection of case study sites will be informed by the early quantitative analysis and the national survey of PCNs; findings from the qualitative analysis will assist with the interpretation of quantitative findings by providing possible explanations for observed phenomena in the local context (40).

5. Research plan

WP1: Variability amongst PCNs in the size and composition (skill mix) of the workforces (Objective 1)

Data sources - Workforce

Detailed data on the workforce of individual general practices (n~6300 in July 2024) (32) and of the 1252 PCNs (19) in England are routinely collected by the National Workforce Reporting System, quality checked and made openly available, monthly for general practices and quarterly for PCNs.

The general practice workforce data provide detailed information on each staff member employed by the practice including age, gender, country of training (general practitioners (GPs) only), head count (HC) and full time equivalencies (FTEs) by four staff groupings: (i) general practitioners (subdivided into partner, salaried, registrar, locum); (ii)nurse (practice, advanced, specialist, extended role, trainee, dispenser); (iii) direct patient care (DPC, including health care assistants (HCAs), and 16 other categories of allied health professional such as pharmacist, physiotherapist, paramedic, physicians associate, counsellor, dietician, social prescriber); (iv) administrative / non clinical (including managers, receptionists, estates).

The PCN workforce data are based on PCN claims for payment for the additional roles they hire. Head count and FTE information is included for the roles that the PCN directly hires, and for the staff of local member organisations (e.g. voluntary sector or hospitals) that are seconded to the PCN for a portion of their work time. Some PCNs, however, contract services out to other organisations (e.g. physiotherapy, social prescribing) on the basis of an agreed FTE to be provided by unnamed professional(s), and for these services the HC is not available.

Data sources: - PCN and practice profile measures- contextual information

Descriptive data on PCN and practice characteristics are available from the 'Fingertips' public health data collection. These data allow comparison across practices, PCNs and other geographical levels and benchmarking to regional (ICB) and national data (44). Variables available at practice level include: list size, weighted list size (adjusting for health inequality, deprivation, rurality and high cost locations to reflect need), region of England, ICB, the age /gender distribution of practice populations, deprivation (Index of Multiple Deprivation 2019) and most recent Care Quality Commission inspection. The population age-distribution, list sizes and the percentages who are unemployed, have long standing conditions and caring responsibilities are provided at PCN level.

Analysis

Total PCN workforce: The size and skill mix in a PCN comprises the staff that are hired by the constituent general practices and the roles that are hired by the PCN with ARRS funding for sharing amongst the practices. Two tranches (last two quarters) of the general practice and PCN workforce data will be downloaded and merged (with practices nested in PCNs) to provide a total record of the workforce for each PCN. Use of two tranches will ensure all staff are captured because late reporting by PCNs and rotating trainees in general practices can otherwise result in missing information.

The new and extended roles included in the PCN workforce data overlap many of those in the general practice data, especially the sections on DPC (pharmacy roles, allied health professionals/ therapists, categories of mental health worker, social prescribing roles) and nurses (advanced, associate). Considering both general practice and PCN workforce data enables the totalling of FTE provision by role across a PCN and the examination of complementarity between practice and PCN workforces.

Contextual information: Variables describing the characteristics of PCNs and general practices will be added to the workforce data base.

Skill mix variables: Skill mix variables will be created from workforce data including: the proportion of total FTE that is clinical (vs administrative, management); the proportion of total clinical FTE that is GP (vs nursing and DPC); the proportion of GP FTE that is fully qualified (excludes trainees and registrars), permanent (excludes locums, trainees and registrars), UK trained (excludes international medical graduates) and female. The proportions of staff hired by practices (vs PCN) will be broken down by role. Indicators of staff workload will also be estimated, i.e. total GP FTE per 1000 weighted patients and total clinical FTE per 1000 weighted patients.

Variability across PCNs: Summary statistics (encompassing frequencies, variability and distributions) will be reported for all workforce and skill mix variables. Outputs will be assessed for missing information and plausibility. Given quality checks are conducted prior to publication of the data, it is expected that most records will be complete. Our previous work on these data, however, has indicated that errors can occur in reporting resulting in implausible ratios which will be investigated and data excluded or imputed, if necessary.

The extent of variability in workforce amongst PCNs will be explored with respect to total PCN FTE and PCN skill mix variables, controlling for the size and age-sex distribution of the PCN population and weighted list size. A ranking of PCNs based on the ratio of ARRS FTE to total

PCN FTE (general practices plus ARRS) will be shown graphically, and the extent to which the ARRS contribution reduces inequality in PCN workloads will be estimated. This exercise will be repeated for individual ARRS roles, e.g. the ratio of ARRS FTE on first contact physiotherapists to total PCN FTE on first contact physiotherapists to assess the extent to which PCN hiring decisions complement those of the constituent practices.

Economic analysis: The workforce costs of each PCN (and the proportion from ARRS roles) will be estimated using a top-down approach. National unit costs, inclusive of oncosts and overheads (45), will be applied to the FTE of each staff role and summed to estimate total human resource cost per PCN; proportions of total cost for different staff groups will be calculated. Summary statistics (mean, SD, median, IQR) will be used to estimate variability amongst PCNs in costs (total and by role). The extent to which costs of ARRS roles reduces inequality in total PCN costs per 1000 weighted patients at PCN level will be explored. Associations between workforce costs per 1000 weighted patients and PCN characteristics (size, demography, morbidity and deprivation) will be explored through bivariate analysis and regression modelling.

WP2: Associations between PCN workforce and performance (Objective 2)

Outcome measures: Reporting by general practices to the Quality and Outcomes (pay-for-performance) Framework (QOF) will be used as outcome/ performance measures (46). These data at PCN level are available from Fingertips (44) including: the proportion of all available points achieved and performance on some 150 other indicators, across 13 topic areas (including cancer, cardio-vascular, diabetes, mental health, maternal and child health, musculoskeletal, respiratory disease, antibiotic prescribing).

The proportion of total available QOF points achieved in a PCN will be used as an overall performance measure. A selection of further outcome measures will be identified in association with the Service User Panel and the Professionals and Service Planners Panel to represent areas where ARRS roles might be expected to make a difference. Examples might include: performance of blood pressure checks for people with hypertension, or foot checks for people with diabetes, to explore associations with the relative size of the PCN nursing workforce; the PCN social prescribing (link workers, wellbeing coaches) resource for how it relates to measures of social deprivation; antibiotic prescribing indicators for associations with availability of pharmacists.

Analysis

Summary statistics will be calculated for all outcome, workforce and skill mix variables. Regression modelling will be used to explore the association between ARRS staffing (overall and by role) and PCN performance measures, controlling for confounding factors. ARRS staffing will be measured as the ratio of ARRS FTE to PCN FTE overall and for individual roles as appropriate for individual outcomes. Inspection of the data has indicated that sufficient variability in outcomes is apparent. For example, the national average prescribed antibiotics by STAR-PU (Specific Therapeutic Group Age-sex weightings related Prescribing Unit) Q4 2023 was 0.2334, ranging 0.1825 in London to 0.2579 in the NE and Yorkshire, with similar variability seen amongst PCNs within regions. The results will provide an indication, relative to the average PCN, of how differences in ARRS staffing may affect the outcome in question. Sensitivity analysis will be conducted to account for uncertainty including the possibility of lagged effects.

The feasibility of using a longitudinal approach across three years of data (2022/3 to 2024/5) will be explored. This may not be possible, however, because non-significant changes between years are reported by the Fingertips data for many outcomes.

Economic analysis: Cost impacts of skill mix effects will be estimated based on the results of the regression analysis. The additional cost (or saving) in staff input will be calculated where skill mix variation is statistically significantly associated with a change in outcome. For example, if having a higher proportion of total clinical FTE accounted for by nurses is significantly associated with an improvement in (say) the QOF measure that records performance of foot checks for people with diabetes, the saving compared to general practitioner time or the extra cost compared to health care assistants, will be estimated. Costs for staffing grades will be identified, inclusive of oncosts and overheads, based on nationally validated unit costs (45). Sensitivity analysis will be conducted to account for uncertainty in effects or in unit costs.

Sample size (WP1 and WP2)

A sample size calculation is not required for WP1 or WP2 because all PCNs in England will be included using available national data. By studying the whole population, the full range of geographies and demographic-social-economic and ethnic variety will be included.

Local level data (Objective 2b)

Discussion with ICB information analysts during the preparation of this proposal show that some PCN-level data that are not available in national sources are collected by some Local Authorities and are made openly accessible. The Kent Public Health Observatory https://www.kpho.org.uk/, for example, provides additional variables on the wider determinants of health, and also for some locally collated outcomes, for the 42 PCNs in the Kent and Medway ICB area (population of 1.9 million with a varied socio-economic ethnicity profile). Amongst the outcomes are data on emergency hospitalisations for ambulatory care sensitive conditions, a recognised indicator of the performance of primary care (47). Use of such data would enable a more nuanced analysis of the performance of PCNs in relation to skill mix and mitigate the limitations associated with QOF as an indicator.

The availability of additional data in local areas will be explored through enquiries to the Association of Public Health Directors and the project's Professionals and Service Planners Panel with a view to repeating the national analysis in a sample of Local Authorities across England, depending on data availability.

WP3: Decision making in PCNs: national survey and in-depth case study analysis (Objective 3), months 1-21

The decision-making processes about hiring and deployment of new and extended roles within general practices and PCNs will be explored at two levels. A survey of all PCNs in England will map variability at a national level and provide a framework for demonstrating ARRS implementation. An in-depth analysis in a small number of PCNs, selected from the survey responses for maximum variability, will further investigate workforce influences on performance and contextual factors. Perspectives of key local stakeholders on workforce planning and decision-making will be explored by qualitative interviews. The survey framework will highlight themes that can be explored and will ground the initial design of interview schedules.

WP3a: National survey of PCNs, months 1-12 *(Leads: Jones and Gage)*

Survey design: Survey design will start in month 1 of the project so that ethics processes can be completed in time to launch the survey at the beginning of month 4. Items will cover basic descriptive information about the PCN including: number of practices and ownership, number of patients and characteristics, setting (city, urban, rural), leadership and governance, PCN hiring of new and extended roles and turnover, staff retention policies, outsourcing, how decisions were made on PCN skill mix with respect to population need and available practice staffing profiles, influence of the regional ICB strategies, processes of sharing resources across practices and financial considerations. The research team will work closely with the Professionals and Service Planners Panel to ensure the items are relevant and appropriate. The survey will be brief and piloted and refined prior to full distribution. Most questions will be closed with carefully designed response options to encourage participation.

Distribution: Data collection will take place months 4 to 6. The survey will be distributed online to the managers of PCNs with a request to complete it themselves or to delegate the task to colleagues with knowledge of the PCN's processes. Non respondents will be contacted after one month with an option to complete the survey over the phone. To encourage data return, respondents will be able to enter a prize draw for vouchers.

Analysis: Descriptive statistics will be calculated at PCN level for quantitative variables using methods appropriate for each variable. Content analysis of open text responses will code for variation across PCNs in use of ARRS roles, structures and decision-making about workforce. Differences will be considered in relation to context e.g. rural vs city location, deprivation, ethnic diversity, and number and size of general practices. Overarching concepts will be defined; and a narrative description of findings provided. Representativeness in responses will be reported through comparison between the profile of responding PCNs and the national picture.

Selection of case study sites: PCNs will be invited to volunteer to be a case study site for in-depth study (WP3b) when they complete the survey. Whilst recognising that the case study approach does not provide comprehensive coverage, volunteer PCNs (up to six) will be purposively selected to represent different contexts. General practices within participating sites will be offered a one-off payment in return for enabling data collection (e.g. staff giving interviews). PCNs and practices will not be identified by name but given a study ID.

A matrix approach will be used to aid selection of case study sites, based on key criteria. Willingness of PCNs to participate (as indicated in a survey response) will be a pre-requisite and areas with extended data sets will be favoured. Regional spread within England will be sought. We will also include variety in characteristics such as deprivation/ affluence, setting (urban/rural/coastal) and size of population. PCNs reporting interesting models of ARRS recruitment or decision making (as identified from the survey) will also be candidate sites.

WP3b: Case studies of decision making in PCNs

WP3b will build on the quantitative work in WP1 and WP2 by including additional layers of detail on the workforce, processes and outcomes in case study PCNs through collection of both quantitative and qualitative data within a mixed methods analysis.

Six PCN case studies will be subject to in-depth data collection and analysis to acquire an understanding of how hiring decisions about new and extended roles are made, why staff mixes vary, how different roles and configurations contribute to service delivery and outcomes, and what enables staff to work effectively together. A case study approach provides a mechanism for exploring how different contexts influence policy implementation (48,49). The aim is to provide new insights to enable managers to adopt effective methods of workforce planning and development.

Set up: Detailed design of data collection in case study sites will start in month 4 with input from the Service User Panel and the Professionals and Service Planners Panel and taking account of responses from the national survey as they come in. The ethics application will be submitted before month 7 so data collection involving interviews can start by month 10. There will be a graduated launch of data collection across the case study sites as recruitment of sites (starting in month 7) and local approvals are obtained.

Contextual information: Preliminary desk research will collate data about each PCN in a database organised by PCN with nested general practices. It is expected that the six case- study PCNs will encompass up to 30 general practices of varying size and that differ with respect to demographic, social, economic and ethnic characteristics. The starting point for the dataset will be the information about case study sites from the national survey (WP3a) and WPs 1 and 2. Locally collected data on alternative outcome indicators and the wider determinants of health (as available) will be added to this through working closely with managers and information analysts in the study PCNs and the parent ICBs. The main purpose of these data are to provide context for the qualitative analysis but they will also be explored descriptively to enable comparisons within and between PCNs.

Qualitative analysis

Data collection: Qualitative enquiry in each PCN using semi-structured interviews will provide understanding of workforce decision making processes related to the deployment of the new and extended roles, taking account of local situations for their influence on the effectiveness of service delivery and focus on population needs and quality of care (50). It will also provide a framework for interpreting the results of the modelling. Interviews will explore the perspectives of members of the workforce (clinical and non-clinical) and other key stakeholders (e.g. ICB workforce teams, training hubs). Patient and public perspectives will be explored separately.

Interview schedules for members of the workforce will be designed with input from the study's two advisory panels and considering responses to the survey. The schedule will provide a framework for a deductive approach to data collection ensuring the overall topic (use of new and extended roles) is maintained in focus. Within that context flexible inductive exploration will encourage nuanced insights from individual experiences. This approach will allow experienced qualitative researchers to gather data describing the bigger picture and organisational influences while also unpacking different layers of understanding and interpretation that influence in-practice outcomes. The framework employed for data collection will also inform the initial stage of analysis.

Case studies will acknowledge local contextual influences and adopt a two-tier approach at 'ICB/PCN' and at 'PCN/general practices' levels to distinguish between external contexts and internal factors that affect decisions. This will include the quality and coherence of policy affecting the primary care workforce, local organisational and socio-demographic environment along with internal resources, organisational culture and relationships to ensure that findings are grounded within the social systems of each PCN, general practices and service delivery.

At ICB/PCN organisational level, the extent to which population needs drive skill-mix decisions will be explored in the context of national and ICB strategy. Interviews (approximately 4 /case study with ICB professionals) will explore understanding of factors affecting hiring decisions (external environment, governance, local economy and labour markets, socio-economic environment, challenges, future trends and plans).

At the PCN/ general practice level the deployment of the new and extended roles within practices across the PCNs will be explored to gain bottom-up understanding, with close focus on operational implications of staffing decisions and skill mix (e.g. resources, communication, interprofessional dynamics, interactions, relationships, trust) in the local context. Interviews (approximately 6 / case study) will be conducted with PCN and general practice staff, including those holding new and extended roles and non-clinical positions. Given pressures on general practice, joint interviews will be made available (instead individual), if more convenient for staff. In cases where respondents are keen to provide their views, but finding it difficult to identify a suitable time, an opportunity to feedback responses via an online platform (e.g. mote for video-recording) will be provided.

Recruitment: Interview participants will be sought through posters in staff rooms and direct emails from PCN and practice leaders with responses direct to the research team. Participants will be selected purposively by role. Information leaflets will be provided setting out the purpose of the study, voluntary nature of participation and ability to withdraw at any time. Confidentiality will be ensured through use of individual study IDs. Informed consent will be obtained before the start of the remote interview, which will last a maximum of 30 minutes and be audio/video recorded if the volunteer agrees. Volunteers will be able to fix a time and method (online video or telephone) for the interview.

Public and patient perspectives: For each case study site, contributions from established Patient Participation Groups (PPGs) across practices or the PCN will be sought. In liaison with PPG organisers, the most appropriate means of engaging with members will be used to establish trusting interactions and this may be with individual representatives or through regular group meetings. A flexible and pragmatic approach will be adopted to enable informal conversations using an interview-type approach that will be adapted to situations. This will ensure that a standard approach is taken while also reflecting local arrangements. If diversity is lacking, using the breadth of coverage within the research team and PPI group, we will work with PPG organisers to encourage wide inclusion. The project's Service User Panel will assist with preparing for the interaction with PPGs. This will include assisting with the design of materials that will provide full information, with guidance on the areas of interest and key questions for representatives to consider. Permission will be sought to record conversations from the PPG lead and all representatives involved; this will ensure that all feedback will be accurately recorded. All information will be made available in easy read formats and in the appropriate language. Support may be provided through interpreters and BSL provision as requested. All contributors will be assured of anonymity.

Analysis: Staff interviews and patient feedback will be transcribed and uploaded to NVivo for analysis (51). At least two members of the research team will be involved in reading, coding using thematic analysis and interpreting the transcripts iteratively (52). Data will be subject to hybrid thematic analysis by adopting a deductive approach within the framework defined to inform data collection and an inductive approach for deeper exploration of richer areas of data. This analytic approach will define key themes summarising semantic aspects as described within the data as well as identifying important underlying concepts. Following this standard approach, data from each case study will be analysed separately to allow comparison across PCNs.

In a final stage of analysis, overall synthesis of thematic findings from individual cases studies will be carried out to identify any overarching concepts, relationships or interactions that may be evident to provide insight into the common influences – either high level or underlying – that may be present. Similarities and differences between case studies with reference to context in a comparative framework. Analysis will drill down into understanding how decisions are made about ARRS roles relate to the structure, organisation and workforce features of practices, the PCN and the ICB, how this affects service delivery and how patients perceive the process.

WP 4: Expert consensus building and recommendations for practice (Objective 4)

Recommendations for PCN decision makers regarding the deployment of ARRS roles will be agreed through an online consensus event involving multiple stakeholders. Approximately 40-50 recruits will participate including patient/public contributors, service planners, PCN leads, ARRS professionals and other key decision-making stakeholders identified from previous WPs. The opportunity will also be advertised through pre-established networks and via social media to achieve the target sample size.

Process:

Findings from WPs1, 2 and 3 will be collated through discussion within the research team and with the three advisory groups to create a series of proposed recommendations for PCNs to consider when planning their team composition and integration. Each of these recommendations will be taken forward into WP4 for further discussion, refinement and prioritisation through consensus approaches involving wider stakeholders.

Online consultation and consensus software such as Loomio (53) will enable the recommendations created from the earlier WPs to be presented in separate discussion threads. All participants will be requested to asynchronously comment on the content, wording and importance of the proposed recommendations. All comments will be visible to other participants to ensure reflection on the opinion of others and to encourage further debate amongst participants. Following a period of consultation the discussion will be closed and each participant will be provided with a defined number of credits to allocate to their chosen priorities; final token allocation will then highlight the group determined priorities. The output from the process is an agreed set of priorities to support workforce composition decision making. These will then be presented in a variety of formats informing each stakeholder group of the outcome.

To ensure inclusive engagement, participants from non-English speaking communities will be selected to take part in separate focus groups to ensure their voices are heard. The views expressed will be fed into the online tool and participants will be able to submit votes by proxy.

6. Equality Diversity and Inclusion

The ethnically diverse research team is committed to ensuring that everyone (public contributors via PPIE and research participants) has an equal opportunity to participate in the study, contribute to its design, feel equally supported to engage with all WPs, have acceptable and accessible study materials, and be made aware of study findings, and where possible participate in dissemination.

A strong EDI approach has been incorporated in the development of the work to date, particularly through engagement with people from African, South Asian and Arabic heritage communities. Members of the team have strong links with ‘grass-root’ community organisations, and multilingual co-applicant Berrou, will continue to work with people from these communities throughout the study within our PPIE advisory group. This will be facilitated through the involvement of Health Research Ambassadors (https://arc-w.nihr.ac.uk/research/projects/health-research-ambassadors/) who have been involved in planning the study and are keen to support its delivery. To allow inclusion of individuals from diverse backgrounds, the project budget includes: translators and translation costs; production of culturally acceptable and accessible materials; hire of community-based facilities to support engagement; reimbursement payments; and any data-use payments.

Recruitment of case study sites, and of participants within sites will be driven by EDI considerations. In addition to ethnic diversity, an inclusive approach to gender identification will be adopted. Liaison with University LGBT+ communities will facilitate engagement work with groups, organisations and partner institutions to enable recruitment and support for people from these communities. Members of the project's advisory panels (service users and professional panels) are from 'deep end' general practices to support the inclusion of areas of greater deprivation (54).

An Equality Impact Assessment will be completed in advance of commencing the study in collaboration with our diverse PPIE advisory group, to ensure all of study processes create equality of opportunity and do not create unintended discrimination or sensitivities. Where any processes are deemed to create potential inequities, mitigating action will be taken to address these issues. Explicit information will be provided on the diversity across and within study sites, amongst individual participants in all phases of the research and in the PPIE advisory group.

7. Dissemination, Outputs and anticipated impact: What do you intend to produce from your research?

Outputs and Dissemination

The approach to dissemination and impact will be guided by Knowledge Mobilisation principles and led by co-applicant Walsh who is a Professor of Knowledge Mobilisation. A Knowledge Mobilisation strategy taking the form of a logic model will be created on commencement of the study in collaboration with key stakeholders who will act as knowledge brokers/ advocates for the study throughout. The External Steering Committee will have insight into study progress and will be involved in suggesting evolving areas for active dissemination and engagement. Similarly, engagement with key decision makers in the project's Professionals and Service Planners Panel throughout the work will maximise the potential for wide dissemination and impact. Research team members will also draw on pre-established networks (including ARC West and ARC KSS) to share information; our recently funded NIHR Workforce Partnership (NIHR 159864) will maximise KM opportunities both within our own membership and also across the other four funded collaborations.

Target audiences for dissemination, the outputs tailored for each audience and the mechanisms for mobilising knowledge are listed below. However, it is anticipated that knowledge products will be relevant for multiple audiences and knowledge cross transference will be maximised. In line with the KM literature, outputs will be produced in a comprehensible and relevant format to potential users (55,56,57).

For study participants: A summary of the study findings will be sent to each participating general practice, and to individual participants ensuring the information is accessible (i.e. that easy-to-read versions, translations and infographics are available). The summary and more detailed findings will also be available on the study website.

For patients and members of the public: A wide-reaching approach will be used for the general public, using inclusive communication strategies, including native language. BSL, and alternative communication strategies such as infographic/vlogs. Email lists and 'X' will be used to publicise and encourage active commentary throughout, with the use of existing social media networks to drive traffic to the study website. Opportunities will be sought for press releases and guest blogs. It will be important to disseminate the findings to communities with lower levels of health literacy, therefore digital stories and animations, video presentations and graphics will be explored with the study PPIE group, with a focus on inclusivity.

For service planners, including members of Integrated Care Boards: We will attend commissioning meetings using the mechanisms of knowledge brokering and relationship building. Opportunities will be sought to present our work at relevant 'commissioning' events, including national conferences. An interactive website application will be created to inform decision makers of the implications of different staff configurations and their impact. All developed materials will be made freely available through FutureNHS and the main study website to facilitate wide uptake.

For general practice teams: Through early engagement with general practice teams as stakeholders, we will create opportunities to influence practice at an early stage. We will present at general practice and nursing educational events to share learning and to maximise opportunities to influence decision making, including Integrated Care Board training hubs that provide Continuous Professional Development events for health and care staff.

For policy makers: Assisted by the External Steering Committee, we will disseminate press releases and policy briefings through links with key statutory organisations (such as the Department of Health and Social Care and Health Education England), and non-statutory organisations (such as the British Medical Association, Royal College of General Practice, Royal College of Nursing, Chartered Society of Physiotherapists, National Association of Social Prescribers).

For academics: Academic outputs will include papers of the main findings and evaluation, submitted to high impact, open-access peer-reviewed journals, such as the British Journal of General Practice and British Medical Journal. In addition, we plan to give presentations or workshops at relevant professional conferences including the Society for Academic Primary Care.

Expected impact

The research is addressing a strategically important issue. There is a lack of research around the rapid introduction of the wide range of shared additional roles into general practice. The proposed research will analyse new and existing datasets, and use qualitative methods, to produce findings that will inform future policy.

The findings will produce evidence about how ARRS funding is being used by PCNs, shedding light on inequalities (and reasons that might need to be addressed) and what skill mixes result in the best outcomes for patients. Findings from all aspects of the work will be brought together in a consensus forming process involving GPs, professionals, commissioners and service users to produce implementation recommendations that are relevant and workable throughout the NHS. These recommendations will inform short term staffing decisions and longer-term workforce planning at practice, regional and national levels. They will enable workforce planners in ICBs and PCNs to make staffing decisions that will ensure that the available ARRS funds are deployed effectively. This will benefit the population who are service users, through improved access to more timely care, and tax- payers (funders of the NHS), because the NHS budget will be more efficiently used. Overall, this will contribute to the smooth running of the NHS in the future, and its sustainability, to the benefit of patients and the public.

8. Project management

The PI (Gage) will be responsible for the overall conduct of the research. She will be supported by a project manager (Jones) who will assist with the day-to-day running of the project (arranging meetings of the research team and advisory groups, overseeing the process of obtaining ethical approvals, coordinating WPs, and assisting with dissemination, the budget and reporting). Each WP will have joint leads, but all co-applicants will contribute to each WPs as relevant.

The research team (the PI and all co-applicants) will form a Project Management Group which will meet monthly, by video conference, to review ongoing work and plan upcoming tasks. Team members already work with each other in various capacities and across other NIHR funded projects. Meetings will be chaired by the PI. The PMG will monitor progress against the project Gantt chart and study objectives. Minutes will be taken with action points followed up at subsequent meetings. Any matters arising that are challenging will be referred to the External Steering Committee.

The ***External Steering Committee (ESC)*** will be convened during the study set up phase. It will meet twice per year (four times in all) to review progress and adherence to the study protocol and advise and support the research team. Two of the meetings will be face-to-face and the other two will be by video conference. The Committee will comprise about ten members including: representatives of key statutory and professional bodies related to the PCN workforce such as Health Education England, Royal College of General Practitioners, Royal College Nursing or Nursing and Midwifery Council, Chartered Society of Physiotherapists; expert academic methodologists (mixed and qualitative methods, statistics, health economics); and two independent patient / public representative (e.g. from the Patient's Association). Terms of Reference and an independent Chair will be agreed before the first meeting. All members of the core research team (PI, project manager, co-applicants) will attend the Committee meetings. The PI will provide a report on study progress in advance of the meeting.

9. Ethical approvals

Various data are being gathered within the project. Data used in WP1 and WP2 are routinely available in the public domain, so ethical approvals will not be required. The consensus exercise in WP4 will draw largely on the existing knowledge of general practice, PCN and ICB staff, combined with evidence from published literature and research, and contributions from patients and members of the public. The work is thus unlikely to require independent ethical review. However, written confirmation of this will be obtained from the Health Research Authority (HRA).

HRA (with NHS Ethics) approvals will be obtained for WP3. The process of gaining ethical reviews will begin at the start of the project to avoid delays in launching the national survey of PCNs (WP3A) in month 4 and the in-depth work in case-study PCNs in month 7. Case study sites will be set up in a graduated way from month 7 to 18. PCNs will be able to volunteer to be a case study site when completing their survey response. The research team will select PCNs from the volunteers to ensure diversity. An allowance has been factored into the timelines for selected PCNs to confirm local capability and capacity to participate. The team has extensive experience from other studies of the governance process and time involved in acquiring relevant approvals. Staff participation in interviews within case studies will be voluntary, subject to informed consent and at a time convenient to the participant.

The procedures of the project sponsor (University of Surrey) require that proposed processes are scrutinized by the internal research ethics committee, prior to applying for external review. Full University approval will be granted after successful completion of all external approval processes.

10. Patient and Public Involvement and Engagement (PPIE)

Public and patient input influenced the development of the proposal and contacts who provided feedback to the research team are keen to remain involved in the project. An intergenerational multicultural group of 10-12 individuals from different backgrounds will act as our Service User Panel (SUP) providing input at each phase of the study. The panel will inform the operationalisation of the research, on-going data collection and analysis stages, details are interwoven into the research plan. This will ensure patient perspectives are reflected in data collection from service providers and planners, as well as in data collection from service users.

For example, the SUP will discuss the development of the national survey of PCNs and interview topics for staff in the case studies. The panel will be closely involved in the organisation of the data collection from patient representatives in case study sites, including the design of information materials for circulating to participants. It will also contribute to dissemination, ensuring outputs are culturally sensitive and widely accessible.

The SUP will meet seven times during the 27-month project. Members will be drawn from areas close to the research team (Surrey and the Bristol). Two meetings will take place face-to-face, the rest being by via video conferencing. Following an 'outreach' model for PPIE, 4 or 5 recruits from the Bristol area will provide 'on the ground' liaison with local ethnic communities, including South Asian, Arabic and African-Caribbean and Somali, reporting back to the SUP members from the Bristol area. The Eastern European community is also represented amongst people who are keen to be involved.

The SUP will receive training and support as required. Full information about the project will be provided initially and short written updates on progress and issues for discussion will be circulated before each meeting. The PI and project manager will attend SUP meetings; other research team members will join, as relevant to the ongoing work, or to describe findings and seek feedback and advice from members. Summary materials will be provided to members in advance of the meeting to encourage discussion. Members will be reimbursed for time and travel at NIHR rates.

The SUP will be joint lead by co-applicants Brady and Berrou. Brady has extensive experience in PPIE for NIHR as a reviewer and public adviser for NIHR ARC Kent, Surrey, Sussex. He also has understanding of NHS processes and institutions as a former governor of Frimley Park hospital and Board member of a local CCG. Berrou will act as PPIE facilitator providing links to diverse groups in their communities including people from different ethnic and religious groups ensuring cultural and language considerations are taken into account throughout and that all voices are equally heard and actioned. Berrou is an adviser to the Bristol, North Somerset and South Gloucestershire Research Engagement Network and has approached Health Research Ambassadors https://arc-w.nihr.ac.uk/news/four-new-health-ambassadors-recruited-to-help-diversify-local-research-participation/ from Caafi Health https://www.caafihealth.org.uk/our-health-ambassadors who have agreed to contribute to the SUP.

11. Professionals and Service Planners Panel (PSPP)

The preparation of this proposal has been informed by professionals local to members of the research team all of whom have agreed to be part of the Professional and Service Planners Panel (PSPP) during the delivery of the research. This group (from ethnically diverse backgrounds) includes: ICB leads for the primary care workforce, research, information analytics and pharmacy and medicines optimisation; a general practitioner, the manager of a deep-end general practice; a community pharmacist working in an ARRS role. They have assisted with information on data sources and have provided insights into operational concerns around the ARRS scheme such as underfunding and uncertainty about future funding, competition for roles (e.g. when pharmacists are recruited from community positions), the constraining effect of the alignment of funding to certain roles and the reliance of small practices on the sharing agreements with larger ones.

The existing group will be strengthened at the outset of the project (to a total of 12) through the recruitment of members holding new and additional roles and involved in PCN management. The full panel will meet, by videoconference, three times a year, six times in all, although the research team will interact with individual members on an agile basis when immediate input to assist with problem solving is required. The panel will advise the research team on practical aspects associated with the deployment of new and extended roles, service delivery, data sources and data collection and facilitate networking with colleagues across England. This engagement throughout the project will ensure the research is relevant and with greater potential for impact.

12. Success criteria, barriers and mitigation

See next page

Success criteria by WP	**Barriers**	**Mitigation**
Analysis accurately describes variation in skill mix in PCNs across England and interprets this in the light of differences in deprivation, ethnicity and rurality (WP1) Associations between PCN skill mix and indicators of performance have been identified (WP2)	- Data required are not available - Data are insufficiently complete or reliable - Insufficient variability in the data to uncover associations - Limitations of QOF as a performance indicator for PCNs	- All data sources proposed for the analysis are in the public domain and are quality checked by NHS England before publication - QOF has been used by others as a performance indicator for primary care [58-60] - Discussions with information analysts when preparing the proposal have suggested additional local data may be available enabling more nuanced analysis in some ICBs and exploring this is part of the research plan - The project's Professionals and Service Planners Panel includes primary care workforce specialists, research and information analysts to provide ongoing advice and contacts as needed regarding data. - Lack of variability in the data would be a relevant finding
The survey to PCN Directors captures variability in decision making processes about hiring and deployment of ARRS roles and provides a sampling frame for selecting varied case study sites for the next stage of the work (WP3a)	- Badly constructed survey instrument - Poor response rate or bias in responding (e.g. regionally, ethnically) - Responses are difficult to interpret - PCNs do not volunteer to be case study sites - Survey returns not in time to inform the selection of case study sites	- The survey will be planned with input from the Professionals and Service Planners panel and piloted before distribution to ensure validity - The survey will be brief and entry to a prize draw will be offered to encourage participation - Directors can delegate response to others in the PCN - Reminders will be sent after 2 weeks and a telephone completion option offered - Telephone follow up will enable clarification on unclear responses - Purposeful sampling will be used to ensure diversity in case study sites. - A one-off lump sum payment will be offered to PCNs to encourage participation as a case study - Preparation for the survey will start at the beginning of the project
Completion of an in-depth case-study analysis in a varied sample of case-study PCNs to gain an understanding of the processes, reasons and effects of decision making around ARRS roles (WP3b)	- Problems with recruiting staff in case-study PCNs, constituent general practices and parent ICBs to offer interviews, or lack of diversity in staff roles - Problems with recruiting patients in case-study PCNs to offer interviews, or lack of diversity in backgrounds - Interview schedules will not elicit the information required	- A one-off payment to practices (within case-study PCNs) to enable release of staff to take part in interviews. - A purposeful sampling approach will select participants by role. - Interviews will be short and scheduled at a time and using a modality (online video or telephone) to suit the participant. In the event of time pressures, group interviews will be offered or written responses. - Patient participants will be sought from established Patient Participation Groups in practices or PCNs. If diversity is lacking, we will work with case study sites to selectively distribute invitations to a pool of diverse patients. - Support for patients will be available through easy-to-read information leaflets, and in appropriate languages. Interpreters and BSL will be offered for interviews. - Our two advisory panels (service users and professionals) will contribute to the design of interview schedules and processes to ensure acceptability
The expert consensus building produces recommendations for PCNs on ARRS deployment (WP4)	- Difficulties recruiting participants in the consensus building, including diversity of stakeholders	- Online process will be used for ease of access - Participants from previous WPs will be invited, and the event will be widely advertised through pre-established networks, via social media and with the assistance of the External Steering Committee. - Focus groups will be offered to patient/public participants from non-English speaking communities so that they can contribute.

REFERENCES

1. Dale J, Potter R, Owen K, Leach J. (2016) The general practitioner workforce crisis in England: a qualitative study of how appraisal and revalidation are contributing to intentions to leave practice. BMC Fam Pract. 2016; 17, 84. https://doi.org/10.1186/s12875-016-0489-9
2. Jefferson L, Holmes M. GP workforce crisis: what can we do now? Br J Gen Pract. 2022; Apr 28;72(718):206-207. doi: 10.3399/bjgp22X719225. PMID: 35483943.
3. Marshall M, Ikpoh M. The workforce crisis in general practice. Br J Gen Pract. 2022; Apr 28;72(718):204-205. doi: 10.3399/bjgp22X719213. PMID: 35483948.
4. Royal College of General Practitioners. Fit for the Future: a new plan for GPs and their patients. https://www.rcgp.org.uk/representing-you/future-of-general-practice Accessed 1 Aug 2023
5. Fletcher E, Abel GA, Anderson R, et al. Quitting patient care and career break intentions among general practitioners in South West England: findings of a census survey of general practitioners. BMJ Open 2017; 7:e015853. doi:10.1136/ bmjopen-2017-015853
6. Sansom A, Terry R, Fletcher E, et al. Why do GPs leave direct patient care and what might help to retain them? A qualitative study of GPs in South West England BMJ Open 2018; 8:e019849. doi: 10.1136/bmjopen-2017-019849
7. Chilvers R, Richards SH, Fletcher E. et al. Identifying policies and strategies for general practitioner retention in direct patient care in the United Kingdom: a RAND/UCLA appropriateness method panel study. BMC Fam Pract 2019; 20, 130. https://doi.org/10.1186/s12875-019-1020-x
8. Odebiyi B, Walker B, Gibson J, et al. Eleventh National GP Worklife Survey 2021.
9. Abrams R, Jones B, Campbell J, et al. The effect of general practice team composition and climate on staff and patient experiences: a systematic review. BJGP Open 2024; 8 (1): BJGPO.2023.0111. **DOI:** 10.3399/BJGPO.2023.0111
10. Goetz K, Campbell SM, Steinhaeuser J. et al. Evaluation of job satisfaction of practice staff and general practitioners: an exploratory study. BMC Fam Pract 2011; 12, 137. https://doi.org/10.1186/1471-2296-12-137
11. Warr P, Cook J, Wall T. Scales for the measurement of some work attitudes and aspects of psychological well-being. Journal of Occupational Psychology 1979*; 52*(2), 129–148. https://doi.org/10.1111/j.2044-8325.1979.tb00448.x
12. Dolan ED, Mohr D, Lempa M, et al. Using a single item to measure burnout in primary care staff: a psychometric evaluation. J Gen Intern Med. 2015 May;30(5):582-7. doi: 10.1007/s11606-014-3112-6. Epub 2014 Dec 2. PMID: 25451989; PMCID: PMC4395610.
13. Edú-Valsania S, Laguía A, Moriano JA. Burnout: A Review of Theory and Measurement. Int J Environ Res Public Health. 2022 Feb 4;19(3):1780. doi: 10.3390/ijerph19031780. PMID: 35162802; PMCID: PMC8834764.
14. NHS England, General Practice Forward View 2016 https://www.england.nhs.uk/gp/gpfv/#:~:text=The%20General%20Practice%20Forward%20View,ways%20of%20providing%20primary%20care
15. NHS England, Long Term Plan 2019 https://www.longtermplan.nhs.uk/wp-content/uploads/2019/08/nhs-long-term-plan-version-1.2.pdf Accessed 1st August 2023
16. Hutchinson J, Lau YS, Sutton M, Checkland K. How new clinical roles in primary care impact on equitable distribution of workforce: a retrospective study. Br J Gen Pract. 2023 Aug 31;73(734):e659-e666. doi: 10.3399/BJGP.2023.0007. PMID: 37604700; PMCID: PMC10471141.
17. Baird B, Beech J. Primary Care Networks Explained. The Kings Fund 2020 https://www.kingsfund.org.uk/insight-and-analysis/long-reads/primary-care-networks-explained
18. Checkland K, Hammond J, Warwick-Giles L, Bailey S. Exploring the multiple policy objectives for primary care networks: a qualitative interview study with national policy stakeholders. BMJ Open. 2020 Jul 5;10(7):e038398. doi: 10.1136/bmjopen-2020-038398. PMID: 32624477; PMCID: PMC7337885.
19. Primary Care Network Workforce data https://digital.nhs.uk/data-and-information/publications/statistical/primary-care-network-workforce
20. Gault B. ARRS hits a high of 37,000 staff, NHS confirms. Pulse July 2024. https://www.pulsetoday.co.uk/pulsepcn/arrs-hit-a-high-of-37000-staff-nhs-confrirms
21. PCN handbook British Medical Association. The Primary Care Network Handbook 2021 https://www.bma.org.uk/media/4222/bma-pcn-handbook-2021.pdf

22. Gault B. PCN funding remains flat for 2024/25. Pulse Today, 09 April 2024. https://www.pulsetoday.co.uk/pulse-pcn/pcn-funding-remains-flat-for-2024-25/#:~:text=Funding%20for%20PCNs%20is%20to,funding%20figure%20for%202024%2F25. Accessed 24-07-2024
23. McDermott I, Spooner S, Goff M, et al. Scale, scope and impact of skill mix change in primary care in England: a mixed-methods study. Health Soc Care Deliv Res 2022;10(9). https://doi.org/10.3310/YWTU6690
24. Baird B, Lamming L, Beech J. Integrating additional roles into primary care networks. The King's Fund 2022. https://researchprofiles.herts.ac.uk/en/publications/integrating-additional-roles-into-primary-care-networks
25. Bramwell D, Hammond J, Warwick-Giles L. et al. Implementing the Additional Roles Reimbursement Scheme in seven English Primary Care Networks: a qualitative study. Br J Gen Pract. 2024 Apr 25;74(742):e323-e329. doi: 10.3399/BJGP.2023.0216. PMID: 38164533; PMCID: PMC11044018.
26. Checkland K, Bramwell D, Warwick-Giles L. et al. Primary care networks as a means of supporting primary care: findings from qualitative case study-based evaluation in the English NHS. *BMJ Open* 2023;**13:**e075111. doi: 10.1136/bmjopen-2023-075111
27. Leary A, Punshorn G. ARRS Workforce Impact Survey Report: The impact of the introduction of the Additional Roles Reimbursement Scheme on the General Practice nursing workforce in England 2024. The Queen's Nursing Institute, International Community Nursing Observatory.
28. Humphrey T. How to successfully embed roles using the additional roles reimbursement scheme. British Journal of Healthcare Management 2024. https://doi.org/10.12968/bjhm.2023.0140
29. MacConnachie, V Assessing the impact and success of the additional roles reimbursement scheme. February 2024. Primary Care Network NHS Confederation
30. Beech J, Smith J, Fraser C, et al. Doing more for less? The Health Foundation; 2023 (https://doi.org/10.37829/HF-2023-P01).
31. Dalgarno E, McDermott I, Goff M, et al. The patient experience of skill mix changed in primary care: an in-depth study of patient 'work' when accessing primary care. Journal of Public Health 45 (1) i54-i62 https://doi.org/10.1093/pubmed/fdad203
32. Salisbury H. Funding GPs through the additional roles scheme won't solve GP unemployment. 1 October 2024. BMJ 2024;387:q2132 http://dx.doi.org/10.1136/bmj.q2132
33. Loke J, Lee K. Additional roles reimbursement to primary care networks: an uplift or downfall of general practice partnership? British Journal of General Practice, January 2024, 37-39. DOI: https://doi.org/10.3399/bjgp24X736089
34. Penfold C, Hong J, Edwards PJ, et al. Additional Roles Reimbursement Scheme uptake, patient satisfaction and QOF achievement: an ecological study from 2020 to 2023. June 2024, British Journal of General Practice Online First 2024
35. Nicodemo C, Salisbury C, Petrou S. The Effects of the Additional Roles Reimbursement Scheme (ARRS) staff in England on Prescription Patterns and Patient Satisfaction. Br J Gen Pract. 2024 Oct 22:BJGP.2024.0196. doi: 10.3399/BJGP.2024.0196. Epub ahead of print. PMID: 39317391.
36. Wilding A, Sutton M, Agboraw E, et al. Geographic inequalities in need and provision of social prescribing link workers a retrospective study in primary care. British Journal of General Practice 2024; 74 (748): e784-e790. DOI: https://doi.org/10.3399/BJGP.2023.060
37. Jones B, Anchors Z, Voss S, Walsh N. Challenges and enablers to implementation of the Additional Roles Reimbursement Scheme in primary care: a qualitative study British Journal of General Practice 2024; 74 (742): e315 e322. **DOI:** 10.3399/BJGP.2023.0433
38. Walshe K, Smith J, Leary A. Workforce research priorities for resilience to future health shocks—and the workforce crisis. BMJ 2024;387:e078997
39. Fetters MD, Curry LA, Creswell JW. Achieving integration in mixed methods designs – principles and practices. Health Services Research 2013; 48(6), Part II: 2134-56
40. Burke Johnson R, Onwuegbuzie AJ. Mixed methods research: a research paradigm whose time has come. Educational Researcher 2004; 33(7): 14-26
41. Cresswell JW, Fetters MD, Ivankova NV. Designing a mixed methods study in primary care. Annals of Family Medicine 2004; 2(1): 7-12
42. Curry L, Krumholz HM, O'Cathain A. et al. Mixed methods in biomedical and health services research. Circulation 2013; 6(1): 119-23
43. General Practice Workforce data https://digital.nhs.uk/data-and-information/publications/statistical/general-and-personal-medical-services/31-may-2024)

44. National General Practice Profiles https://fingertips.phe.org.uk/profile/general-practice
45. Jones KC, Weatherly H, et al. (2024) Unit Costs of Health and Social Care 2023 Manual. Technical report. Personal Social Services Research Unit (University of Kent) & Centre for Health Economics (University of York), Kent, UK 10.22024/UniKent/01.02.105685. (doi:10.22024/UniKent/01.02.105685) (KAR id:105685)
46. Kayira AB, Painter H, Mathur R, et al. Practice list size, workforce composition and performance in English general practice: a latent profile analysis. BMC Prim. Care 25, 207 (2024). https://doi.org/10.1186/s12875-024-02462-w
47. Dixon A, Gao H, Tian Y. Emergency Hospital Admissions for Ambulatory Care Sensitive Conditions. The Kings Fund 2012 https://www.kingsfund.org.uk/insight-and-analysis/briefings/emergency-hospital-admissions-ambulatory-care-sensitive-conditions
48. Yin RK. Case Study Research: Design and Methods. Sage 2013
49. Baxter P, Jack S. Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. The Qualitative Report 2008;13(4):15.
50. Stebbins, R. 2001. Exploratory Research in the Social Sciences. London: Sage.
51. https://lumivero.com/products/nvivo/ NVivo15 reference.
52. Braun V, Clarke V. (2022). Toward good practice in thematic analysis: Avoiding common problems and be(com)ing a knowing researcher. International Journal of Transgender Health, 24(1), 1–6. https://doi.org/10.1080/26895269.2022.2129597
53. Deseriis M. (2023). Reducing the Burden of Decision in Digital Democracy Applications: A Comparative Analysis of Six Decision-making Software. Science, Technology, & Human Values, 48(2), 401-427. https://doi.org/10.1177/01622439211054081
54. GPs at the Deep End Bristol University of Bristol https://deependgps.bristol.ac.uk/other-deep-end-networks/
55. Holmes BJ, Best A, Davies H, et al. Mobilising knowledge in complex health systems: a call to action. Evidence & Policy. 2017 Aug 1;13(3):539-560. Available from, DOI: 10.1332/174426416X14712553750311
56. Ward, V (2017) Why, whose, what and how? A framework for knowledge mobilisers, Evidence & Policy 2017; 13 (3): 477–97, DOI: 10.1332/174426416X14634763278725
57. Harvey G, Kitson A. PARIHS revisited: from heuristic to integrated framework for the successful implementation of knowledge into practice. Implementation Science. 2015;11(1).
58. Goh, T.T., Eccles, M.P. & Steen, N. Factors predicting team climate, and its relationship with quality of care in general practice. BMC Health Serv Res 9, 138 (2009). https://doi.org/10.1186/1472-6963-9-138
59. Forbes LJ, Marchand C, Doran T, Peckham S. The role of the Quality and Outcomes Framework in the care of long-term conditions: a systematic review. Br J Gen Pract. 2017 Nov;67(664):e775-e784. doi: 10.3399/bjgp17X693077. Epub 2017 Sep 25. PMID: 28947621; PMCID: PMC5647921.
60. Kayira, A.B., Painter, H., Mathur, R. et al. Practice list size, workforce composition and performance in English general practice: a latent profile analysis. BMC Prim. Care 25, 207 (2024). https://doi.org/10.1186/s12875-024-02462-w

Flow chart: Skill mixes in primary care - a mixed methods study of the deployment of new and extended roles in Primary Care Networks (PCNs) in England