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Synopsis

Remote and digital services in UK general practice 2021–2023: the Remote by Default 2 longitudinal qualitative study synopsis

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Published September 2025
DOI: 10.3310/QQTT4411

Abstract

Background: Remote services (in which the patient and staff member are not physically colocated) and digital services (in which a patient encounter is digitally mediated in some way) were introduced extensively when the COVID-19 pandemic began in 2020. We undertook a longitudinal qualitative study of the introduction, embedding, evolution and abandonment of remote and digital innovations in United Kingdom general practice. This synoptic paper summarises study design, methods, key findings, outputs and impacts to date.

Overview of the study and key findings: From September 2021 to December 2023, we collected > 500 hours of ethnographic observation from a diverse sample of 12 general practices. Other data sources included over 200 interviews (with practice staff, patients and wider stakeholders), 4 multi-stakeholder workshops (184 participants), grey literature (e.g. Care Quality Commission reports) and safety incident reports. Patient involvement included digitally excluded individuals from disadvantaged backgrounds (e.g. homeless, complex needs). Data were de-identified, uploaded to NVivo (QSR International, Warrington, UK), coded thematically and analysed using various theoretical lenses.

Despite an adverse context for general practice including austerity, workforce shortages, rising demand, rising workload and procurement challenges, all 12 participating practices adjusted to some extent to a 'new normal' of hybrid (combined traditional and remote/digital) provision following the external shock of the pandemic. By late 2023, practices showed wide variation in digital maturity from a 'trailblazer' practice which used digital technologies extensively and creatively to 'strategically traditional' practices offering mainly in-person services to deprived and vulnerable populations. We explained practices' varied fortunes using diffusion of innovations theory, highlighting the extensive work needed to embed and routinise technologies and processes. Digitally enabled patients often, but not always, found remote and digital services convenient and navigable, but vulnerable groups experienced exclusion. We explored these inequities through the lenses of digital candidacy, fractured reflexivity and intersectionality. For staff, remote and digital tasks and processes were often complex, labour-intensive, stressful and dependent on positive interpersonal relations – findings that resonated with theories of technostress, suffering and relational co-ordination.

This synopsis should be referenced as follows:
Greenhalgh T, Nishio AA, Clarke A, Byng R, Dakin F, Faulkner S, *et al.* Remote and digital services in UK general practice 2021–2023: the Remote by Default 2 longitudinal qualitative study synopsis. *Health Soc Care Deliv Res* 2025;**13**(31):1–50. https://doi.org/10.3310/QQTT4411

Our initial plan for workshop-based co-design of access pathways with patients was unsuccessful due to dynamic complexities; shifting to a more bespoke and agile design process generated helpful resources for patients and staff.
Discussion: This study has confirmed previous findings from sociotechnical research showing that new technologies are never 'plug and play' and that appropriate solutions vary with context. Much variation in digital provision in United Kingdom general practice reflects different practice priorities and population needs. However, some practices' low digital maturity may indicate a need for additional resources, organisational support and strengthening of absorptive capacity. Negative impacts of digitalisation are common but not always inevitable; an 'inefficient' digital pathway may become more efficient over time as people adapt; and digitalisation does not affect all work processes equally (back-office tasks may be easier to routinise than clinical judgements). We have developed novel ways of involving patients from vulnerable and excluded groups, and have extended the evidence base on codesign for the busy and dynamic setting of general practice. Findings are being taken forward by national, locality-based and practice-level decision-makers; national regulators (e.g. in relation to safety); and educational providers for undergraduate, postgraduate and support staff (via a new set of competencies).
Future work: Ongoing and planned work to maximise impact from this study includes using our competency framework to inform training standards, pursuing our insights on quality and safety with policy-makers, a cross-country publication for policy-makers with examples from colleagues in other countries, resources to convey key messages to different audiences, and continuing speaking engagements for academic, policy and lay audiences.
Limitations: The sampling of practices was limited to Great Britain. Patient interviews were relatively sparse. While the study generated rich qualitative data which was useful in its own right, a larger sample of practices with a quantitative component could support formal hypothesis-testing, and a health economics component could allow firmer statements about efficiency.
Funding: This synopsis presents independent research funded by the National Institute for Health and Care Research (NIHR) Health and Social Care Delivery Research programme as award number NIHR132807.
A plain language summary of this synopsis is available on the NIHR Journals Library Website https://doi.org/10.3310/QQTT4411.

Introduction

Rationale

In this synoptic paper, we address how remote and digital services in UK general practice have changed since 2021. We define *remote services* as those in which the patient and clinician (or support staff member) are physically distant from one another, and *digital services* as those in which the encounter is digitally mediated in some way. An encounter at the reception desk in which the receptionist asks the patient a set of questions to populate an online consultation request form on their behalf is digital but not remote. A telephone encounter is remote but not necessarily digital, though modern telephony systems often include a digital component (e.g. asking the patient to select from a list of options by pressing a number). Many encounters in contemporary general practice are both remote *and* digitally mediated.

The early COVID-19 pandemic was a period of 'opportunity, disruption and exposure' for digital innovation in health care.[1,2] UK general practice shifted at pace and scale from an almost exclusively in-person service to 'total triage' (in which patients seeking an appointment had to enter data on an online platform or provide such information by telephone before receiving a call-back from a clinician)[3] and remote consultations (mostly by telephone, some video and e-consultations).[2,4–6] These radical changes were cautiously welcomed as contributing to the long-overdue modernisation of healthcare services.[1,2,7,8]

From mid-2020, incentivised by an explicit policy push,[9] many general practices attempted to routinise remote and digital services, and some (though not all) patients and staff learnt to communicate remotely and navigate the new systems.[4,10–12] Benefits included greater convenience for some patients.[12,13] but anticipated gains in efficiency were not clearly demonstrated – confirming earlier findings from before the pandemic.[14,15] Other potential downsides included inequities of patient access[10,16–20] and greater complexity of work practices (including inefficient double-handling).[21] Concerns were also raised about overprescribing,[22–24] overinvestigation,[22] compromises to preventive medicine[25] and long-term condition monitoring,[26] reduced continuity of care[27,28] and concerns about clinical risks.[29] As noted below, we later showed that safety incidents linked to remote and digital services were extremely rare.[30] Largely in response to patient complaints and negative press articles,[31,32] policy shifted in the direction of a 'face-to-face by default' service.[33]

The policy goal of retaining and extending remote and digital services was thus tempered by legitimate concerns from clinicians, patients and the public about quality, safety and equity of care. The context of these changes is also noteworthy. The period 2020–3 came at the end of a long period of austerity in UK public services[34,35] and was notable for rising professional concern about the poor state of material and technical infrastructure;[2,36–38] a 'slow crisis' of recruitment, retention and skill mix in the healthcare workforce, particularly in primary care;[36,39–45]

and rising consultation rates (which reflected an ageing population, more – and more complex – illness, and rising patient expectations).[45–47] Various policy incentives had been introduced in England to expand and extend new clinical and clinically related roles (e.g. extended roles for physician associates, pharmacists and paramedics).[39,48,49]

Objectives

In September 2021, we commenced data collection for a longitudinal (mostly qualitative) study, Remote by Default 2 (RBD2). This study built on our earlier mixed-methods study of the clinical and operational challenges associated with the rapid shift to remote and digital options during the early COVID-19 pandemic (RBD1).[6,37,50–54] The focus of RBD2 was on exploring whether and how remote and digital services were being routinised and sustained in a sample of general practices. Our four original research questions for RBD2 were:

1. How can we make remote and digital care better and safer (including designing for digital inclusivity)?
2. How can we balance remote and digital options with traditional in-person care for those who need it?
3. How can we optimise workload and meet the training and well-being needs of general practice staff?
4. What are the infrastructural challenges of remote and digital services and how might they be overcome?

These questions were modified as the study unfolded. The final research questions and sub-questions are summarised in *Table 1*.

The study protocol[95] and baseline findings[11] for RBD2 have been published, along with a separate protocol for the care navigation work[96] and various thematic papers described in detail below. In this synoptic paper, we outline the RBD2 study methods, summarise publications and describe our work on dissemination and impact.

Methods

RBD2 was a multisite, 28-month ethnographic case study of 12 UK general practices across England, Scotland, and Wales, with additional data from workshops, stakeholder interviews and documents. The data sources, along with their contribution to the study and caveats, are summarised in *Appendix 1*, *Table 2*. Data collection ran from September 2021 to December 2023. A social care extension to the original RBD2 study addressed care navigation by patients with particular needs and vulnerabilities (e.g. refugees, complex needs, elderly); data collection for that study ran from September 2022 to May 2023. Three linked PhDs and some smaller (e.g. student-led) projects drew on the RBD2 data set and examined related themes.

Our external advisory group had a lay chair and representation from academia, industry, policy (including national policy leads from England and Scotland), lay people and people with lived experience. All research participants gave written or verbal informed consent in accordance with our ethics protocol; low-literacy individuals were supplied with easy-read versions of information sheets and consent forms, and materials were translated as needed. Details of patient and public involvement (PPI) are given in the separate section below.

Practices were purposively sampled to achieve maximum variety in practice size (from 2300 to 31,000 patients), geographical locality (8 from England, 2 from Wales and 2 from Scotland), socioeconomic deprivation (explained in *Equality, diversity and inclusion*) and digital maturity. This sampling reflected established best practice for case study sampling – in other words, it was not intended to achieve statistical representation in any parameter but to achieve, overall, as wide a range in key axes of variation as possible. For example, having identified a large, digitally advanced practice situated in an urban centre with relatively low socioeconomic deprivation but high ethnic diversity, we then looked for practices to balance these characteristics, such as small practices, rural practices, less digitally mature practices and those serving more deprived populations.

At the outset, we classified digital maturity on a pragmatic five-point scale,[95] seeking variety but oversampling from less digitally mature practices. Practices were invited to self-classify on this scale, and their assessment generally aligned with researchers' assessments (in two cases, we assessed a practice's digital maturity as one point higher than they ranked themselves). Our original scale, which was modified in the light of our findings, comprised: traditional (few digital services: three practices); traditional with lone innovator (few digital services but one keen staff member attempting to introduce more: two practices); digitally curious (experimenting with remote and digital technologies and reacting to prevailing trends in these, but without a clear strategy: four practices); digitally strategic (introducing and evaluating a wide range of remote and digital services as part of a wider practice strategy: two practices); and system-oriented (providing state-of-the-art digital services and supporting other practices: one practice).

Practice characteristics are described in detail in previous papers[11,95] and summarised in *Appendix 1*, *Table 3*. We supplemented our original planned sample of 11 practices[95]

TABLE 1 Topics/sub-questions and how they were addressed in the RBD2 study

Topic/sub-question	Unit(s) of analysis	Theoretical lens	Key outputs
PRACTICE CASE STUDIES: How did remote and digital services unfold in general practice 2021–3, and what explains inter-practice differences?	Practice	Organisational science, including the innovation journey;[55] crisis-driven innovation,[1,2] and the assimilation, routinisation and sustainability of healthcare innovations.[52,56,57]	Greenhalgh *et al.* 2022 (baseline)[11] and 2024 (final)[58]
SAFETY: Why do safety incidents occur in remote and digital general practice, and why don't such incidents occur more often?	Safety incident (safety I analysis); practice (safety II analysis)	Safety I lens (systematic analysis of safety incidents)[59] and Safety II lens (examining organisational resilience and how individuals and teams work to *avoid* safety incidents).[60,61]	Payne *et al.* 2023[30]
EQUITY: What kinds of inequity occur in relation to accessing, engaging with and benefiting from general practice and primary care? What explains these inequities and how might they be mitigated?	Patient	Extension of Dixon Woods *et al.*'s theory of candidacy[62] to produce a new theory of digital candidacy.	Dakin *et al.* 2024[63]
	Patient	Extension of Archer's theory of fractured reflexivity[64,65] to produce a new theory of how people with multiple disadvantage (including poverty, limited social networks, adverse past experiences and certain neurocognitive conditions) are further disadvantaged by digitalisation of health and care services.	Rybczynska-Bunt *et al.* 2024[66]
	Patient	Combining theories of structural disadvantage[67] with critical race theories[68,69] and intersectionality theory[70] to explain ethnic and racial minorities' experiences of remote and digital services.	Husain *et al.* 2022,[19] 2024[71]
CONTINUITY: To what extent can continuity be achieved in remote and digital general practice, and what are the benefits and potential trade-offs of this?	Clinical relationship; care episode	Ladds *et al.*'s framework: continuity of the clinical relationship *and* of the illness episode *and* of distributed work *and* of commitment to the practice population over time.[72,73] Extends a previous theorisation by Haggerty *et al.*[74]	Ladds *et al.* 2023[72,73]
OTHER ASPECTS OF QUALITY: What is the impact of the shift to remote and digital modalities on core aspects of a quality general practice service?	Various (some addressed in specific themes above)	Institute of Medicine quality domains (efficiency, effectiveness, timeliness, equity, patient-centredness, safety);[59] Starfield *et al.*'s domains of quality primary care (accessibility, continuity, co-ordination, comprehensiveness).[75,76]	Payne *et al.* 2024[77]
TRAINING: What are the key staff training needs and competencies for remote and digital general practice? How has the shift to remote impacted on the training of the next generation of general practice clinicians?	Trainee or staff member	Theories of adult (experiential) learning; professional competence and capability;[78,79] sociomateriality and the role of social interaction in learning how to use technologies.[80,81]	Greenhalgh *et al.* 2024[82]
WORKFORCE: What is the experience on general practice staff of remote and digital working? What are the preconditions for effective teamwork and co-ordination, and how can these be met?	Staff member, team	Pentland and Feldman's theories of organisational routines;[83,84] theories of organisational suffering[85] and technostress.[86] Edmondson's work on psychological safety;[87] Gittell's work on relational co-ordination;[88,89] implications of these for workplace conditions.[90]	Dakin *et al.* 2023,[40] 2024[91]
TECHNOLOGIES AND INFRASTRUCTURE: What are the material properties, affordances, costs and value of technologies? How does sociotechnical infrastructure shape and constrain their uptake and use?	Technology; sociotechnical network	Star's theory of infrastructure (including material and human aspects and formal standards),[92,93] adapted to address the challenges of UK public-sector health care.[2,94] Theories of crisis-driven organisational innovation.[2]	Wherton *et al.* (in preparation); Shaw *et al.* (in preparation)

with an additional practice recruited soon after our protocol paper was submitted, mainly to avoid research fatigue as several PhD students had joined the team.

To collect data on these practices, we used an adapted researcher-in-residence model,[101] in which one member of the research team built a relationship with practice staff, made repeated ethnographic visits, conducted semistructured interviews (in-person or remotely) with staff (n = 124 across the 12 practices) and patients (n = 31 across all practices), and collected basic descriptive statistics such as demographics of patient population,

consultation numbers and waiting times. We identified 209 online patient reviews of their experiences in the 8 practices from England (comparable data were not available from Scotland or Wales). The study protocol included codesign work with patients and staff in 3 of the 12 practices in an effort to develop more patient-centred pathways for digital access.

The selection of which staff to interview and shadow at each practice was made largely on pragmatic grounds (who was keen, who was available), but also guided by the principle of surfacing and exploring all aspects of the patient-facing work of each practice. In practice, many of our in-depth interviews were with a named contact at the practice [general practitioner (GP) or practice manager], who linked us with other staff, from whom we identified other interviewees by snowballing. Ethnographic observation captured whoever was working in the setting at the time; details of how we ensured that no staff member of patient was involved in the ethnography against their will are given in the protocol[95] and baseline findings[11] papers.

Data on each practice were synthesised iteratively to build an ongoing picture of how the introduction of remote and digital services was evolving. After the data collection period ended, we fed back a summary narrative to each practice and amended it in response to feedback.

In addition to our longitudinal case studies of practices, we drew on additional data sources (see *Appendix 1*, *Table 2*). We interviewed 39 stakeholders for wider context, comprising senior policy-makers and representatives from industry and advocacy groups. These 'elite' stakeholder interviews also served to make contact with people in strategic positions who would help disseminate findings from the study. We also held four online multisector workshops with clinical, policy, industry and lay stakeholders (including staff and patients from participating practices but also extending beyond this sampling frame). The workshops addressed key cross-cutting themes: access and triage (April 2022, *n* = 48), quality and safety (September 2022, *n* = 35), workforce and training (January 2023, *n* = 63), and technologies and infrastructure (April 2023, *n* = 38). Each workshop generated a large amount of rich data including video archives of plenaries and breakout group discussions and led to follow-on work with practices and national policy-makers on the priority topic.

To pursue priority themes identified in the ethnography, stakeholder interviews and workshops, we collected various supplementary data sets. To further pursue an early theme around the challenges of training and supervising early-career GPs in a predominantly remote environment, we conducted additional interviews with 10 GP trainers and 10 trainees (shown in *Appendix 1*, *Table 2* as supplementary data set 1). To further pursue the theme of patient safety (having identified no actual or near-miss safety incidents in our 12 participating practices), we sought access to national-level sources of anonymised safety incidents and obtained a total of 95 such incidents from training materials, complaints and closed indemnity claims in England and Wales (supplementary data set 2). To further pursue the theme of equity, we linked with an online network of GPs in Deep End practices (i.e. those with the highest levels of socioeconomic deprivation), visited some of their practices (where we observed front-desk activity and sat in on consultations), and interviewed GPs and patients (supplementary data set 3). Using separate funding from the National Institute for Health and Care Research (NIHR) School of Primary Care Research (SPCR), we appointed a PhD student (a multilingual researcher) to study elderly first-generation immigrants who lived in a deprived setting, spoke limited English and had various difficulties engaging with digital services (supplementary data set 4). Finally, attached medical students analysed press coverage of remote and digital services (supplementary data set 5).

In addition, we are currently conducting an SPCR-funded ethnographic study focused on decision-making about mode of consultation (ModCons) involving three of the 12 RBD2 practices; this will be reported separately.

Data from the RBD2 study – ethnographic field notes, interviews, extracts from documents and our own interim summaries of practices' efforts at digitalisation – were uploaded to NVivo (QSR International, Warrington, UK) along with the supplementary data sets. The research team met regularly (approximately weekly) to discuss new findings and also our emerging picture of the whole. We used Braun and Clarke's thematic analysis[102] to gain familiarity with the study's very large data set and identify priority cross-cutting topic areas which we then examined in detail by forming a focused working group for each: access (especially equity of access for particular need groups), quality (including safety, continuity and long-term condition monitoring), workforce and training, and technologies and infrastructure.

Theoretical analysis: case studies and thematic substudies

We used case study methodology to produce longitudinal case narratives of how remote and digital services unfolded on a practice by practice basis.[103,104] Taking each of our 12 participating practices in turn, and beginning with a

detailed familiarisation document,[11] we considered how and why the provision of remote and digital care evolved from mid-2021 (approximately 15 months after the introduction of remote by default care as an emergency pandemic response[3]) to end 2023, using theories of organisational innovation and change.

We also undertook various thematic substudies. The different theoretical approaches for these substudies, along with the research questions which guided them, are summarised in *Table 1*. An additional small student project addressed press coverage of safety issues in 2021–2.[105]

Overview of key findings

Safety

As reported in Payne *et al.*,[30] we combined a 'Safety I' analysis (exploring causes of real safety incidents retrospectively) with 'Safety II' analysis in the RBD2 practices (seeking individual, organisational and system-level explanations for how safety and near-miss incidents were avoided most of the time). The Safety I study (of safety incidents that were collected nationally, not from our 12 participating practices) showed that many of the following features were present in such incidents: patient allocated to a modality or digital pathway that was inappropriate to their needs, poor rapport building, gathering insufficient information, clinical assessment that was too superficial or had key gaps, and failure to take sufficient account of social circumstances. As a result, some diagnoses were overlooked or delayed and others were flawed. In some cases, the severity or urgency of the problem was underestimated; referral and treatment were misdirected or delayed; and safety netting and follow-up were inadequate. Patients with certain conditions seemed particularly vulnerable to safety incidents. These included complex pre-existing morbidity, chest or abdominal emergencies, ill-defined or generalised symptoms, safeguarding challenges, previous treatment that was ineffective, or communication difficulties (see our original publication for a more extensive list[30]). The study design did not allow us to fully capture whether safety issues were missed (e.g. failing to detect safeguarding concerns in a telephone consultation). The Safety II analysis showed that our 12 particpating general practices faced severe resource constraints, understaffing and high demand and that triage and care pathways were complex, hard to navigate and involved multiple staff. In this context, patient safety often depended on individual staff taking initiative, speaking up or personalising solutions. We concluded that while safety incidents are extremely rare in remote general practice, deaths and serious harms have resulted and the lack of resilience in the system is a major concern. We offered suggestions for patient, staff and system-level mitigations.

Equity

The RBD2 study revealed various inequities of access linked to well-established markers of disadvantage, especially poverty, low health or digital literacy, extremes of age, multimorbidity, poor housing (and especially homelessness), and conditions affecting cognition or communication. Individuals who had multiple markers of disadvantage were sometimes at very high risk of digital exclusion. In some cases, such individuals were unable to use (or engage with) any form of remote or digital health care. In others, they were able to use some low-tech options (e.g. a telephone call with a human) but not websites, apps or digital telephony systems (which required them to follow algorithmic 'if you wish X, do Y' instructions).

Digital inequity should be considered in relation to wider social inequities. Disadvantage is pervasive and exerts its effects through multiple mechanisms; simple unidimensional 'fixes' are unlikely to overcome these. Our papers on inequity were underpinned by various social science theories, which we explain briefly here before outlining the main findings of each paper.

As reported in Dakin *et al.*,[63] we combined Dixon-Woods *et al.*'s theory of candidacy (in particular, concepts of self-assessment, help-seeking, adjudication and negotiation)[62] with sociotechnical and technology structuration theories (in particular, concepts of user configuration, articulation, distanciation, disembedding, and recursivity) to produce and apply a novel theory of digital candidacy. To access contemporary health care, patients must find and navigate a complex sociotechnical network of human and digital actors linked in multimodal pathways. Synchronous, in-person conversations between humans have largely been replaced by asynchronous, digitally mediated interactions and triage decisions. Social structures are embodied by human actors and also (in different ways) by technological actors; they affect how people and technologies behave in different situations. Human and technological actors (in different ways) embody social structures which affect how they 'act' in social situations. Built into technologies are assumptions (often flawed) about what users want and need, and about their capabilities and rights. Various kinds of disadvantage influenced patients' ability to (1) identify whether and how badly they were sick; (2) advocate for themselves; (3) overcome the limitations of technologies; and (4) navigate the various stages in the access pathway. Some were

highly skilled at these tasks while others (typically those with multiple markers of disadvantage) struggled. We documented the prevailing expectation that patients must create and populate a 'digital facsimile' (by which we mean a detailed, accurate and persuasive version of themselves on their electronic record). Staff make their triage decision (and also many clinical decisions) on the basis of this digital facsimile. Not everyone is able to create an adequate digital facsimile. One that lacks sufficient detail, has gaps or mistakes, or is unpersuasive may lead the patient being deprioritised or allocated inappropriately. If staff are aware of these patients, they may use 'tinkering' to produce an appropriate, personalised access package, but it is not possible for staff always to identify and fully mitigate these cases. How people and technologies act, and the decisions they make, when someone tries to access care can have a profound influence on that person's candidacy both in the immediate (current) situation and, over time (recursively), influence future attempts. We concluded that services need to be (co-)designed with attention to the exclusionary tendencies of digital technologies and technology-supported processes and pathways.

As reported by Rybczynska-Bunt *et al.*,[66] we studied how different kinds of structural and personal disadvantage (e.g. severe economic hardship, homelessness, unemployment or job precarity, adverse past experiences, drug/alcohol use) combine and reinforce one another. We used Margaret Archer's concept of 'reflexivity', meaning creative self-mastery that enables individuals to evaluate their social situation and act purposively within it. In short, people with complex health and social needs may be less able to reflect on their predicament and act to address it. Reflexivity is imperative in complex and changing social situations. We drew in particular on data from more disadvantaged settings in our data set. We supplemented this with in-depth clinical cases from additional 'Deep End' practices serving highly deprived populations (supplementary data set 3 – see *Appendix 1*, *Table 2*). We used a technique of 'composite case studies', crafting fictional stories by combining and fictionalising themes from multiple real patient participants, to illustrate different aspects of disadvantage. We showed how various axes of disadvantage intersect – for example, how current structural conditions (e.g. poverty, poor housing) combine with adverse past experiences and also with patients' capacity to reflect on their predicament, advocate for themselves and act strategically. Sometimes, practice support staff manged to compensate when a patient showed fractured reflexivity, but their ability to do this was limited by their own awareness and the availability of staff. This paper concluded that remote and digital health care will continue to disadvantage people with complex needs in multiple ways unless a more systematic safety net can be introduced and resourced.

As reported by Husain *et al.*,[71] we used the technique of developing fictional 'personas' to help practices consider the needs of patients with multiple intersection axes of disadvantage (especially poverty, advanced age and race). Drawing on supplementary data set 4 (participants recruited from a telehealth project in a deprived setting), we found that digital services created significant challenges for older patients with limited economic, social and linguistic resources and low digital, health, or system literacy. We produced four contrasting personas which captured the variety and complexity of how dimensions of disadvantage intersected and influenced identity and actions. The personas illustrate important themes including experience of racism and discrimination, disorientation, discontinuity, limited presence, weak relationships, loss of agency and mistrust of services and providers. Further publications from this sub-study are in preparation.

Continuity

As reported by Ladds *et al.*,[72,73] we addressed continuity (a long-established and fiercely defended value in primary care) in the digital age. Traditional continuity, based on a one-to-one doctor–patient relationship, has declined in recent years. Our data showed that contemporary general practice is organisationally and technically complex, with multiple staff roles and technologies supporting patient access (e.g. electronic and telephone triage) and clinical encounters (e.g. telephone, video and electronic consultations); hence a re-evaluation of continuity's relational, organisational, sociotechnical and professional characteristics was needed. Continuity was almost universally valued by both staff and patients but was differently defined across practices. It was invariably situated (i.e. strongly influenced by local practicalities and constraints) and effortful (i.e. it happened only insofar as people put in work to make it happen). Continuity had a number of key influences: the geographical locality and particular organisation setting; the nature of the technical infrastructure within the practice and more widely; and staff and patients' personal values and preferred ways of working. Achieving continuity in digitalised settings often required staff to make small, ongoing adaptations (what is known in the sociology of technology as 'articulation' or 'tinkering'). Through remote and digital modalities, continuity could be extended across space and time, thereby achieving (to some extent at least) continuity of the digital record and a shared understanding among the multidisciplinary team of a patient and their illness episode. For the most vulnerable patients, achieving continuity was sometimes labour-intensive and needed

bespoke, individualised adaptations. Extending Haggerty *et al.*'s earlier work,[74] we proposed a novel four-part ontology: first, continuity of the therapeutic relationship (which drew on psychodynamic and narrative theories); second, continuity of the illness episode (which drew chiefly on biomedical theories); third, continuity of distributed work (which drew on sociotechnical theories); and finally, continuity of the practice's commitment to a community (which drew on theories of political economy and the ethics of care). This ontology allowed us to examine both successes (where continuity was achieved) and failures (where continuity was breached and care was fragmentated) from a theoretical perspective.

Other aspects of quality

As reported in Payne *et al.*[77] and using generic[59] and general practice-specific[72,73,76] quality frameworks to analyse our data, we found that practices' efforts to deliver on the different domains of quality occurred in a highly challenging context. Faced with the cumulative impacts of financial austerity, loss of resilience, increasingly complex patterns of illness and need, a diverse and fragmented workforce, material and digital infrastructure that was sometimes unfit for purpose, and distanciated (physically distant and asynchronous) ways of working, practices found that providing the human elements of traditional general practice (e.g. continuity of the therapeutic relationship, compassion, support) was difficult and sometimes impossible. Triage systems designed to increase efficiency had sometimes introduced new forms of inefficiency and compromised other quality domains including accessibility, patient-centredness and equity. Long-term condition monitoring and management varied in quality; while there were some convenience gains, there was also some evidence of quality compromises in some practices (e.g. they at times relied on remote, asynchronous data entry by patients and fragmented care by underqualified staff). Measures to mitigate digital exclusion (e.g. digital navigators) were evident in many practices but did not compensate for extremes of structural disadvantage. Many staff were stressed and demoralised. We concluded that some of the changes which characterise contemporary hybrid general practice (digitalisation, distanciation, role differentiation, protocolisation) have had the unintended effect of dehumanising, compromising and fragmenting care. We raised concerns about risks to patients and the traditional core values of general practice.

Training

As reported in Greenhalgh *et al.*,[82] we found much remote and digital care is fragmented and requires input from multiple team members in a co-ordinated way; knowing what others can do (and are doing) is key. Learning to provide remote services occurred in the context of high workload, understaffing and complex workflows. Low confidence and perceived unmet training needs were common. People's training priorities depended on their role. Novice clinicians prioritised basic technological skills and triage principles, ethics (e.g. privacy, consent), and communication and clinical skills. Established clinicians' training priorities include advanced communication skills (e.g. maintaining rapport and attentiveness), working within the limits of technologies, making complex judgements, co-ordinating multi-professional care in a distributed environment, and training others. Much existing training was didactic and technology-focused (typically delivered by an online self-study module). While basic knowledge was often gained using such methods, the ability and confidence to make complex judgements needed experience, informal discussions and on-the-job methods such as shadowing. Staff valued whole-team training, but this was rarely available. Based on these findings, we offered an outline set of competencies for both clinicians and non-clinicians (reproduced in *Appendix 1*, *Table 4*). We concluded that the knowledge needed to deliver high-quality remote encounters to diverse patient groups is complex, collective and organisationally embedded, and that greater recognition was needed of the vital role of non-didactic training, for example joint clinical sessions, case-based discussions and in-person, whole-team, on-the-job training needs to be recognised.

Workforce

As reported in Dakin *et al.*,[63] this substudy of staff experiences showed that most staff in participating practices perceived benefits from technology-supported tasks and processes, including convenience, efficiency, and more comprehensive patient care and that when remote ways of working aligned with the staff member's personhood and values, fulfilment could result. However, many clinical and administrative staff experienced job dissatisfaction, worsened well-being and a sense of misalignment with professional identity and values. Drawing on work by Gill,[85] we proposed this as a form of workplace suffering. Sometimes, staff experienced both benefits and drawbacks of remote and digital working simultaneously. This study also showed how the new routines and working styles associated with digitalisation, and the suffering ensuing from them, could cause relational strain among general practice teams. This, in turn, had downstream implications for team cohesiveness and practices' ability to effectively co-ordinate and integrate their inter-related tasks and navigate ongoing challenges. We concluded that digitalisation in general practice generates new forms of workplace stress and may adversely affect team relationships. We proposed relational support interventions to reduce the impacts of technostress.

Technologies and infrastructure

Further publications on technologies and infrastructure are in preparation. In sum, we found that the policy focus tended to emphasise technological novelty and procurement of innovative products; less emphasis was placed on the human and organisational aspects of this adoption and assimilation process. A vast and confusing range of technologies (with varying functionality) was available, and more were in development. Procurement was often driven by standard protocols and occurred at locality or higher level, limiting practices' ability to customise their purchases. Some practices were much better than others at identifying which technologies were available, negotiating which were purchased, successfully introducing these to their own practices, and improving their set-up in an ongoing way. In general, the infrastructure for digital general practice was weak and patchwork, with variable quality broadband and various legacy systems limiting the system's overall capacity.

Variation in practice experiences and outcomes

As reported in Greenhalgh *et al.*,[58] remote and digital services unfolded very differently across our 12 practices from mid-2021 to end 2023. Their hybrid (mixed digital and traditional) solutions ranged from a near-total return to in-person services (with very selective use of digital tools) to a single, digital-by-default access route, extensive use of digital processes and pathways, and more than half of all consultations delivered remotely. Practices' efforts to find the appropriate balance between these extremes were shaped and constrained by numerous factors, including:

- policy drivers in a challenging context, including system complexity, austerity, rising clinical complexity, limitations in material and technical infrastructure and difficulties in staff recruitment, retention and skill mix
- organisational antecedents such as practice size, available resources, absorptive capacity (i.e. the practice's existing technological set-up, in-practice capability and know-how, and extent of external horizon-scanning), historical path dependencies, leadership and practice relations
- organisational readiness for remote and digital modalities, which was strongly influenced by tension for change, practice values and population demographics
- technologies' material properties and functionality, including fitness for purpose, usability, configurability, interoperability
- the work of embedding and sustaining technologies, including the ongoing, labour-intensive process of adapting and refining tasks, processes and team interactions, assessing the impact of these changes and adjusting the technological set-up as needed, and selectively abandoning technologies that prove unfit for purpose
- staff factors (e.g. confidence, risk aversion); interpersonal influence (e.g. via champions and 'super-users'); and team relations (interpersonal trust, psychological safety); and
- patient factors (especially demographics, disease patterns and the needs and capabilities of vulnerable groups).

When technologies fitted poorly with tasks and routines, when staff were reluctant or when the work of embedding was inadequate or unsuccessful, inefficiencies in work processes and 'technostress' among staff resulted. In such situations, the patient experience was sometimes unsatisfactory and at times potentially unsafe.

We concluded that while there is wide variation in digital maturity among UK general practice, low use of remote and digital technologies and processes may be warranted. It may, for example, reflect local strategic choices, especially in relation to equity and patient preference. But low use may also indicate a reactive rather than strategic approach to digital innovation, leadership challenges, low absorptive capacity, deficiencies in resources and limited awareness of technological solutions. We offered an updated typology of digital maturity in general practice with suggestions for tailored support. This new typology, along with suggestions for supporting each type, is summarised in *Appendix 1*, *Table 3*. Our new digital maturity scale divides practices into five broad categories: digital trailblazer, digitally strategic, digitally reactive, digitally hesitant and strategically traditional.

Discussion and interpretation

Principal findings and achievements

This multimethod longitudinal study using ethnography, interviews, document analysis and workshops revealed wide diversity of experience and strategic decision-making in a sample of 12 general practices. This was in the context of a policy push for digitalisation and multiple contextual complexities. We documented infrastructural weaknesses and challenges with procurement of new technologies. We demonstrated that remote and digital care in general practice is not, in general, unsafe, but it does have potential

downsides including increased complexity of care, widening of inequities (especially for multiply disadvantaged groups), fragmentation of care with reduced relational continuity, and technology-induced inefficiencies (such as double-handling of patients and processing of lengthy forms). Other downsides include unmet training needs, technostress and threats to team relations among staff, and pressure on an already-strained material and technical infrastructure. We also demonstrated that while short-term inefficiencies are almost inevitable when introducing novel digital pathways and processes, significant longer-term increases in efficiency can be achieved with attention to strategic leadership and the work of embedding and adaptation, especially for non-clinical tasks and processes. The decision to revert wholly or partially to traditional in-person services may be strategic and warranted, but it may reflect unmet support needs for practices. We have produced a new typology of digital maturity based on our empirical findings.

Contribution to existing knowledge

Our findings affirm and extend previous studies which demonstrated that remote and digital modalities in general practice may be acceptable and even preferred by some patients,[12,29,106] but that organisational transformation to such modalities is rarely unproblematic.[107] Challenges include

- potential increases in workload and reductions in efficiency[14–16,29,106] at a time when capacity is severely constrained;[28,45]
- complexification of staff roles and interactions, with increase in role stress;[16,108] distortion of demand for patient-initiated consultations (leading to a mismatch between provision and need);[4,16]
- a shift towards more transactional care and loss of opportunities for preventive and long-term condition care;[20,109,110]
- reduced continuity of care;[28,110]
- documented[27] or perceived[16,29,106] safety challenges; and
- widening of inequities.[10,13,16,20,106]

Our finding that some patients may be completely unable to use key digital access routes because of physical, cognitive or mental health conditions aligns with recently published work by other groups.[111,112] Other groups have also shown, like us, that inequities in digital health are especially dramatic for most disadvantaged patients because axes of disadvantage are often mutually reinforcing.

We have extended the existing evidence base by producing depth and detail in accounts of how British general practices coped with the disruptive innovation of remote and digital services from 2020 to the end of 2023. We have distinguished *warranted* variation (based on sound strategic choices) from variation that may reflect the need for additional support or resources. We have shown that while the negative impacts of digitalisation are common, they are not inevitable; they may not be permanent; and they do not affect all tasks and processes equally. We have also surfaced important issues for national policy-makers, Integrated Care Boards (ICBs), health boards and practices to address. These issues relate to safety, equity, continuity, non-acute services, training (including a comprehensive list of staff competencies – see *Appendix 1*, *Table 4*[82]), workforce support, technologies and infrastructure, and patient information and support (including professionally designed patient-facing materials and resources).

Theoretically, we have made novel and important contributions to the theorisation of safety (showing how to combine a 'Safety I' and 'Safety II' approach[30]), equity (introducing a new theory of digital candidacy,[63] adapting Archer's theory of fractured reflexivity to address digital healthcare access,[66] and extending theories of intersectionality to inform the production of digital personas[71]), continuity (producing a new ontology of continuity to reflect the realities of contemporary hybrid health care[72,73]), workforce (producing a novel theory of technostress, workplace suffering and strained team relations in the primary care context[91]) and infrastructure [extending sociotechnical theories of infrastructure to incorporate major disruptive innovation in an austerity context in the public sector (paper in preparation)].

Strengths and limitations

A significant strength of this study was the use of longitudinal ethnography in individual general practices, with a dedicated researcher for each practice. Using a purposively diverse sample of general practices drawn from across England, Scotland and Wales, we built relationships with clinical and non-clinical contacts, developed mutual trust, and visited regularly to collect data. The 28-month data collection period allowed us to observe the longer-term impacts of disruptive innovations introduced in the acute phase of the pandemic and to capture how 'clunky' and 'inefficient' technology-supported innovations could become more efficient over time through mutual adaptation and customisation of both the technology and the work process. Data analysis included extensive discussion among researchers to examine similarities and contrasts between practices, and member checking with practices.

Another strength was the adaptive use of additional data sources as the study unfolded. The 39 'elite' stakeholder interviews and 4 multi-stakeholder workshops were

part of the original study design, but as summarised in *Appendix 1*, *Table 2*, we later added 5 supplementary data sets to pursue key areas identified in the workshops as requiring further in-depth exploration: safety incidents including never-events relating to remote and digital care; the perspectives of clinical trainees and trainers; two data sets to address multiply disadvantaged patients (those with complex health and social care needs including homelessness and drug/alcohol abuse, and elderly first-generation immigrants with low digital literacy and limited English); and an examination of press coverage.

Limitations included that the study was limited to Great Britain (we did not have a practice in Northern Ireland); we had no practices in the north of England (though we did have some in Scotland); and patient interviews were relatively sparse. Also, while we managed to study a range of disadvantage, we did not capture the full range of disabilities and circumstances that can affect access (we did not, for instance, have an example of a patient with hearing or visual impairment, nor one where the patient was clinically extremely vulnerable and hence seeking to avoid in-person contact if possible for infection control reasons). While the study generated rich qualitative data which was useful in its own right, a larger study with a quantitative component could support formal hypothesis-testing (e.g. around the organisational-level determinants of digital innovation). A health economics component to such a study could allow firmer statements about efficiency.

Reviewers highlighted two classic papers on access to health care (both from North America[113,114]) which we might have referenced; both discuss patient factors, organisational factors, resources and appropriateness of services to need. To these, we would add a classic UK text on the important links between poverty and access to health care (Julian Tudor Hart's 'Inverse Care Law' paper, which is written from a political economy perspective[115]) and Michael Marmot's work demonstrating that such structural influences remain pervasive and often overlooked.[116]

Take-home messages

The study generated a number of important take-home messages.

The patient perspective: accessing and using remote and digital services

Patients vary in their ability to use remote and digital services. Many patients already possess digital devices (e.g. smartphones) and skills to use them, or have family members who can help them access care. These individuals often find remote and digital services convenient and accessible for most contacts, most of the time. Some patients' abilities to use remote and digital services are limited by sight or hearing impairment, neurodiversity or other conditions that make social interaction challenging, conditions affecting cognition (e.g. learning difficulties, memory loss, though both these conditions affect people in different ways and in varying levels of severity), mental health conditions, or low health, digital or system literacy. Notwithstanding the special needs of these groups, everyone might experience some difficulties in connecting at some times (e.g. when particularly distressed or concerned about their health or that of e.g. a child, or when working in a role that does not allow for 'call backs' during the working day). People with fluctuating physical or mental conditions vary from day to day in their ability to use digital access routes – hence a rigid coding of patients' digital capability will not solve access challenges (rather, staff need the capability and flexibility to respond adaptively in real time).

Some low-income groups possess only basic technologies and limited data. Many patients who appear 'digitally connected' may struggle to use the full functionality of a digitalised primary care service as they possess only conventional mobile phones (or entry-level smartphones) and a 'low-cost' data package. The environment from which they seek access may not be conducive for private conversations. Low-income individuals may also be time-poor (e.g. they may work long hours, have long commutes and have limited negotiating power to gain time off for appointments) and some may struggle with the cognitive load[117] of digital access routes. For all these reasons, they may value 'low-tech' remote services such as text messaging and telephone calls. Such messaging needs to be used carefully, avoiding extraneous information and clearly marked as coming from the patient's general practice (to avoid being misinterpreted and ignored as 'cold call' marketing).

Patients with multiple markers of disadvantage find remote and digital services hard or impossible to access. Disadvantage includes (in addition to the conditions mentioned in 1a above) extreme poverty, inadequate housing (or homelessness), precarious jobs (or unemployed), adverse social circumstances (including survivors of adverse childhood experiences), displacement (e.g. refugees), drug or alcohol misuse, and weak social and family networks. These axes of disadvantage play out differently in different individuals. In many people with *multiple* disadvantage, accessing care is extremely problematic. The addition of remote and digital options for such people can complicate the process of accessing care and increase the likelihood of disengagement. The needs

of such patients may be best met with a traditional, walk-up-and-book/wait, in-person service. For some groups, specialist outreach services are required.

Human intermediation may be helpful but is not a panacea. 'Digital navigators' are people who help patients use digital access routes – for example, by helping patients complete an online digital-by-default consultation request. These staff are typically receptionists who have undertaken extra training. Some patients with low digital literacy (e.g. elderly people) may benefit from such human intermediation. However, there are many challenges to an intermediation service, including training and supervision, trust (some patients and staff are troubled by confidentiality issues), affordability (some patients require a great deal of human input and staff time is a limited resource), and the cognitive and emotional demands on the patient (who is usually required to answer a long list of questions in a structured format). Engaging with an intermediary requires additional interactions which some people find difficult both practically (locating an appropriate service) and interpersonally (e.g. if neurodiverse or upset). Digital services, even with intermediation, are unsuitable for some patients.

The quality challenge: benefits and trade-offs of digitalisation

In addition to the access and equity issues described above, a number of key messages relate to quality of care (including efficiency, effectiveness, safety, continuity and patient-centredness).

Digitalisation may produce inefficiencies as well as efficiencies. Potential inefficiencies include generation and circulation of large amounts of text and other material, double or triple handling (e.g. in which a single problem generates an e-consultation, a phone call and an in-person visit), loss of relational continuity (so that multiple staff members need to get to know the patient and the problem), a need for new or different supervision of roles, and an increase in task complexity. Ongoing adjustment of tasks and processes may (in some but not all cases) iron out some of these problems and turn an 'inefficient' process into a highly efficient one. The inefficiencies of digitalisation may compound those linked to the growing diversification of staff roles in general practice.[48,49]

Remote and digital interactions are socially very different from in-person ones. When the clinician–patient interaction occurs by telephone, video or asynchronous electronic communication or text message, there is less of a sense of 'presence' (the intersubjective awareness of the other person being close and attentive). In physically distant and asynchronous interactions, the human elements of traditional general practice (e.g. continuity of the therapeutic relationship, compassion, support) are more difficult. This does not matter much in more transactional consultations (e.g. seeking a repeat prescription for an uncomplicated condition) but may be crucial in others (e.g. especially when the patient has serious or complex clinical or social needs).

Safety incidents are rare in remote general practice, but they do occur. Staff tend to err on the side of caution and use creativity and 'workarounds' to make care safer; hence serious safety incidents (deaths or harms relating to e.g. missed or delayed diagnoses, failure to refer urgently or inadequate follow-up) relating to remote modalities are extremely rare. When safety incidents do occur, they may be partially attributed to excessive workload, interruptions and other sources of stress, and inadequate training among support staff. Safety in the clinical consultation can be compromised by inappropriate modality (e.g. offering a telephone call when the patient should be seen in person), poor rapport building, inadequate information gathering, limited clinical assessment, inappropriate pathway (e.g. staff member selects the wrong algorithm) and inadequate attention to social circumstances. Special care should be paid when patients have complex conditions, cardiac or abdominal emergencies, vague or generalised symptoms, safeguarding issues, failure to respond to previous treatment or difficulty communicating.

Continuity is changing. Traditional continuity of the GP–patient relationship is less common and harder to achieve as practices advance their digital services. In some practices, commitment to traditional continuity is a reason for cautious progress and even strategic de-digitalisation. More commonly, practices orient around an expanded definition of continuity which includes continuity of the illness episode (e.g. a clinician following up the test results on patients they have seen), continuity of distributed work (ensuring that all staff can access, and contribute to, an unfolding digital record of what has been done and what is planned for the patient), and continuity of commitment to the community served by the practice (e.g. in a Deep End practice, engagement with the community's complex and ongoing needs and placing these centrally in any plans to digitalise – or not). As practices redesign their clinical pathways to accommodate digital technologies, it is essential to 'design in' relational continuity for patients with repeat attendances for still-undiagnosed problem and those with complex physical, social and or mental health problems. This includes developing ways to identify these patients and triage rules which allocate them to a GP or other clinician who knows them.

Efficiency-driven protocols for non-acute services may compromise care. In long-term condition monitoring, for example, tasks such as structured information-gathering can safely occur by text message or e-template for many patients. However, some key components of a check-up (e.g. diabetes foot examination) cannot be done adequately without an in-person assessment, and some patients may not disclose problems through a digital modality. As with most digital health technology, high-quality care requires an evidence-informed blend of technology and human input and designing care pathways with this in mind is an essential part of implementing and embedding digital care in general practice.

The staff perspective: training and workforce issues

Learning to provide digital services is more than learning how the technologies work. The knowledge needed to deliver high-quality remote services is complex, collective and organisationally embedded. Providing person-centred and safe care requires individuals and teams to be able to quickly assess patient capacity to use digital technologies and to use initiative and adapt to particular circumstances. Staff need to know how their input fits in with what other team members are contributing, and how to interact with them, hence on-the-job training and team training is essential.

Training needs are multiple and currently often unmet. Many staff have been taught to use a technology in a classroom or via didactic, self-completion online study modules, but lack confidence to use it in real workflows in a busy general practice. Clinical trainees may have low confidence and skills in telephone triage and consultations; trainers are concerned about the level of some trainees' competence in the virtual environment. Staff turnover is sometimes high, and many staff work part-time, which makes it harder to extend training to all practice staff and co-ordinate team-based training.

Competencies for remote and digital services vary by staff group. Key competencies for clinical students and trainees include basic technical, triage, communication and information governance skills. Those for more senior clinicians include making complex judgements, working within the limitations of technologies and overseeing the distributed work of a multidisciplinary team.

Competencies for support staff include basic technical skills, system knowledge, safety-critical clinical knowledge for safe triaging and how to support patients in navigating services. This raises questions about whether and how to professionalise the triage support role (perhaps looking to the Netherlands for an example) with a longer and more standardised training and qualification for receptionist staff.

Competencies for those with a strategic role include a system-level understanding of how remote and digital services could help deliver the organisation's mission, awareness of underserved populations and other complex need groups who may need bespoke arrangements, a sound grasp of workforce and training issues, and knowledge and skills to evaluate and monitor a dynamically unfolding digital service.

Digitalisation increases pressure on an already-stressed primary care workforce. In order to provide adaptive, person-centred, co-ordinated care in a high-pressure, safety-critical environment, healthcare staff must be able to do their job confidently, experience their work as fulfilling, feel safe to speak up and have positive and emotionally warm relationships with one another. Staff who are overworked, under-trained, under-supported and required to go beyond their scope of practice or work in ways they feel are causing harm or distress to patients are likely to become burnt out, distressed and unproductive.

The innovation and routinisation process in general practice

Most practices need considerable support and guidance to introduce digital technology safely, efficiently and strategically. Digital technologies introduced in the complex world of general practice are never plug-and-play. They require much embedding, in which work processes are adjusted to accommodate the technology and maximise the value generated. Fundamental redesign of tasks and processes is often needed, and this can take some time to optimise. In the current context of GP shortages, workforce pressures and burnout, few practices have the time, resources or skills to rethink care delivery, including consulting with patients about this. As noted above, staff need to learn to use technologies both independently and as part of a team, and to do this in an ongoing way as technologies evolve. Dialogue between technology users and designers may lead to key adaptations which make the technology more fit for purpose and transform the value proposition. Patients and carers also need to acquire key knowledge and skills.

One size does not fit all. UK general practices have responded in different ways to the strategic question of whether and how to continue, adapt, extend and abandon remote and digital services. Mostly, but not always, their decisions reflect the priorities and constraints of the

local context, especially in relation to the communities they serve. Practices serving multiply disadvantaged communities may choose to prioritise in-person services ('strategically traditional'). Some practices have reached the ability to select and assimilate technologies as part of a wider strategy to meet the needs of their population ('digitally strategic'). A few practices are digitally advanced and innovative ('trailblazers'). Practices which recognise the potential for digital technology to support and improve care often the material, technical, financial and human preconditions to get started ('digitally hesitant'). Some are still experimenting with digital innovations in a somewhat unsystematic way, and mostly as a reaction to policy incentives or must-dos ('digitally reactive'). Each of these archetypes needs a different approach to support but with current workload pressures on practices, additional ringfenced resources for digital transformation are essential if rapid progress is to be made (see *Implications for decision-makers* and *Appendix 1*, *Table 3*).

Larger, better-resourced, horizon-scanning practices usually innovate more readily. Practices meeting the preconditions for innovativeness (e.g. large size, well-resourced, high existing digital knowledge and capability, good team relations, well-networked with other practices, on the lookout for new solutions) generally find it easier to identify, procure, assimilate, embed and adapt new technologies. Smaller, more isolated practices may have the advantage of strong traditions and deep commitment to their local communities. Whatever the size of the practice, high levels of trust from patients and strong team relations seem to help innovation and vice versa.

Technologies and infrastructure

The context for digital innovation in general practice is adverse, with weak and fragmented national and local infrastructure, workforce shortages, demand–capacity misalignments and constraints on procurement. There is much policy emphasis on technological novelty. However, in general, there is less policy attention paid to patients' and practices' experiences and needs – for example, relating to issues of equity (the need for multiple routes of access), to infrastructural weaknesses, and to the costly and time-consuming process of embedding and adaptation. Standardised procurement protocols and top-down imposition of particular technologies or targets may restrict practices' ability to address local needs flexibly and adaptively.

The range of technologies is wide and potentially confusing. A wide range of software applications is available, and many more products are in development, to support practices with access, triage and remote consulting. The usability and functionalities of these products, and their scope for integration into existing systems, vary. Identifying, procuring and integrating these products is challenging for practices. While some localities have good horizon-scanning and assessment mechanisms in place, allowing practices (individually or collectively) to identify and obtain new technologies that fit well with their vision and existing set-up, others struggle to navigate the market and identify and integrate appropriate products.

Practices need to build infrastructure as well as purchase new technologies. Practice infrastructure is critical and needs ongoing strategic investment and support. Some practices ('digital trailblazer' and 'digitally strategic' in our taxonomy) have sound existing material, human and technological infrastructure and are able to assimilate new technologies to augment and extend their existing platforms. This is challenging (and often unrecognised) work that involves incremental, step-by-step engagement with digitalisation, leveraging of people and resources (both often in short supply), and a learning-driven approach across the practice. The push to extend digitalisation to all practices will need significant support to build this digital infrastructure and to hold it all together.

The picture is dynamic. Procuring, adapting and embedding digital technologies will be an ongoing challenge as products evolve and new technologies become available. This is in part due to a diversity of suppliers and products and limited incentives for companies to design, develop or adapt platforms that bear practices' routines and workflows in mind. There is no 'one-size-fits-all' technological solution. Rather, platforms that allow for ongoing adaptation (with practice staff working with the supplier) have far greater potential than those that that are inflexible. As artificial intelligence (AI)-enabled products become available, identifying and integrating such products into the busy and complex routines of general practice are likely to be challenging for all practices and (without additional support) impossible for some.

Reflections

See also *Lessons learnt for future research*.

Our original study design included a codesign component in 3 of our 12 practices, in which an independent design company attempted to work with patients and staff to try to optimise key access pathways using a popular design tool (the 'double diamond' method, which consists of four

phases: discover – define – develop – deliver[118]). This approach did not produce workable solutions in any of the three practices. On reflection, this approach was ill-matched to the highly complex and dynamic challenges faced by participating practices. The approach assumed that a particular 'design problem' could be readily surfaced by an external design agency talking to staff and patients; that a solution to this problem could emerge with facilitated, creative thinking in a collaborative workshop format; and that this solution would be implementable, helpful and relatively enduring.

But as the empirical work described elsewhere[58] has demonstrated, practices faced multiple and sometimes 'wicked' problems unfolding in dynamic and unpredictable ways across multiple interacting subsystems (e.g. technical, clinical, administrative, policy) in a context of severe resource constraints. As the RBD2 study unfolded, we moved from the 'double diamond' model to a more flexible and agile approach to design, in which a separate small design company was commissioned to respond rapidly to practices' design needs as these emerged. We found that the major need in this space was for high-quality, accurate and appealing information and guidance for both practice staff and patients to explain new digital technologies, pathways and ways of working.

Also noteworthy is that we recruited one additional practice to avoid research fatigue as various PhD students joined the study team. This proved straightforward since all materials and processes were in place and it just required an amendment to our ethics approvals. The study design was emergent, with the intention to pursue key themes as they were identified. As it turned out, we collected five supplementary data sets (see *Appendix 1*, *Table 2*) to pursue additional research questions which emerged during our study. Again, this proved very straightforward because we had 'designed in' the possibility of doing this (though we did not identify in advance which data sets would be needed or what methods we would use). Additional funding was secured to examine processes of digital care navigation for people with social care needs, and also for several linked PhD projects as reported below.

We reflect on the challenges of involving patients and the lay public in the separate section below.

Regarding the implementation, embedding and post hoc adjustment of digital technology, we have closely observed the gradual adjustment of digital services and the impact of these adjustments on quality, safety, access, equity and staff and patient well-being. Alongside the considerable benefits and opportunities of digital technology in general practice, our observations highlight examples of inefficient and stressful implementation and the ways in which poorly designed clinical pathways embedded in practices that are intolerant of rule bending and flexible interpretation of practice policies by staff can create clinical risk and occasional safety incidents. These insights are important for the future design of clinical pathways and practice processes for safe and effective care as well as highlighting the need for some discretion in reception and clinical staff to act flexibly if their instincts alert them to clinical risk.

Engagement with partners and stakeholders

In the design, writing, delivery and dissemination of the RBD2 study, we used three main mechanisms to ensure a broad perspective from diverse stakeholders, including patients.

Firstly, we formed an External Advisory Group (EAG) consisting of a lay chair, senior policy-makers from NHS England and the Scottish Government, digital health providers, academics from outside our own institutions, and patients with lived experience. The EAG provided input into writing the grant proposal and regular links into their networks to share our emerging findings. Importantly, the EAG served as a constant 'critical friend', reviewing quarterly progress reports and (for each report) joining a 90-minute webinar discussion between the EAG and research team. Through these regular written reports and discussion meetings, we were able to articulate our progress, discuss evolving research findings and sense-check new research questions and ideas. The EAG was important in helping maintain focus in a rapidly evolving digital and policy environment.

Secondly, The Nuffield Trust (an independent think tank), our research collaborator, was integral in developing policy-related outputs from the start – that is identifying messages to target decision-makers at national, regional and local level. Their extensive networks of cross-sector health policy leads and decision-makers across the four nations were leveraged to bring key people together for the various dissemination events (described below). The Nuffield Trust have also created policy briefs and blogs of key study findings and distributed them through the same networks.

Thirdly, the four large, multi-stakeholder workshops, each on a different priority theme (access and equity, quality and safety, workforce and training, and technologies and infrastructure), required us to create and maintain a map of stakeholders across government, industry,

third sector, NHS and patient groups. The design of the workshops, which included virtual breakout groups, allowed extensive networking and interaction across sectors. Post-workshop follow-up activity strengthened these links further. The relationships and alignments developed during and after the workshops are described elsewhere in this report.

Individual training and capacity-strengthening activities

The RBD2 study has built individual capacity in multiple areas within and beyond academia.

The study was large and lasted for almost 3 years (including writing up), allowing us to accommodate three PhD students who conducted focused studies on topics related to the core RBD2 study – relational continuity in the digital age (Emma Ladds), intersectionality of race/age/deprivation in explaining access challenges in ethnic and racial minorities (Laiba Husain), and staff working conditions, well-being, and relational work (Francesca Dakin). These PhDs were made possible by additional funding leveraged on the strength of the RBD2 study, from (respectively) Wellcome Trust, THIS Institute and NIHR School of Primary Care Research (SPCR). All three PhD students have already achieved several first-author publications and presented their work at international conferences; at the time of writing, two have now passed their PhDs and secured postdoctoral positions at leading universities.

We also accommodated four clinical pre-doctoral GP researchers under the NIHR In-Practice Fellow Scheme (Rebecca Payne and Ellen MacIver), NIHR Pre-doctoral Fellowship (Asli Kalin) and a John Monash scholarship Fellowship (Isabel Hanson). Rebecca Payne led two major substudies, leading to two first-author publications in leading journals. She successfully applied for a PhD (DPhil) place to take forward her work in digital innovation and was awarded a prestigious Clarendon Scholarship from the University of Oxford. She has also been awarded a Churchill scholarship to visit digital primary care services in remote Alaska and Australia. Ellen MacIver, who joined a year later, contributed substantially to various papers and earned authorship. Asli Kalin was a researcher-in-residence on RBD2 and has built her CV with numerous coauthored papers, with a view to applying for PhD following a career break. Isabel Hanson led a substudy on trainees' learning needs using supplementary data set 1 and gained coauthorship on two papers, including one paper led by trainees and written for trainees, and published in a trainee journal.[119] Isabel Hanson undertook a study of GP trainees' confidence in remote consultations, collecting supplementary data set 1 for her MSc dissertation, earning authorship on several papers and gaining a DPhil place at the University of Oxford.

Early-career academics also developed significantly. Post-doctoral researchers included Sarah Rybczynska-Bunt and Joseph Wherton, both of whom have published first-author papers in leading journals; other postdocs (including Sarah O'Rourke and Stuart Faulkner) have coauthored outputs and are working on further publications. During the course of the study, Gemma Hughes secured a tenured Associate Professorship at the University of Leicester and Sara E Shaw was promoted from Associate to Full Professor at the University of Oxford.

More informally, several clinical academics (Aileen Clarke, Sara E Shaw, Emma Ladds, Richard Byng, Asli Kalin, Rebecca Rosen, Rebecca Payne) obtained exposure to interdisciplinary training opportunities with social scientists; and, conversely, social scientists (Francesca Dakin, Laiba Husain, Joseph Wherton, Sara E Shaw, Sarah O'Rourke, Sarah Rybczynska-Bunt) benefited from working closely with clinical academics (Trisha Greenhalgh and Lucy Moore are dual qualified in social sciences and medicine/nursing).

Two attached medical students (Kai Song and Molly Hey) conducted a media analysis of how remote and digital general practice was covered in newspapers and gained authorship on a paper published in a leading journal. A further medical student (Tabitha Pring) supported data collection and analysis on the quality workstream, contributing to the quality paper. In-Practice Fellows gained experience supervising these students on an academic project. A lived-experience researcher (Nadia Swann) contributed to the safety paper and wrote the patient advice section for that, helping build her CV for a PhD application (which was successful).

People with lived experience of remote general practice gained research experience and were welcomed as partners in the collection and analysis of data and writing up of findings. One individual with lived experience of a safety near-miss (Nadia Swann) undertook data collection and analysis for the safety paper,[30] and wrote the patient advice section of that paper.

Institutional capacity strengthening

This study was a partnership between a large team based at the Interdisciplinary Research In Health Sciences (IRIHS) research group at the University of Oxford and smaller teams based at the University of Plymouth and the policy-focused think tank, Nuffield Trust. Through this

collaboration, both academic departments gained insights into policy analysis and policy-focused impact work from working with the Nuffield Trust and vice versa.

The study was led from the IRIHS research unit at the Nuffield Department of Primary Care Health Sciences, University of Oxford. IRIHS seeks to use creative interdisciplinary methods to bring both clinical and social science insights to bear on applied health research. The RBD2 grant provided significant resource for the IRIHS team over almost 3 years (including a no-cost extension). In addition to supporting individual career development, this grant enabled IRIHS to consolidate and expand a diverse and talented team which included clinicians (Trisha Greenhalgh, Aileen Clarke, Sara E Shaw, Isabel Hanson, Rebecca Payne, Ellen MacIver, Asli Kalin, Lucy Moore, Emma Ladds), anthropologist (Francesca Dakin), psychologist (Laiba Husain), human–computer interaction scholar (Joseph Wherton), sociologists (Sara E Shaw, as well as Trisha Greenhalgh and Lucy Moore who are dual qualified) and people with lived experience (Nadia Swann).

The RBD2 study supported a small team led by Richard Byng within the University of Plymouth's Community and Primary Care Research Group. The collaboration provided opportunities to share expertise in addressing inequalities for marginalised populations and has extended the group's experience in social sciences and digital health. It has provided valuable experience for two postdoctoral researchers and developed new partnerships.

Patient and public involvement

Approach to patient and public involvement

As noted above, our external advisory group had a lay chair as well as lay people and people with lived experience. Lay people and patients/carers with a range of lived experience attended the four stakeholder workshops. Additional patient and lay input was obtained in two ways.

Firstly, a patient participation group with representation from all participating practices met approximately 3-monthly online. An average of 11 participants attended across 6 meetings over the course of the study. An initial plan for members of this online PPI group to each 'buddy' a friend or relative who was less digitally enabled had partial success (some members were able to convey the perspective of someone less digitally skilled and equipped than themselves), but we did not feel that this approach fully captured the perspective of digitally excluded people. Secondly, therefore, a separate reference group of eight people was recruited in one deprived locality via a social support day centre and consulted via in-person meetings. This latter group was proactively recruited by one of the researchers in residence (Sarah Rybczynska-Bunt) to ensure that the voices of people likely to be digitally excluded were captured in the RBD2 study. It included people with experience of, or at risk of, digital exclusion (e.g. lack of digital devices, low digital literacy, homelessness, and complex health or social care needs).

Both these groups gave periodic feedback on our emerging findings and made suggestions from a lived experience perspective. For example, after a workshop held in Plymouth on Optimising Access for Patients with Refugee and Asylum Status, practitioners from refugee support agencies alongside our public advisors on RBD2 highlighted the need for extra support for those who are recent migrants and non-English speaking. Information packs were co-created with patients about their access rights to primary care and signpost to other guidance and resources that explain in more detail how the NHS works (translated into six languages – Farsi, Arabic, Kurdish, Sorani, Tigrinya and French). While not part of the original grant proposal, these were needs led and are being used by the practice team.

In addition, Nadia Swann, a patient/parent with lived experience of a life-threatening near-miss experience from remote consultations attended as guest speaker at our Parliamentary dissemination event in April 2024. She recounted a powerful personal story which illuminated some of the research findings we were presenting (see *Impact of the study to date*).

Dissemination to participants

Researchers in residence visited each participating RBD2 practice in late 2023, giving a presentation which summarised the overall RBD findings and specific feedback on that practice. We created a layered and flexible universal slide deck that could be adjusted to the needs and themes that were pertinent to each practice and were delivered in various formats ranging from informal 'lunch and learn' to practice staff, to more structured weekly seminars. The patient refugee packs (detailed in *Engagement with partners and stakeholders*) have been shared with practices.

Representatives from the practices (clinicians and support staff) were invited to the four main workshops, the dissemination event in Parliament in April 2024 and the final Implementation workshop on 5 July 2024 in Oxford.

We held a webinar for patients and lay people in May 2024 (including but not limited to patients from the participating practices), which was attended live by 50 people, recorded and recently put on YouTube (https://youtu.be/iwL7q4WylXs?si=sR6VZoXKRchgRcmf) and since watched by an additional ~150.

We are currently working with a design company to produce PDF and paper versions of a number of key outputs for clinicians, patients and lay people in both digital and non-digital formats. These include (1) one-page summaries of eight academic papers; (2) additional summary tables of the key competencies for remote and digital primary care (from our staff training paper[82]); (3) digital archetypes (from our digital candidacy paper[63]), and persona[71] papers; (4) what patients and clinicians should expect from their consultation (from our safety paper[30]); and (5) a clinician-facing guide on supporting patients with digital navigation (drawing on our digital candidacy[63] and reflexive imperative[66] papers). The ModCons study continues to work with three RbD2 practices (see above), including codesigning resources with and for practices, to support patients with access and triage. These will all be freely available on the study website and links and distributed through our networks.

We have produced policy briefings (via the Nuffield Trust) – see *Additional information* for full list.

We presented findings of our safety substudy to NHS Resolution – see *Impact of the study to date*.

Equality, diversity and inclusion

There is much evidence that as health services became digitalised, new kinds of inequity emerge, producing what one author has called the 'digital inverse care law' (patients most in need of care are even less likely to be able to access it than previously).[120] As discussed in previous sections, equity was one of the main themes covered in this qualitative study. There is much evidence as that as health services became digitalised, new kinds of inequity emerge, producing what one author has called the 'digital inverse care law' (patients most in need of care are even less likely to be able to access it than previously).[120] We took seriously the challenge of ensuring that our findings would apply to disadvantaged, underserved and seldom heard groups, and addressed this challenge in the following ways:

1. While seeking a maximum variety sample of general practices, we oversampled from more deprived post-codes. Using the Index of Multiple Deprivation,[121] there were four practices in the most deprived decile by postcode, two in the 2nd (next most deprived) decile, one each in the 3rd, 6th and 8th deciles, and two each in the 7th and 9th deciles.
2. As noted under *Approach to patient and public involvement*, we supplemented our online PPI group with an additional patient panel recruited from individuals who had complex life circumstances, few or no digital devices and low digital literacy.
3. We identified digital inequity as a major theme early in our study, and also identified that this theme had up to now been poorly theorised. This informed our study of digital care navigation for people with social care needs. We worked to develop and apply theory, and produced several novel theorisations of digital inequity.[19,63,66]
4. We obtained additional funding for two linked PhD studies on multiply disadvantaged groups. One of these focused on elderly people from racially minoritised groups living in deprived postcodes and the other focused on patients from 'Deep End' practices serving populations with complex needs (including drug and alcohol use).
5. When selecting participants, we actively sought to achieve diversity not merely in the different axes linked to disadvantage or discrimination (income, gender, age, race/ethnicity, health status, educational status) but also in intersectional factors (the participant who is poor *and* elderly *and* from a racial minority *and* low literacy *and* has multiple health conditions). Our work on digital personas was developed to draw these intersectional influences together.[71]

Despite these efforts, we did not cover every complex need group and our findings will need to be interpreted with attention to whether they are likely to apply to other groups.

Impact and learning

Impact of the study to date

At the time of writing, our dissemination, engagement and follow-through work are ongoing. From the outset of the study, we have emphasised active and ongoing engagement of policy-makers. Senior policy-makers from NHS England and the Scottish Government sat on our EAG and had ongoing input to the RBD study as it unfolded. The 39 'elite' interviews conducted at the outset of the RBD2 study served to engage a wider group of policy-makers with whom we have kept in

touch. This ongoing engagement can be categorised as 'soft power', helping to influence 'hearts and minds' and place us strategically as available to be contacted if academic input is needed (see last paragraph in this section). The Chief Investigators have regular ongoing meetings with national policy-makers leading on primary care transformation.

Presentations and seminars to date on our overall findings include:

1. **Parliamentary dissemination event,** held on 24 April 2024. Co-chaired by two parliamentarians who are also medical doctors, James Davies MP (House of Commons) and Baroness Ilora Finlay (House of Lords). Attended by 50 people including members of the project team, representatives from practices, patients and lay people, as well as MPs, Special Advisers, Health Foundation, Kings Fund, NHS England (including senior policy-makers from digital innovation teams and inequalities teams, and those responsible for education and lifelong learning), equivalent teams for Scottish and Welsh governments, NHS Resolution, patient charities and advocacy groups (e.g. Healthwatch), Royal College of General Practitioners (RCGP), Patient Safety Commissioner, Care Quality Commission (CQC), Healthcare Safety Investigation Branch, postgraduate deans, primary care leads for England, Scotland, Wales and Northern Ireland. The event included presentations from the research team plus a presentation from a patient (see *Patient and public involvement*). The formal presentations were followed by a networking tea hosted by Baroness Finlay and Dr Davies. Various cross-sectoral contacts were made. Again, deliverables from this event are indirect and mainly take the form of enriched academic-policy networks. A summary of policy recommendations and advice to MPs about supporting their constituents in relation to digital and remote general practice was launched at the event and published online (www.nuffieldtrust.org.uk/sites/default/files/2024-04/RBD%202024%20event%20briefing_WEB%20%281%29.pdf). A blog was written by one of the research team (www.spcr.nihr.ac.uk/news/blog/spcr-trainee-blog-post-reflections-on-a-visit-to-parliament).
2. **European Dissemination Event.** On 25 June 2024, we held an interactive webinar, 'Digital primary care: from research into policy and practice'. We collaborated with Aarhus University in Denmark and World Health Organization (WHO) Europe to co-host a pan-European dissemination event, aimed at bringing research directly to policy-makers and practitioners. The goal was to share the findings from RBD2 and place this alongside research and policy work from other European countries on remote and digital health care. Following an opening keynote from Professor Greenhalgh, there was another keynote from a representative from WHO Europe and then talks describing comparable studies in Denmark, Catalonia, Estonia and Greece. This 3-hour event was attended live by 80 senior policy-makers from 31 countries, including many senior UK stakeholders. It was recorded; a full video is in preparation for public dissemination and an interactive PDF summary of key messages will be produced and disseminated to attendees. The workshop was well received, and further joint work is planned with stakeholders in other European countries (see *Plans for taking this work forward*).
3. **End of Project Dissemination and Networking Event.** On 5 July 2024 (slightly delayed because of election purdah), we held a major event at Green Templeton College, Oxford, 'The changing face of remote access to primary care in the UK: Moving from research findings into implementation'. Fifty-five people attended, including academics, policy-makers, clinical leaders from NHS Resolution, NHS England, NHS Wales, Healthcare Services Safety Investigations Branch, ICBs, clinicians and managers from participating RBD2 practices, senior leaders from British Medical Association General Practitioners Committee and RCGPs, people involved in the GP curriculum and in other senior training roles and representatives from government across three of the UK nations. The study findings were shared (along with those from related NIHR-funded studies 'Mode of Consultation' and 'Video and Hybrid Group consultations') as part of the broader evolving landscape of remote access to care. In the afternoon, attendees joined breakout groups to consider how the study findings could be implemented across the areas of (1) contracts and regulation, (2) education and training and (3) within the practice itself. Study findings and implementation actions were summarised through visual minutes (*Figure 1*) and to be disseminated through our networks. A networking event followed into the evening.
4. **Welsh Assistant Medical Directors (AMDs) presentation.** In Wales, the Primary Care AMDs play a key role in system leadership, including in developing the GP contract, influencing national primary care policy and developing local enhanced services. We presented the study findings to this group and had

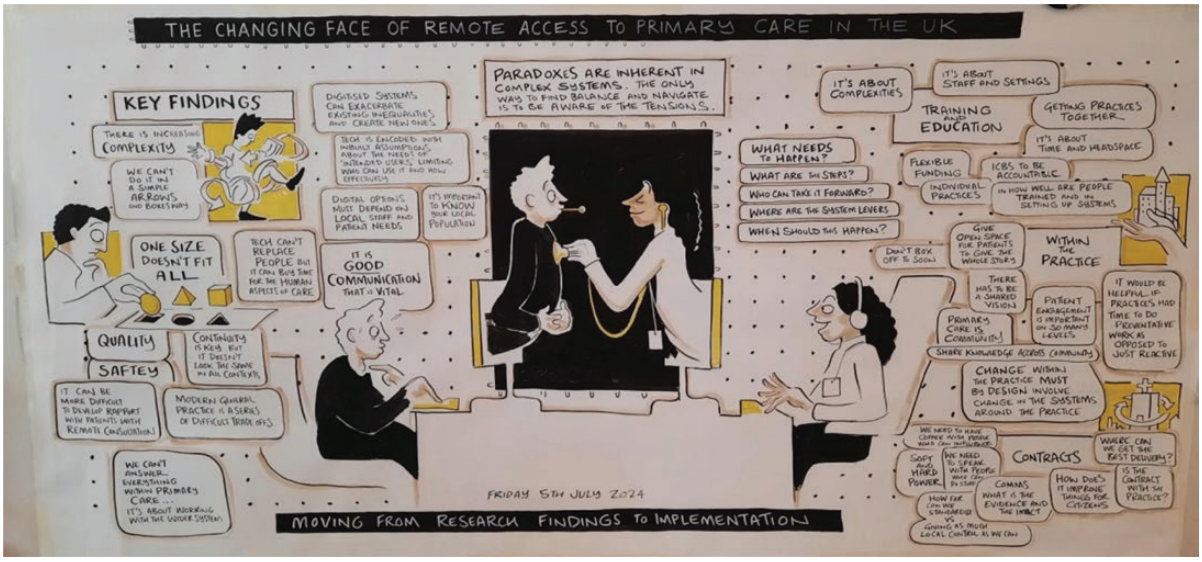

FIGURE 1 Visual minutes from the Dissemination Event in Oxford 5 July 2024. Information about the above event was reproduced from the Remote by Default 2 website (www.phc.ox.ac.uk/research/groups-and-centres/interdisciplinary-research-in-health-sciences/remote-by-default-2/project-resources), which was published under the Creative Commons Attribution License (CC BY 4.0), which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited (https://creativecommons.org/licenses/by/4.0/).

a follow-up meeting with the Senior Medical Officer for primary care in Welsh government. The AMDs have been vocal advocates of our work, as an example sharing the recommendations from the safety paper with all GPs and practices within the Aneurin Bevan Health Board area.

Below, we summarise how we have taken (and continue to take) forward specific themes.

1. **Quality and safety.** Our findings on risks to quality of remote and digital services, especially in relation to long-term condition management,[77] and on the features of safety incidents and how these are usually avoided[30] led to a stream of impact-oriented work with quality and safety leads. These included:
   a. **RBD2 workshop on quality and safety.** This was held in September 2022 and attended by 61 stakeholders from clinical, academic, policy, third sector and lay sectors (see *Methods*).
   b. **Webinar and follow-on work with NHS Resolution.** In March 2024, we presented at a bespoke education/review meeting with an arm's length body responsible for indemnity claims against the NHS, along with external attendees. We presented and invited discussion on the findings of our patient safety analysis which had used de-identified data from (among other sources) NHS Resolution's closed indemnity claims. Two hundred and fifteen people signed up and 97 attended on the day (others planned to watch a recording). The letter of thanks from NHS Resolution reported the results of an evaluation, which was very positive. Free-text comments included:

Practical advice that was transferrable to professionals other than GP e.g. I'm a palliative care consultant in community and think there are situations where I could better integrate remote consultations into my practice in order to see more patients over a large geographical area.

[T]he seminar was delivered in real language discussing how real events occur.

[T]here was transferable learning and made me think about the way we have introduced remote consultation in services with little or no training – covid leading much of this response.

National Health Service Resolution have taken forward our findings through sending our recommendations through to practices in their newsletter and encouraging their adoption.

   c. **Editorials aimed at clinicians in safety roles.** We published two short editorials, one in the *British Medical Journal*[122] and one in the *International Journal for Quality in Healthcare*.[123]

2. **Access and equity.** Our findings on the tendency of remote and digital services to widen inequities of access, especially among the multiply disadvantaged,[63,66] led to a stream of work to help mitigate these inequities. This included:
   a. RBD2 **workshop on access and triage.** This was held in April 2022 and attended by 50 stakeholders from clinical, academic, policy, third sector and lay sectors (see *Methods*).
   b. **Direct link with leading policy-makers.** The NHS England lead for Primary Care Digital Transformation has been a member of our Advisory Board throughout, gaining direct and timely access to our findings.
   c. **Editorials aimed at clinicians.** We were commissioned to write a summary editorial on how digitalisation can leave the most disadvantaged patients without adequate access.[124]
   d. **Linguistic minorities.** We worked with Deep End general practices serving disadvantaged racial minorities with limited English (e.g. refugees) to produce PDF and paper versions of instructions for accessing the practice. For example, in one practice we translated practice access leaflet into Tigrinya, Ukranian, Romanian, Polish, Arabic and Russian.

3. **Workforce and training.** Our findings on organisational suffering, technostress and challenges to relational co-ordination among practice teams, and linked findings on training needs and key competencies for general practice staff,[82] led to a stream of impact work on reducing stress, improving team relations and building competence in the workplace. This has included:
   a. RBD2 **workshop on workforce and training.** This was held in January 2023 and attended by 51 stakeholders from clinical, academic, policy, third sector and lay sectors (see *Methods*).
   b. **Ongoing work by Nuffield Trust on workforce.** The RBD2 findings have informed a wider stream of work on the future role of the GP and how to preserve and strengthen medical generalist skills in a context where remote consulting is driving more transactional care. Nuffield Trust work on this subject has included a round table with national policy-makers which drew on findings from RBD2.
   c. **Educational webinars for GPs and other primary care clinicians in all jurisdictions.** Between April and July 2024, we delivered educational webinars for primary care clinicians as part of their regular postgraduate education series in England, Wales and Northern Ireland. These events consisted of presentations (focusing mainly on the clinical practice implications) and a long discussion slot where we answered clinicians' questions. For example, in May 2024, the main study findings were shared in a webinar to the Northern Ireland national GP and practice team. Presentations were given by Trisha Greenhalgh, Francesca Dakin and Rebecca Payne. The event was attended by more than 70 GPs and GP leaders live and recorded; it has since been watched by many more who could not attend on the day. It was rated 4.8/5 with example positive feedback 'practical take home points, for example what conditions should be offered face to face care rather than remote encounter'.
   d. **Management in Medicine seminar in Oxford.** In November 2023, Trisha Greenhalgh delivered a continuing professional development (CPD)-approved session 'How can we organise remote consultation services that are safe, effective and equitable?' on this highly regarded course run from Green Templeton College, Oxford, and supported by the Faculty of Medical Leadership and Management. An estimated 120 people, mostly clinicians in training, attended.
   e. **Editorials and practical papers aimed at** GP **leaders.** Rebecca Payne coauthored a short article 'Teaching patient safety in remote consultations' in Education for Primary Care.[125] Francesca Dakin led on a paper in *BMJ Leader* 'Supporting your support staff', with practical recommendations on how to improve staff job satisfaction and fulfilment and strengthen team relations.[40]
   a. ***British Medical Journal* webinar for doctors.** On 3 July 2024, Trisha Greenhalgh and Emma Ladds led a 1-hour webinar 'How to make the organisational changes for remote and digital consultations' by invitation as part of a wider series by the *British Medical Journal* on digitalisation and innovation in health care. RBD2 findings were distilled into practical points for an estimated live audience of 100, with many more watching the recording afterwards.
   b. **Conference presentations.** We made several presentations (including the opening keynote) at the Organisational Behaviour in Healthcare conference in Oslo (April 2024). See *Conference presentations and keynote lectures based on RBD2 findings*.

4. **Technologies and infrastructure.** Our findings on technologies and infrastructure – particularly the challenges of identifying, procuring, implementing and continually reviewing a range of interlinked technologies that are 'fit for purpose' for individual practices, workflows and patients – led to a stream of impact work to improve infrastructure and the fitness for purpose of and configurability of technologies. Specifically:
   a. **RBD2 workshop on technologies and infrastructure.** This was held in April 2023 and attended by 48 stakeholders from clinical, academic, policy, industry, third sector and lay sectors (see *Methods*). The workshop provided opportunities for interaction in particular between the designers and vendors of technologies and the front-line users in our participating practices. Various links were made, and practices arranged follow-up meetings, as the following extract from an e-mail illustrates:

The Accurx team did visit on [date] 2023 with their Chief Executive [name] coming. Another visit followed on [date] 23 with two people from their product development team. In both meetings they took time to look at how we were using their product as part of our total triage model and clinical workflow. We fed back several points to them and suggested a few priorities for further product development. I'd like to think that as a result of these discussions, a couple of recent product updates have been made to Accurx Patient Triage. There is now a function for patients to choose a specific clinician when sent a self-book link. There is another update shortly to come where we are able to select specific clinicians as options when sending self-book appointment links to patients (so we can decide whose appointments to offer). Secondly a really big update has just landed to the Usage Dashboard. It allows us to dig into historical trends and play with the data. It is extremely similar in appearance and function to the excel dashboard that we had made for analysing the data and that I shared with you.

   b. **Stakeholder interviews stretched across policy-makers, local and regional decision-makers and industry representatives,** providing critical opportunities to discuss and reflect on emerging findings, and to build relationships. This informed nuanced discussion with practices about the need to consider and attend to infrastructure and interoperability, and about specific technological developments and adaptations; with industry and decision-makers about the context of remote care in general practice, the typically incremental, step-by-step engagement with digitalisation and infrastructural requirements to support it; and with decision-makers the challenges faced by practices (individually and collectively) in procuring technologies relevant for their local setting and population, and those faced by industry (particularly small and medium-sized enterprises) in entering the market, understanding and enacting requirements for public sector procurement, and appreciating the context in which practice were working to introduce and evolve digital technologies.
   c. Additional dissemination work on this final theme is currently being planned.

A note about diffuse influence and soft power

One of the important parts of impact – how 'soft power' can influence individuals and groups – is the hardest to capture. Soft power includes the patient who now feels more confident to push for a face-to-face appointment when a condition is not getting better via remote; the designer of undergraduate Objective Structured Clinical Examinations who now designs their assessments around evidence-based competencies for remote and digital care; the policy-maker who better understands the caveats of digital and remote health care and is able to make more balanced decisions; and practice teams who have a better understanding of which modality is most appropriate for which patients and which condition. A number of team members now receive regular sense-checking calls from those in positions of power and are thus able to bring our research findings to the heart of national decision-making.

Further dissemination activities (e.g. press coverage) are listed in *Appendix 1*, *Table 5*.

Anticipated longer-term impacts

As the RBD2 study reached completion, a new (Labour) government was about to take up office. Access to care and efficient use of a stretched clinical workforce became a central policy theme. The Nuffield Trust will draw on findings from RBD2 to inform their briefings to ministers, see for example, their briefing ahead of the general election (published online: www.nuffieldtrust.org.uk/sites/default/files/2024-06/Election%20briefing%203_general%20practice%20and%20dentistry_WEB_1.pdf).

At the Parliamentary briefing event in April 2024, we made a number of key contacts which we will be taking forward.

Lessons learnt for future research

In a previous study in UK general practice published in 2019, Newbould *et al.* covered 146 practices and demonstrated considerable variation in the impact

of a 'telephone first' innovation, with some practices reporting overall increases in workload and efficiency while others reported a decrease.[126] But the design of their study (larger, more quantitative and focusing more on before-and-after metrics than unfolding-over-time narratives) did not allow them to tease out the complex contextual influences and path dependencies that could fully *explain* between-practice variation. When we submitted our stage 1 bid for the RBD2 study, we had initially conceptualised a study with some similarities to the Newbould study, including a larger unit of analysis [the Primary Care Network (PCN), which would have become the Integrated Care System in England part-way through the data collection period]. On the basis of insightful feedback from anonymous reviewers, we changed the unit of analysis to the individual general practice – a shift which enabled us to compare rich case narratives of 12 very diverse practices. We think this shift worked well, in that we now have a good understanding of why a technological innovation that increases efficiency and patient satisfaction in one practice might have the opposite effect in another practice. We cautiously conclude that the trade-off between breadth and depth in RBD2 was worthwhile and that other researchers might consider a 'small n' study using the researcher-in-residence model to explore the complexities of contemporary general practice.

Related work

Three PhD projects were launched from the RBD2 platform and a fourth was linked to it.

Dr Emma Ladds, a GP, was funded by Wellcome Trust (via NIHR School for Primary Care Research) for a doctoral study entitled 'What is the Role of the Therapeutic Relationship in Modern Day Primary Care?' Inspired by the cross-cutting theme of continuity in RBD2 (which she led as an Academic Clinical Fellow), Dr Ladds designed a novel methodology to prospectively explore the unfolding therapeutic relationship between a small sample of patients and their GPs (and other practice members) over 2–3 years, using longitudinal ethnography. This ongoing study, which is undertkaen part-time alongside clinical work, will contextualise findings in relation to the historical evolution of the role of the GP and the opportunities and constraints of modern technology.

Laiba Husain, a psychologist and health services researcher, was funded on a THIS Institute Improvement Science Fellowship for a doctoral study entitled 'The Shift to Remote Consultations and its Implications for Digital Health Disparities'. Ms (now Dr) Husain, a multilingual researcher from a minority ethnic group, recruited 23 participants from a telehealth service, all with multiple axes of disadvantage: elderly, first-generation immigrants, socioeconomically deprived, low digital literacy and multiple health conditions. Using in-depth interviews and home visits, she prepared individual case studies and used these to construct fictional personas. She is now working with providers and service users, drawing on these personas and her wider data set, to co-design services that are more accessible to this vulnerable group. She has now passed her PhD.

Francesca Dakin, an anthropologist and health services researcher, was funded by the NIHR School of Primary Care Research to look at the impact of the COVID-19 pandemic (and associated technological and structural changes in general practice) on staff in GP surgeries (including support staff such as receptionists and back-office workers, and clinical staff such as GPs, nurses, phlebotomists). She co-led the cross-cutting theme of 'workforce' in the RBD2 study, identified the subthemes of 'technostress' and organisational suffering which we describe in the findings section (findings to be published in *British Journal of General Practice*). Building on these findings, she developed a linked PhD project looking at team relations, psychological safety and relational co-ordination in the context of resource constraints, workforce shortages, advancing digitalisation and high demand (findings published in *BMJ Leader*). She also co-led the inequalities theme, developing a novel theory of digital candidacy and the concept of the digital facsimile (findings published in *Social Science and Medicine*). She has now passed her PhD.

Dr Amy Booth, a medical doctor, commenced a DPhil in Translational Health Sciences in 2021. During her time working as a clinician during the COVID pandemic, she became acutely aware of the impact the health system has on the environment. Her research explores the environmental impact of health systems and how a sustainability lens can be embedded into healthcare practice and policy. She has contributed to a major systematic literature review on the role of virtual consulting on developing environmentally sustainable health care.[127] She worked with RBD2 researchers in residence to ensure that practices' awareness of the green agenda (and its links to remote health care) was explored.

Dr Hassane Amani, a visiting scholar from the University of Montreal, joined us for a year and helped with data collection. He contributed to the stream of RBD2 work on infrastructure and the links between access and equity, and undertook a linked project on the system-level links between universal health care, human rights

and the need for publicly funded (as opposed to private, for-profit) digital platforms.[128]

Our work on remote consultations surfaced novel research questions about what happens *after* such consultations in terms of patients obtaining the tests, medication and ongoing support they need. We have already published an Analysis article 'After the teleconsultation',[129] and Rebecca Payne has successfully applied to study an aspect of this for a DPhil at the University of Oxford.

Collaborations and future funding

We have developed multiple new research collaborations. One example is that our work on the organisational and workforce aspects of remote and digital care led us to develop collaborations with academics in the Said Business School, University of Oxford (Associate Professor Michael Gill), and the Organizational Sociology Group at Aalborg University, Denmark's Department of Sociology and Social Work (Professor Ninna Meier). We have begun to collaborate with researchers at Aarhus University, Denmark (with whom we co-hosted the European Dissemination event); a joint grant application is being planned.

The RBD2 study helped attract visiting professor Tiffany Veinot from the University of Michigan, USA, who has an international reputation for her work on digital inequity. Professor Veinot worked with the RBD2 team and supported and extended our digital inequity work. An additional book chapter is in preparation.

Within IRIHS, the RBD2 grant formed a strong platform from which to apply for further funding for digital health research. In addition to the original RBD2 funding (£893,417), three externally funded PhD places and three pre-PhD fellowships described in the previous section, we have secured the following additional grants related to remote and digital health (in addition to other grants on wider topics):

- **Care Navigation Extension to RBD2** (Oxford and Plymouth) NIHR Health and Social Care Delivery Research: social care extension 2022–4. PI – Greenhalgh: £177,157.
- **MoDCons: Mode of Consultation in general practice** NIHR SPCR 2022–4. PI Shaw. £398,566.
- **The Oxford-RAND Europe centre for rapid evaluation of technology-enabled remote monitoring: DECIDE (Digitally Enabled Care in Diverse Environments)** (Oxford) NIHR Health and Social Care Delivery Research. 2023–6, PI – Shaw. £2,080,430.
- **Social and Ethical Aspects of Remote and Hybrid Care in the Special Allocation Scheme in general practice (SEARCH): A mixed methods study.** (Oxford) NIHR School for Primary Care Research. PI – Brenman, van Dael with Shaw as senior mentor. 2024–6. £231,514.
- **Evaluation of Enhanced Reconnect services for prison leavers,** NIHR Policy Research Programme, £400k, 2024–5. (Plymouth) Co-PIs: Byng and Rybcynska-Bunt.
- **MocCons Goes Dutch (funding/funder).** Cross-national perspectives on remote care and determining modes of consultation in Dutch general practice. GP. PI – Dakin. €25,000 from Amsterdam Huisartsen Alliantie (Amsterdam GP Alliance). Co-PIs: Wieringa, Shaw.

Plans for taking this work forward

A number of streams of work are ongoing to enable further impact from this study. In addition to the new research projects that have already begun (see above), these include:

1. **Using our competency framework to inform training standards.** We have begun to work with Health Education England and the RCGPs to map our competency framework for remote and digital services to the postgraduate training of primary care clinicians. This work is currently at an early stage. We have also begun to work with University of Oxford undergraduate teachers to inform medical student training. Again, this work is at an early stage at the time of writing.
2. **Pursuing our insights on quality and safety with policy-makers.** Rebecca Payne has informed CQC leads of the RBD2 findings on quality, and begun discussions as to whether these findings could inform CQC inspection methodology. Rebecca Payne, Trisha Greenhalgh and others have begun dialogue with policy-makers in the Welsh government, Scottish primary care leads, and NHS England as to which of our findings might be relevant to be included in developing metrics (e.g. within practice self-assessment tools). Some discussions with senior policy-makers are confidential at this stage and therefore not reported here.
3. **International case study booklet.** Four of the speakers at the European Dissemination Event (June 2024, see *Impact of the study to date*) are now working to produce a short, policy-oriented booklet covering learnings from their respective countries, aimed mainly at EU policy-makers.
4. **Professional quality resources to convey key messages to different audiences.** We continue to work

with Design Science to produce accessible and engaging information and resource materials in PDF and paper format. Sara E Shaw is in discussion with policy-makers about aligning practice-focused resources and disseminating most effectively. Target audiences include:

a. **Resources to support care navigation.** We are co-designing an infographic that will help care navigators (staff that provide personalised digital support during patients' navigation of care) consider what they can do to better support patients navigating care services digitally (i.e. getting an appointment, using technology). This will include a 'worksheet' of digital candidacy archetypes that can be used to better understand how and why patients may have complex needs and how to identify them. National Voices are engaged in this work, and likely to support dissemination.
b. **Visual summaries of eight key papers.** Findings on key cross-cutting thematic papers (e.g. quality, safety, access and equity) will be summarised in visually appealing one-page summaries.
c. **Patients.** We are extending the existing guidance we produced for patients when they seek to access general practice care, highlighting the challenges that digitalised systems can create and how to navigate these.

5. **Continuing speaking engagements.** Several members of the RBD2 research team have been booked as speakers for postgraduate training events, seminars or conferences. For example, Trisha Greenhalgh has been invited to speak to the BMA General Practitioners Committee and the Urgent Health UK Annual Conference. RCGP Wales and Scotland are currently in the process of adapting our English parliamentary briefing for their devolved nation parliaments and administrations. This will be co-badged with RBD2. Release has been delayed due to the election but is scheduled for early autumn 2024.

Implications for decision-makers

We strongly encourage decision-makers to study the key findings set out in *Take-home messages* section. We use those take-home messages to structure some key implications.

Our findings on the impact of remote and digital services on patients have a number of important implications for national government in relation to promoting digital inclusion and capacity planning for general practice; for national and local training bodies regarding the new skills staff need; and for primary care commissioners to secure the support needed for vulnerable patients to use digital services. Because patients vary in their ability to use remote and digital services, all services must have a range of services offered through different modalities (including in-person), a way of ascertaining patients' capabilities and preferences, and sufficient time, capacity and resources to provide a flexible service. Because low-income patients may have limited connectivity and data packages, remote and digital services should be designed to be readily accessible via entry-level and even outdated technologies. Because patients with multiple kinds of disadvantage (especially those living in deprived settings with complex health and social care needs) tend to be unable to benefit from digitalised services, in-person services may be a strategic priority in some 'Deep End' settings. Because human intermediation helps some but not all patients who are unable to access digitalised services unaided, and because it is costly and in limited supply, 'digital navigators' should be resourced but we should recognise that they are, at best, a partial solution to digital inequities.

Our findings on the challenges to quality in remote and digital general practice (over and above those to patient access) have the following implications. Because digitalisation (usually introduced with the aim of increasing efficiency) may generate unintended *inefficiencies* which can be potentially ironed out by careful attention to optimising tasks and processes, the ongoing work of embedding and optimisation needs to be prioritised and resourced. We return to this point below. Because remote encounters (especially text-based asynchronous ones) cannot provide the same level of human presence as a traditional in-person consultation, sufficient in-person appointment slots should be available to patients whose clinical or social needs require such presence. Because the high standard of patient safety that is currently achieved in general practice depends on staff initiative and creativity (e.g. 'workarounds'), staff should be supported and encouraged to take action as needed.

An additional element of quality is the safety implications of remote and digital care with implications of study findings for decision-makers in RCGP and Royal College of Nursing (RCN) in relation to both undergraduate and post-graduate clinical curricula and for training practice support staff who have a safety critical role in assessing and booking patients. There are also implications for national decision-makers working on incentives in the GP contract for quality, safety and continuity and for ICB

level digital primary care leads in supporting the design and implementation of safe digital services. Because rare safety incidents tend to be traced back to high workload, interruptions and stress among support staff, providing a calm, low-stress working environment and minimising interruptions is safety-critical. Because clinical factors in safety incidents include poor choice of modality, poor rapport-building, limited assessment and poor use of algorithms, clinicians should be specifically trained to use and sharpen their skills in the remote environment (including use of the telephone). Because there is now a strong and consistent evidence base on the kind of problems that make for unsafe remote consultations, all practice staff should know the main clinical conditions and trajectories that should be given an in-person appointment. Because continuity is (often though not always) a key component of quality, and because it is harder to achieve in a digitalised service, incentives and resources should be allocated to ensuring that continuity is provided to patients who need it. As digitalisation and distributed work become the norm in many practices, it is important to ensure that there is a shared and documented knowledge of patients' clinical needs, capabilities, vulnerabilities and what is at stake for them. Because long-term condition management includes components that cannot be safely undertaken remotely, and because information gathered on remote platforms may not give an accurate or complete picture of patients' health status, some in-person capacity must be provided for long-term condition monitoring. With a growing body of research on remote consultations, the time is right to convene a national expert group to optimise digital assessment and triage pathways and update guidance on quality and safety in remote services.

The implications in relation to staff relate both to national bodies charged with training curricula (i.e. NHS England, RCGP, General Medical Council, RCN and others) and to local decision-makers in relation designing digital services in ways that optimising staff well-being and minimise technostress. For trainee GPs and practice nurses, the core curriculum needs to include remote consultation skills such as communication and rapport building in digital consultations and safeguarding assessment. Because learning how to provide remote and digital services is as much about shared information spaces and workflows and 'system knowledge' as it is about knowing how to operate particular technologies, on-the-job and team training is essential. Because training needs are many and often unmet currently, and because both support staff and clinical trainees often describe themselves as undertrained and underconfident, additional incentives and resources need to be provided for staff training. The NHS in England and Scotland could consider scaling the model used by health boards in Wales, whereby practices are granted funding to provide practice-wide, all-staff learning days, enabling multidisciplinary teams to train together.

Because many staff are part-time or newly appointed, training courses which are flexible and modular are essential to ensure that all staff can access them. Because staff at different grades and levels of experience have different roles and training needs, all key roles should be linked to explicit competencies and training arranged accordingly. Outline competencies for clinical and support staff are given in *Appendix 1*, *Table 4*. The Department of Health and Social Care and NHS England could consider trialling a national training programme for reception staff, for example adapted from the 3-year training provided for clinic assistants in the Netherlands.[130] Finally, because digitalisation increases pressure on support staff (with burnout occurring not uncommonly), and because effective and safe services depend on harmonious teamwork, urgent attention should be paid to recruiting, valuing, retaining and supporting staff of all grades.

We suggest the following implications for supporting the innovation and routinisation process in general practice. Because technologies are not plug-and-play (digitalisation requires extensive redesign), because primary care services are currently under severe strain, and because technologies that are not optimised into workflows can generate inefficiencies, ringfenced investment is urgently needed in ICB digital primary care budgets for digital transformation in general practice – not just to purchase technologies but to help practices assimilate, embed and sustain them.

Furthermore, because practices are at different stages of digital maturity, support should be tailored accordingly. Practices serving multiply disadvantaged communities who have chosen to prioritise in-person services ('strategically traditional') need affirmation and support for this traditional model plus resources to ensure that basic digital tools and infrastructure (especially the telephone) are dependable and optimised. Practices lacking the material, technical, financial and human preconditions for digital innovation ('digitally hesitant') may need significant support to get to the stage where they can identify, introduce, routinise and evaluate digital innovations. Practices which are already introducing digital innovations but in a somewhat unsystematic way ('digitally reactive') may need help to achieve a more co-ordinated and strategic approach. In England, there is a clear role for Integrated Care System Digital First teams and PCN digital care leads to support practices to implement all the above effectively. The need for

this support to practices is recognised in NHS England's Delivery Plan for Recovering Access to Primary Care, but there is a risk practices may not be adequately resourced to support a digitally enabled, whole practice team approach to improving access and triage for patients.

Practices that have reached the ability to take such an approach ('digitally strategic') should be supported to identify, obtain, trial and routinise the technologies they need to achieve their vision and meet the needs of their population. Digitally advanced and innovative ('trailblazer') practices may inspire and support other practices but since they often serve a predominantly digitally enabled population, they should not be used as a blueprint. Policy-makers should not confuse the 'technology-light' digitally strategic practice (which is cautious about certain technologies and pathways for good reasons) with the digitally hesitant practice and should be careful not to stigmatise the practice which chooses strategic de-digitalisation. Because larger practices tend to have more slack resources and higher absorptive capacity (e.g. in-house technologies and know-how, horizon-scanning capability), additional support may be needed for smaller practices, which (in general but not invariably) tend to be less digitally advanced.

Implications around technologies and infrastructure include the following. Because novel technologies are only part of the digital transformation challenge and because the context for innovation is currently suboptimal, policy-makers should look beyond new technologies and seek to optimise the preconditions for innovation within practices and externally to them. For example, because standardised and top-down procurement arrangements can stifle innovation, these should be made more flexible and negotiable. Because the range of available technologies is vast and confusing, guidance and mentorship should be available to practices seeking to identify and select technologies. Because new technologies will not work if introduced into practices that lack the capacity to assimilate, embed, adapt and evaluate them, funding is urgently needed to strengthen the material, human and technological infrastructure for remote and digital general practice. And because the picture is dynamic, and especially because the 'AI revolution' is generating novel technologies with the promise of transforming services, it is even more urgent to ensure that practices have a basic level of infrastructure and in-house knowledge and capability, and that they are supported in an ongoing way to meet the future.

In sum, there is a need to ensure that a proportion of the £3.4B currently earmarked for digital infrastructure in the NHS[131] is allocated to infrastructural strengthening in general practice, including developing the installed base, attending to regulatory levers and incentives, and significantly boosting the capability and confidence of staff. In sum, there is a need to ensure that a proportion of the £3.4B currently earmarked for digital infrastructure and improving productivity in the NHS[131] is allocated to infrastructural strengthening in general practice, including developing the installed base, attending to regulatory levers and incentives, and significantly boosting the capability and confidence of staff. Crucially, national strategies for digital transformation need to shift focus from the development and implementation of particular technologies towards supporting ongoing system-wide improvement, maintenance and integration. Distributed control over different elements of infrastructure demands concerted and collective approaches to improvement, and the mobilisation of existing resources and expertise. This is likely to be mostly about incremental development, building on existing infrastructure, rather than large-scale, big-bang rapid transformation – and hence needs attention over the longer term.

Recommendations for future research

Our findings have gone a long way to answer the original research questions posed in the RBD2 study and have generated some important new questions on key topics. We consider some of those below (these topic suggestions are not intended to be comprehensive).

Informing and communicating with patients

The RBD2 study revealed widespread confusion among patients in relation to the options for seeking and receiving health care from their GP surgery. System knowledge in particular was limited – most patients lacked awareness of current services offered by their practice; many had no idea how to navigate these services or what other services or routes they might be channelled to. We worked with a design company to generate materials and resources (both digital and paper based, and in different ethnic languages) to begin to address this need. But we believe there is a continuing need for better signposting and information to help patients navigate the complexities of the digital NHS. Signage in many NHS organisations is clear and consistent (every emergency department in the country, e.g. has the same signs, in the same font, same colours, with the same meaning). There is a piece of design work to be done to bring a similar level of clarity and consistency to the 'signage' of digital services. This work should include advice on how

to select an appropriate modality and actions to take if conditions deteriorate.

Theory-driven ways to mitigate digital inequities in the most disadvantaged

We believe that one of the most important outputs from this study has been a significant contribution to the theoretical literature on digital inequity. Dakin *et al.*'s work on digital candidacy introduces the novel concept of the digital facsimile – the idea that the patient seeking access to care now needs to create an accurate, complete and persuasive version of themselves on the electronic record.[63] In contrast to traditional candidacy theory, in which the negotiation of a person's candidacy for care occurs synchronously and directly with a human being (e.g. a receptionist or triage nurse), the negotiation of candidacy in the digital world involves 'gaming' an algorithm and crafting pull-down menus and other digital tools to generate the facsimile which a human (or conceivably, a technology) will subsequently assess for eligibility. While the idea of digital candidacy and the digital facsimile are appealing, we did not actually study these facsimiles directly. There is scope for further research to examine the material and rhetorical properties of such facsimiles and explore *why* those submitted by disadvantaged patients may result in them being deprioritised or routed inappropriately.

Rybczynska-Bunt *et al.*'s work on fractured reflexivity is also theoretically novel and ripe for further empirical application, especially in relation to the finding that people with multiple axes of disadvantage are at very high risk of digital exclusion.[66] Scambler has depicted fractured reflexivity has been depicted as a neglected social determinant of health.[65] Extending Archer's original typology, he describes some fractured reflexives as characterised by 'disconnected fatalism', which includes a tendency to engage in habits and behaviours that are injurious to health and to underuse health and social services. In our published paper, we have applied these ideas to a sample of multiply disadvantaged patients (including social disadvantage, drug use and neurocognitive impairments) who were participants in our RBD2 study. Our analysis illustrated how maladaptive behaviours (such as impulsively putting the phone down or getting into altercations with receptionists) emerge in such patients. In general, this group did not benefit much from digital navigator support. This work could be extended by developing interventions (perhaps using a codesign approach) to better meet the needs of these complex patients.

We have begun to show how an intersectionality approach might bring together multiple intersecting axes of disadvantage in the study of digital inequities – for example, in considering how to provide for people who are elderly, poor, with limited English, low health literacy, low system literacy, digitally ill-equipped and unskilled, and with past experience of perceived racism and discrimination.[19] Intersectionality theory, which originated in critical race theory and feminism, takes as its starting point that these multiple axes combine in any one individual to produce a single, unique identity.[132] Husain has begun to show how the use of composite case narratives and personas (i.e. fictional profiles that represent key user segments and are designed to humanise the technology design process[133]) could capture these complexities in a way that allows provider organisations to reflect and re[design] services around their needs.[71] However, the literature suggests that personas can also have a negative effect of reinforcing and activating stereotypes and – worse – ensuring that these stereotypes become 'baked in' to the design of digital technologies and services.[134] There is scope for a programme of research into how to optimise the codesign and sensitive use of personas in shaping patient-centred health services, perhaps with a particular focus on ethnic and racial minorities.[134] There is scope for a programme of research into how to optimise the co-design and sensitive use of personas in shaping patient-centred health services, perhaps with a particular focus on ethnic and racial minorities.

System-wide partnerships for digital innovation in primary care

The longitudinal and collaborative components of the RBD2 study highlighted the importance of building and harnessing inter-organisational and inter-sectoral partnerships in order to facilitate the implementation and use of technology and to address infrastructural constraints. It is important to consider how national policy can facilitate trusted partnerships and knowledge transfer pathways, including investment into formal and centrally co-ordinated activities alongside informal and locally driven initiatives and networks. There is a substantial literature on the role of intersectoral partnerships in driving forward large-scale innovation in the healthcare sector, most of which emphasises the role of the private sector.[56,135–137] A smaller literature, to which the RBD2 team are contributing, warns against commercially focused 'utopian' visions and instead emphasises the crucial role of the state in creating a digital economy that is primarily oriented to delivering universal healthcare and digital services to all as a human right and a public good.[128] A recent review concluded that 'the dynamics of translation, which results in new technologies, are complex, transdisciplinary, inter-institutional, systemic, and non-linear'.[136] While it is already known (and confirmed by this

study) that such networks are important in the innovation process, we know remarkably little about how such networks should best be designed and facilitated for the specific challenge of strengthening the infrastructure of primary care and promoting digital innovation.[128] A recent review concluded that 'the dynamics of translation, which results in new technologies, are complex, transdisciplinary, inter-institutional, systemic, and non-linear'.[136] While it is already known (and confirmed by this study) that such networks are important in the innovation process, we know remarkably little about how such networks should best be designed and facilitated for the specific challenge of strengthening the infrastructure of primary care and promoting digital innovation. A programme of research on this topic would be timely.

After the teleconsultation

A key finding from this study was that workflows need to change to maximise the potential of remote and digital technologies. The patient with a possible urinary tract infection, following a telephone consultation and urine test, needs to pick up a prescription for antibiotics. The patient who has had a telephone consultation for asthma monitoring may be identified as needing input on inhaler technique – something that could be provided by an educational video. A patient with chronic chest disease with an acute exacerbation may be invited to monitor their oxygen levels at home and send in the readings. The parent who has had a telephone consultation for a febrile child needs safety-netting instructions in case the child deteriorates.

In all these situations, something – a prescription, a link to an online video, a set of biomarker readings, a set of instructions – is being sent to or from the patient *after* the teleconsultation. There is limited research on what happens to these various links and artefacts, or why (in some cases) patients fail to take them up as expected or find them helpful. Optimising the workflows and transfer of materials for these post-teleconsultation follow-on activities, and exploring inequities in their uptake and use, is an under-researched aspect of remote general practice services. Both quantitative studies (to ascertain patterns of use) and qualitative ones (to seek explanations for variation in these patterns) are needed. More broadly, more thought needs to go into optimising 'post-consultation infrastructure' for transfer of data and supporting follow-up, and into identifying and addressing inequities in the post-consultation phase.

Workforce support

Another key finding in the RBD2 study was that both clinical and administrative staff experienced job dissatisfaction, worsened well-being and a sense of misalignment with professional identity and values. We extended Gill's original theory of workplace suffering[85] with sociotechnical theories to produce a novel theory of technostress, and are currently exploring how staff who are stressed and burnt out from the demands of digitalisation have difficulty forming the positive workplace relationships on which effective multidisciplinary teamwork depends (paper in preparation). There is an important set of research questions to be addressed around how best to reduce technostress and workplace suffering. Related to this, published and upcoming work highlights the value of relational approaches to work in general practice, particularly during periods of crisis, change and innovation, and the need to improve relational co-ordination among practice staff. To understand how to improve relational competencies in GP teams, we need to better understand the preconditions for developing relational workplaces, how they can be embedded, and what can trigger their erosion.

Green agenda

An aspect of remote care which we had intended to explore was its role in contributing to the 'green agenda' of reducing the carbon footprint of the NHS. There is an expanding and hopeful literature on this topic,[127,138–140] but almost no evidence from a primary care setting. In the RBD2 study, we asked practice staff about the green agenda, but we did not identify any examples of this agenda driving (or even explicitly influencing) digitalisation strategy in general practice. Since patients tend to live near their GP surgery, published estimates of energy savings are likely to be an overestimate. A focused research study could examine in more detail whether a major shift away from in-person care could make a significant contribution to the carbon footprint of the NHS – and also what the trade-offs of such an achievement (e.g. in terms of possible double-handling or increased prescriptions or investigations) might be. As the drive for digitalisation and use of AI progresses in primary care, and the NHS more widely, there will inevitably be questions about the environmental impact of such technologies, not only in terms of carbon emissions but also impact on communities and resources (e.g. water use). Research in this field could examine how and where best to focus digitalisation efforts in primary care while at the same time achieving a net zero health service.[141]

Remote links between general practice and other providers

Based on reviewers' comments on an earlier draft of this paper, we agree that another priority area for future research should be how to optimise remote and digital

links between general practice and other providers, including (but not limited to) secondary care, community mental health services, nursing and care homes, hospices, social services, hostels and prisons. The RBD2 study was not designed to explore any of these links in detail but they are of course essential to an effective and safe local health and care system.

Conclusions

The RBD2 study picked up the story of remote and digital care in UK general practice following a period of disruptive innovation (the rapid introduction of remote services as a pandemic response) and followed that story from September 2021 to December 2023. Empirically, this was an opportunity to look at variation in the continued assimilation, embedding, adaptation and (in some cases) abandonment of remote and digital technologies, in a diverse sample of 12 practices, as they moved to the 'new normal' of hybrid provision, and to capture the experience of patients and staff. Theoretically, it was an opportunity to develop and extend theory on important elements of primary health care in the digital age, including digital inequity, continuity, safety, competence, workforce well-being, team relations and the wider context (including infrastructure and the market for digital technologies).

We have produced important take-home messages on the patient experience, the challenges of quality care (including equity, safety, continuity, effectiveness and efficiency) in contemporary general practice, and the training and well-being needs of staff. Of particular note is our finding that while all patients deserve the option of remote and digital care where appropriate (hence, such services need to be designed to be accessible from basic 'entry level' digital technologies and by people with limited digital and health literacy), patients with multiple axes of disadvantage (e.g. complex health and social care needs) may have severe and intractable difficulties accessing services. For complex reasons, such patients can repeatedly find the practice's 'digital front door' closed in their face – a problem for which there are no easy solutions. We have offered a deeper theorisation of the challenges of digital inequity and proposed a rethink of empirical solutions.

We have also produced a unique and rich ethnography of the process of embedding and adapting remote and digital services in the busy and dynamic setting of UK general practice. Our findings that this embedding process is labour-intensive and ongoing, that staff are currently undertrained and underconfident to deliver a digital-by-default service, and that infrastructure is weak (sometimes precariously so) have mission-critical implications for the funding of digital transformation of general practice. We believe that a proportion of recently announced resources for digital transformation of the NHS[131] must be urgently allocated not just to purchasing new technologies but to strengthening the installed base of general practice, retaining and training staff, and the work of continually adapting and transforming work processes and pathways to maximise the value of existing and new technologies. We believe that a proportion of recently announced resources for digital transformation of the NHS[131] must be urgently allocated not just to purchasing new technologies but also to strengthening the installed base of general practice, retaining and training staff, and the work of continually adapting and transforming work processes and pathways to maximise the value of existing and new technologies. The picture is dynamic and the looming opportunities and threats of the AI revolution make the need for this investment all the more imperative.

The study raised challenges in how to involve patients and the lay public, since a fully in-person PPI group was impractical in a UK-wide study, but an online PPI group would necessarily be skewed towards the digitally enabled. The combination of a 'buddying' scheme in which PPI group members linked with less digitally enabled friends or relatives and the recruitment of a lay panel from a hostel for socially disadvantaged people with complex needs produced some much-needed balance to our PPI input. The second patient panel was particularly helpful in helping us to analyse data on digitally excluded patients and producing credible composite narratives that reflected the experiences of, for example, homeless, struggling and drug-addicted patients trying to access care.

We were fortunate to partner with a policy think tank, The Nuffield Trust, whose members are co-applicants (RR) on the grant and coauthors (RR, Nina Hemmings) on our outputs. Nuffield Trust's long experience working at the policy interface enabled us to reach a national policy audience and remain engaged with them and other stakeholders throughout and beyond the funding period.

On the basis of our findings, and cognisant of other research in this space, we offered six priority areas for future research: first, further studies (e.g. from the design perspective) of how to improve information and signposting for patients attempting to navigate remote and digital services; second, continuing theory-driven research on the needs of the multiply disadvantaged

and digitally excluded patient; third, research into how to develop and evaluate system-wide partnerships for developing the complex knowledge and transformation impetus for primary care digital transformation; fourth, studies of the nature of patients' needs (in terms of investigations, medication, follow-up monitoring and safety-netting) *after* a remote consultation and how these needs might be met; fifth, studies informed by theories of workplace well-being and team dynamics of how best to train and support the workforce; and finally, focused studies of how remote and digital general practice might better interface with the 'green agenda' in health care.

Additional information

CRediT contribution statement

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This synopsis should be referenced as follows:
Greenhalgh T, Nishio AA, Clarke A, Byng R, Dakin F, Faulkner S, *et al.* Remote and digital services in UK general practice 2021–2023: the Remote by Default 2 longitudinal qualitative study synopsis. *Health Soc Care Deliv Res* 2025;**13**(31):1–50. https://doi.org/10.3310/QQTT4411

Joseph Wherton (https://orcid.org/0000-0001-7701-4783): Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – reviewing and editing.

Patient data statement

No direct patient data are reported in this paper.

Data-sharing statement

Raw data from this qualitative study are not publicly available because of participant and practice confidentiality agreements. However, bona fide researchers with appropriate ethics approvals may apply to the lead author to discuss sharing of selected extracts.

Ethics statement

Full details of ethics and governance are given in the protocol[95] and baseline findings[11] papers. Briefly, the study was sponsored by the University of Oxford and had approval from East Midlands—Leicester South NHS Research Ethics Committee and UK Health Research Authority (September 2021, 21/EM/0170) and subsequent amendments.

Information governance statement

This study followed standard university guidelines on 'Privacy by Design'. The project, methods data collection and storage strategy were reviewed by the Information Governance team (https://compliance.web.ox.ac.uk/individual-rights). The members of our research team analysed the data and have written some papers and reports, including a summary written for the general public (i.e. a lay summary). Our findings will continue to be published and available through journal publications. Participants will not be identified from any report or publication placed in the public domain. We may use de-identified quotes from interviews, observations or our notes in a conference presentation or teaching session. We will keep identifiable information about you including names, home address and telephone number – for 12 months after the study has finished. All interview recordings will be destroyed at the end of the study.

Research documents with personal information, such as consent forms, and copies of the interview text will be held securely at the University of Oxford for 15 years after the end of the study.

The University of Oxford is committed to handling all personal information in line with the UK Data Protection Act (2018) and the General Data Protection Regulation (EU GDPR) 2016/679.

Under the Data Protection legislation, University of Oxford is the Data Controller, and you can find out more about how we handle personal data, including how to exercise your individual rights and the contact details for our Data Protection Officer here: www.ox.ac.uk/privacy-policy.

Disclosure of interests

Full disclosure of interests: Completed ICMJE forms for all authors, including all related interests, are available in the toolkit on the NIHR Journals Library report publication page at https://doi.org/10.3310/QQTT4411.

Primary conflicts of interest: Trisha Greenhalgh is a member of Independent SAGE. Anica Alvarez Nishio is a lay Vice Chair of NICE Quality Standards Committee. She received consulting fees from the University of Oxford from 2023 and the University of Kent from 2024, and honoraria for lectures from the University of Kent (2019–25) and University of Liverpool from 2022 to 2025. She has received travel reimbursement from the Veterans Advice and Pensions Committee at the Ministry of Defence (2020–5). She sat on Thames Valley Policing Data Ethics Panel (2020–5). She was Vice Chair of NICE Quality and Safety Advisory Committee (2020–5), sat on NIHR Programme Grants for Applied Research panel (2019–25), and was President of Yale Club of London (2024–5). Richard Byng is a member of the Health Technology Assessment Prioritization Committee A (2022–5). Nina Hemmings is a Trustee at HSR UK. Rebecca Payne has received funding from NHS 111 Wales and an Honorarium from Management in Practice for a lecture; she is Chair of the NICE Quality Standards Committee (2022–5) and was a member of a technology appraisal panel (2021–4). She was previously a national professional adviser to the Care Quality Commission (2017–22). Sara E Shaw has received consultancy income from Ipsos Mori UK and honoraria from CRUK. She holds research grants from NIHR School for Primary Care Research (FR4 Project 594), NIHR Programme Grant for Applied Research RP-PG-0218-20001 and linked NIHR Programme Development Grant NIHR207604. NIHR Public Health Research Programme NIHR169828, and UKRI Medical Research Council/ESRC. Trisha Greenhalgh, Sara E Shaw and Richard Byng have received NIHR funding for previous research. Sietse Wieringa is on the advisory committee of UpToDate and on the Dutch Royal College of GPs Council. All other authors declare no conflicts of interest.

Department of Health and Social Care disclaimer

This publication presents independent research commissioned by the National Institute for Health and Care Research (NIHR). The views and opinions expressed by authors in this publication are those of the authors and do not necessarily reflect those of the NHS, the NIHR, MRC, NIHR Coordinating Centre, the Health and Social Care Delivery Research programme or the Department of Health and Social Care.

This synopsis was published based on current knowledge at the time and date of publication. NIHR is committed to being inclusive and will continually monitor best practice and guidance in relation to terminology and language to ensure that we remain relevant to our stakeholders.

Publications

Academic publications – empirical research

Greenhalgh T, Shaw SE, Alvarez Nishio A, Byng R, Clarke A, Dakin F, *et al.* Remote care in UK general practice: baseline data on 11 case studies. NIHR *Open Res* 2022;**2**:47.

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Policy briefing from Nuffield Trust

Getting the Best Out of the New World of Remote and Digital General Practice. Nuffield Trust, April 2024 (prepared for Parliamentary Briefing). www.nuffieldtrust.org.uk/sites/default/files/2024-04/RBD%202024%20event%20briefing_WEB%20%281%29.pdf

Blogs and web resources

Main RBD2 Study Website which includes research team, external advisory group and will house all of the publicly available resources to date.

www.phc.ox.ac.uk/research/groups-and-centres/interdisciplinary-research-in-health-sciences/remote-by-default-2/

Blogs and press releases (Nuffield Trust)

www.nuffieldtrust.org.uk/news-item/overhaul-of-training-needed-to-support-general-practice-staff-to-provide-remote-health-care

www.nuffieldtrust.org.uk/news-item/clinicians-practices-and-patients-all-have-a-part-to-play-in-dealing-with-risks-of-remote-consulting-new-study-reveals

www.nuffieldtrust.org.uk/research/getting-the-best-out-of-remote-consulting-in-general-practice-practical-challenges-and-policy-opportunities

Conference presentations and keynote lectures based on RBD2 findings

Greenhalgh T. *How New Technologies Could Be Used to Reduce Inequalities (But Usually Aren't)*. Keynote lecture, Nordic Congress of General Practice, Stavanger, Norway, June 2022.

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Funding

This synopsis presents independent research funded by the National Institute for Health and Care Research (NIHR) Health and Social Care Delivery Research programme as award number NIHR132807.

This synopsis provides an overview of the research award *Remote by Default 2: the 'new normal'?* For other articles from this thread and for more information about this research, please view the award page www.fundingawards.nihr.ac.uk/award/NIHR132807.

About this synopsis

The contractual start date for this research was in September 2021. This article began editorial review in July 2024 and was accepted for publication in March 2025. The authors have been wholly responsible for all data collection, analysis and interpretation, and for writing up their work. The Health and Social Care Delivery Research editors and publisher have tried to ensure the accuracy of the authors' article and would like to thank the reviewers for their constructive comments on the draft document. However, they do not accept liability for damages or losses arising from material published in this article.

List of abbreviations

AI	artificial intelligence
CQC	Care Quality Commission
EAG	External Advisory Group
GP	general practitioner
ICB	Integrated Care Board

IRIHS	Interdisciplinary Research In Health Sciences
NIHR	National Institute for Health and Care Research
PCN	Primary Care Network
PPI	patient and public involvement
RBD2	Remote by Default 2
RCGP	Royal College of General Practitioners
RCN	Royal College of Nursing
WHO	World Health Organization

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Appendix 1

TABLE 2 Summary of data sources, contribution to the study and caveats

Source, type of data, dates	Description of data set	Contribution and caveats of this data source
Multisite longitudinal case study of remote care in general practice (September 2021–December 2023)[95]	Twelve general practices (eight in England, two in Wales, two in Scotland) followed for 30 months. Five hundred hours of ethnography. Interviews with practice staff (*n* = 124) and patients (*n* = 31); practice documents (e.g. annual reports, websites, leaflets). Interviews with eight staff in linked local organisations (e.g. homeless hostels, refugee charities, care home).	In-depth ethnographic and interview material providing rich insights into the functioning and priorities of modern UK general practice, covering a key 28-month period as practices transitioned to the 'new normal' of hybrid provision. While the sample was diverse, it was relatively small and not statistically representative.
Online reviews by patients (2021–3)	Two hundred and nine online patient reviews from the eight practices in our sample from England, hosted on NHS practice websites (comparable data were not available in Wales or Scotland).	Unedited data set containing patient opinion and experiences of care. Unverifiable; may be biased towards poor experiences.
Stakeholder interviews (2021–3)[95]	Stakeholders (*n* = 39). Thirty-one were in health roles at national and local level in England, Wales and Scotland sampled from policy (arm's length bodies, government, health boards), industry, training providers and patient advocacy. Eight were in social care roles.	'Birds eye view' provided by senior stakeholders and experts from across the UK, main emphasis on policy-makers but also includes other sectors. Skewed towards views of senior national stakeholders.
Four multi-sector workshops (held online)	Intensive 2-hour workshops with clinicians, national clinical leads, representatives from arm's-length bodies, practice staff and lay people (total 184 participants). Plenaries and breakout groups recorded on video and transcribed.	Diverse and nuanced discussions among a large number of participants from various sectors. Breakout groups facilitated the capture of a wide range of perspectives. While many and diverse views were captured, some groups were not represented.
Official publications relevant to quality of care in UK general practice	Includes reports from English Care Quality Commission,[98,97] Healthcare Safety Investigations Body[27] and GP Patient Survey for England[99] (see our quality paper)[100] and GP Patient Survey for England[99] (see our quality paper[100] for further details); plus various training materials and resources for remote consultations (see our training paper for details[82]).	Data gathered from a wide range of inspection activity and internally validated by CQC. Limited to England. Data relate to areas of interest to each body; they were collected for a particular purpose (e.g. regulation and formal monitoring).
Supplementary data set 1: Interviews with GP trainers and trainees (2022–3)[82]	Ten GP trainers and 10 GP trainees, interviewed about how the shift to remote and digital provision affected training.	Concerns of trainees and trainers about adequacy of training in absence of in-person opportunities, and perceived impact on confidence and quality of care.
Supplementary data set 2: Safety incidents reported to official bodies	Ninety-five actual or near-miss incidents involving remote or digital care in primary care, drawn from NHS Resolution, NHS111, health boards and ambulance reports (see our safety paper for details[30]).	Skewed sample of rare cases involving serious harm. Not sampled from our participating practices (who reported no safety incidents over our study period, hence our decision to cast a wider net).
Supplementary data set 3: Patients with complex health and social care needs	Field notes from visits to two additional Deep End practices (including observing reception and a morning surgery in each); nine narrative interviews with Deep End GPs; five interviews with patients.	Small sample. Deliberate sampling of practices in multiply disadvantaged settings (e.g. high rates of homelessness and drug abuse) may mean that findings do not reflect patients with less complex kinds of disadvantage (e.g. poverty without other social factors).
Supplementary data set 4: Elderly first-generation immigrants from disadvantaged backgrounds	In-depth case studies of 17 patients (interviews and home visits by multilingual PhD student); focus groups with patients, patient advocates and staff (*n* = 12).	Small sample recruited from one remote community health project in one locality, with three languages represented, hence generalisability limited.
Supplementary data set 5: UK press coverage of safety aspects of remote and digital general practice 2021–2	Fifty-seven press particles published in 2021–2 covering stories about patient safety in telephone or video consultations.	Stories mostly unverifiable and skewed towards reportable events (e.g. harms, deaths). However, gives a good indication of how the press addressed the issue.

TABLE 3 Typology of general practices in relation to digital innovation

Type	Support needs and strategic contribution
1. Digital trailblazer (Towerhill) Being innovative and digitally advanced is a core part of the practice's ethos and identity. Characterised by very high absorptive capacity (i.e. in-house human and technical infrastructure strongly geared to capturing innovations, bringing them into the practice and making them work) and close alignment with national digital technology policy. Digital technologies are quickly piloted and (if successful) smoothly routinised through advanced processes for monitoring their impacts, learning and adjusting accordingly. The emphasis is typically on efficiency (e.g. prompt waiting times). Staff may include digital entrepreneurs who work to develop, source and adapt digital technologies and support wider uptake of these locally and nationally. Trailblazer practices tend to be sited in relatively affluent areas and serve a demographic who are able to benefit from remote and digital services. They are often system-oriented, active at local or regional level to support and drive innovation and procurement across a network. The needs of less digitally enabled patients tend to be met by bespoke arrangements and workarounds.	Trailblazer practices could serve as 'sentinel' or 'beacon' sites to inform policy-makers and horizon scanners of novel digital technologies and illustrate how to optimise the use of these in innovative processes and pathways. Their entrepreneurial ethos and values may help forge links with commercial suppliers (though there needs to be attention to regulation and if there are commercial conflicts of interest). Their system orientation means they are often important strategic partners in locality-wide change efforts. Their enthusiasm for digital solutions means they may need reminding and incentivising to ensure that the needs of non-digitally enabled patients are identified and fully addressed.
2. Digitally strategic (Fernleigh, Camp St, River Rd, Easton, Newbrey) Typically large, well-resourced and with strong leadership and high absorptive capacity (i.e. meets key preconditions for organisational innovativeness). Digital technologies are readily identified, introduced and evaluated as part of a wider strategic vision but the practice does not pursue digital innovation as an end in itself. Rather, this is one of multiple strategic considerations; others may include responding to demographic changes, addressing the needs of particular vulnerable groups, mergers with other practices, ensuring staff comfort and well-being; teaching/training, and research. Ideas and plans for novel technologies and pathways are discussed in the context of wider strategic questions and (if approved) taken forward. Enthusiasm for particular digital innovations will vary depending on alignment with practice values and the needs of the patient population and practice staff. In some practices (e.g. where key subgroups are at risk of being disadvantaged), strategic decisions will tend to favour a relatively technology-light set-up. In others, the needs of digitally less confident patients may be addressed via human intermediaries like digital navigators.	Digitally strategic practices should be supported to identify, obtain, trial and routinise the technologies they need to achieve their strategic vision. One key role for policy-makers and commissioners is removing barriers to procurement so practices can source the 'right' technological solutions (and move on from the 'wrong' ones) promptly. Funding may be needed for intermediary roles. Digitally strategic practices can provide insights about the challenges of combining and juggling multiple strategic priorities. Policy-makers should not confuse the 'technology-light' digitally strategic practice (which is cautious about certain technologies and pathways for good reasons) with the digitally hesitant practice, and be careful not to stigmatise the practice which chooses strategic de-digitalisation.
3. Digitally reactive (Westerly, Queens Rd) The reactive practice is not in principle opposed to digital technologies and has no over-riding reason for not introducing them. Indeed, it may be keen to introduce them and actively experimenting. However, for various reasons, the practice is not yet digitally strategic. Rather, digital technologies tend to be introduced *reactively* and/or in a somewhat piecemeal way – for example as a 'fix' for an immediate problem (e.g. overwhelming patient demand) or to respond to a policy must-do. This practice may be relatively technologically advanced in some areas and achieve significant efficiency gains. But because decisions are mostly reactive, there is little sense that new technologies and pathways serve a clear practice mission. There may be a prevailing ethos of 'firefighting' and staff and patients may be dissatisfied with the overall service.	It is important to identify and address the underlying reason(s) why the practice is not taking a more strategic approach. Workload may be excessive and/or staffing and skill mix suboptimal. Leadership may be weak or resources inadequate, and there may be low agreement on strategic direction. There may be too little 'headspace' for reflection and planning. Policy incentives and must-dos may be (experienced as) perverse. Once the underlying reasons have been identified, solutions follow – for example, practice leaders may benefit from mentoring, attention to team relationships, or specific support (e.g. with business planning). Funding is likely to be needed for intermediary roles.

continued

TABLE 3 Typology of general practices in relation to digital innovation (*continued*)

Type	Support needs and strategic contribution
4. Digitally hesitant (Rhian) The hesitant practice generally lacks one or more key preconditions for organisational innovation. It may, for example, be smaller, less well-resourced or lacking strong leadership. It may also have limited absorptive capacity, with few or no staff able to horizon-scan; limited in-house technological knowledge and know-how; and weak processes in place to introduce and evaluate innovations. There may be strong traditional values (e.g. associating 'proper' medicine with in-person consultations). Negative experiences with attempting to introduce digital technologies in the past may have shaped current attitudes, making such efforts more likely to fail. This kind of practice tends to have few up-and-running digital services. Those that are in place may have been purchased at locality level and imposed, and may be experienced as clunky and stressful by staff who are neither confident nor adequately trained to get the most out of them. When new technologies are considered, these are usually at a relatively late stage of adoption (e.g. neighbouring practices have already introduced them), but the practice may still be uneasy about trying them out and be unsure as to how to go about this.	Policy-makers and commissioners should recognise digitally hesitant practices as needing significant organisational support to meet the preconditions for innovation, not merely help in introducing a particular digital technology. These practices may be struggling with technologies that are unfit for purpose because they were unable to identify or negotiate for their particular needs. Resources may be needed to optimise the existing technological set-up, train clinical and support staff, and provide protected time for team reflection and strategic planning. Local networks (e.g. ICBs) may be able to help with raising awareness of technological innovations and other opportunities locally. Networking events with (or visits to) practices at a more advanced stage of digital maturity may help build knowledge and confidence.
5. Strategically traditional (Range Park, Carleon, Ogden East) Typically, a small practice serving a less digitally equipped and digitally capable demographic. Key patient groups may have a strong preference for (and/or have needs that require) predominantly in-person services. These practices include (but are not limited to) Deep End practices serving deprived communities with complex health and social care needs, including major social challenges and drug/alcohol use. Other vulnerable groups include those living precariously (perhaps moving home and changing practice frequently), homeless, refugees and other displaced people, people with learning difficulties, and elderly people who lack family or social support for technology use. These practices may make selected use of digital technologies (e.g. for back-office functions or to allow some patients to order prescriptions online) but are careful to prioritise in-person services for those with greatest need.	Policy-makers should acknowledge that in the context of profound socioeconomic hardship, digitalisation may worsen inequities and put vulnerable groups at risk. They should support practices serving such populations to provide a traditional, 'in person by default' service, including ensuring that basic technologies such as telephony systems are fit for purpose and have adequate capacity. Policy-makers should encourage and support such practices to maximise the use of digital solutions for back-office (non-patient-facing) functions and maximise the opportunities for low-tech digital tools (e.g. text messaging). They should not assume that strategically traditional practices are digital laggards, nor that human intermediation ('digital navigators') can fully overcome the effects of multiple disadvantage on access to services.

Source: Adapted from Greenhalgh *et al.*[58]

TABLE 4 Outline competencies and capabilities for staff providing remote and digital general practice services

Staff group	Domains and example content
Clinical students and novice trainees	Basic descriptive knowledge (e.g. ...) • Describe the different kinds of remote consultation (e.g. telephone, video, electronic) • Describe the elements of a clinically adequate, appropriate and safe remote encounter Technical knowledge and skills (e.g. ...) • Make contact with a patient using remote technology including video, telephone and asynchronous electronic (e-)communication, including test calls where appropriate • Describe technical and logistical issues arising within these different modalities • Outline potential harmful impacts of a 'failed' digital encounter (e.g. due to loss of signal) Triage skills (e.g. ...) • Explain why triage to allocate patients to different kinds of encounter may be needed • Identify patients suitable (and unsuitable) for different kinds of remote encounter (e.g. telephone, video and e-consultation, SMS messaging, e-mail, answerphone messages) Knowledge of ethics and governance (e.g. ...) • Describe the consent process for a video or telephone consultation • Discuss ethical issues (e.g. confidentiality, data handling and storage, safeguarding, digital exclusion) relevant to different kinds of remote encounter Communication and clinical skills (e.g. ...) • Explain why it is important to establish rapport in a remote encounter • Demonstrate attunement to the patient and their environment in a remote encounter, noticing and responding to cues within the limits of the modality • Demonstrate establishment of rapport in a remote encounter • Adapt method and style of communication appropriately to the remote modality • Take a detailed and careful history, given that clinical examination and non-verbal cues will be limited • Elicit symptoms and signs, including explaining concepts and giving instructions so as to gather information without being able to directly examine or fully observe the patient • Assess and interpret visual physical signs by video, or as described on the telephone, with appropriate caution • Explain the importance and principles of safety-netting in remote encounters • When undertaking remote or digital encounters, identify situations where there is a risk to patient safety and describe appropriate mitigative action (e.g. ask about relevant red flag symptoms, invite for face-to-face assessment, escalate to senior colleague) • Communicate appropriate safety-netting procedures in clinical cases in different remote modalities
Established clinicians	In addition to demonstrating a high level of competence in all the above: Advanced technical knowledge and skills (e.g. ...) • Remain up to date on new and emerging technologies to support remote encounters - Adopt, select and use a range of technologies to support remote encounters, including traditional (e.g. telephone) and digital modalities • Demonstrate a sophisticated understanding of how particular remote and digital technologies fit with workflows and routines across their own organisation • Use remote and digital technologies to help achieve team-based multi-professional care in a multimodal care environment (e.g. through continuity of record-keeping for episodes of illness) • Be aware of how informational and managerial continuity are achieved between organisations, for example: pathways for electronic referrals, results and discharge or outpatient letters between primary and secondary care, and how breaches in continuity may occur • Know how to obtain technical help when troubleshooting fails Advanced triage capability (e.g. ...) • Work within the limits of remote technologies and care models, supporting patient choice as far as possible and knowing when to advise a patient that they need in-person assessment • Quickly and accurately identify patients who are sick and require physical assessment or more urgent care • In situations where in-person appointments are limited, prioritise patients for those slots • Make creative use of digital technologies to support the triage process and associated workflows

continued

TABLE 4 Outline competencies and capabilities for staff providing remote and digital general practice services (*continued*)

Staff group	Domains and example content
	Advanced communication and clinical capability (e.g. ...) • Build and maintain therapeutic relationships through remote modalities, conveying attentiveness and compassion to the patient • Practise appropriate telehealth etiquette, adapting to different patients' communication preferences and styles • Cope with minor technical glitches such as lag or crackle using linguistic techniques such as repetition and repair • Negotiate with patients who request a particular modality that does not align with clinical need or capacity constraints • Use advanced history-taking, questioning and probing skills, and elicit and interpret patient self-assessment data appropriately, to compensate for lack of in-person clinical assessment • Ensure that the clinician's full duty of care is realised in terms of responsibility for assessment, investigation and treatment, onward referral, outcomes and documentation • Show awareness of, and sensitivity to, specific groups that may be more vulnerable to miscommunications or misinterpretations in remote encounters, for example: older people, those with hearing impairments, those with learning disabilities, some neurodivergent people, some with emotionally unstable personality disorder, limited English speakers • Take action to mitigate inequities that arise from people's differential ability or willingness to use remote and digital modalities • When undertaking remote or digital encounters, consistently identify subtle clues that may indicate a risk to patient safety and take appropriate mitigative action Advanced knowledge in ethical, legal and regulatory domains (e.g. ...) • Ensure patient privacy and consent during remote assessments and data gathering, including where safeguarding issues are pertinent (such as possibly coercive relationships, children and teenagers, cognitive impairment, limited English proficiency) • Demonstrate a good working knowledge of when and how to pursue safeguarding concerns through local processes and safeguarding leads • Demonstrate understanding of relevant security and information governance rules and regulations • Demonstrate understanding of the legal limits of care provided across jurisdictions (e.g. national borders), and the implications for indemnity Digital implementation skills (e.g. ...) • Contribute to selection and procurement decisions for technologies to support remote and digital care • Contribute to the ongoing development and embedding of digital technologies in local settings, coadapting technologies and workflows and identifying potential design improvements • Develop and adapt remote and digital workflows and practices to optimise safety Supervisory, teaching and co-ordinating roles (e.g. ...) • Ensure appropriate supervision and support are in place where needed when trainees and allied health staff are involved • Motivate patients to try remote technologies; explain the 'rules of engagement' for remote encounters to them; and assist them to use and troubleshoot technologies in this context • Support and motivate fellow staff members to learn to use remote technologies • Manage scenarios where team members may be in different locations (e.g. learner is with patient vs. learner is with supervisor vs. none are colocated)
Strategic role (e.g. senior manager, clinical director)	System-level perspective on remote and digital service provision (e.g. ...) • Ensure that the organisation adopts a variety of information and communication technologies to deliver high-quality, safe, patient-centred care to diverse populations in a variety of settings • Work within the healthcare team and setting to ensure that remote encounters function well within a system or programme of care that has continuity and follow-up as needed • Monitor, evaluate and continuously improve the organisation's digital maturity and success in delivering remote and digital services • Proactively address digital disparities and the needs of excluded and underserved groups by providing multiple access options and care navigation as appropriate • Assess and address the multiple training needs of individual staff members and teams, including, but not limited to, the introduction of new digital technologies • Put systems in place to proactively identify and address safety issues arising from the remote delivery of care, working with technology suppliers, patients, regulators and others

TABLE 4 Outline competencies and capabilities for staff providing remote and digital general practice services (*continued*)

Staff group	Domains and example content
Support staff	Basic system knowledge (e.g. ...) • Describe the different modalities of patient encounter (triage or consultation) available in the practice • Outline the key remote and digital workflows for which their role is relevant Technical knowledge and skills (e.g. ...) • Be familiar with the remote and digital technologies associated with their role, including supporting patients to use these technologies • (Where appropriate, show and support other staff members to use these technologies) Triage skills (e.g. ...) • Explain why triage to allocate patients to different kinds of encounter may be needed • Gather information appropriately from patients and identify those suitable (and unsuitable) for different kinds of remote encounter (e.g. telephone, video and e-consultation, SMS messaging, e-mail, answerphone messages) • Be familiar with measures used in the practice to aid remote triage, for example: asking patients to send a photo of a skin complaint • Outline the principles of safety netting Communication skills (e.g. ...) • Use professional and 'customer care' approaches to communicate with patients remotely, conveying attentiveness and compassion • Be aware of the kinds of patients who may require support or flexibility with communication • Recognise the need to mitigate digital disparities • Deal effectively and sensitively with patients who are upset or insistent in a triage encounter Safety-critical clinical knowledge (e.g. ...) • Be aware of 'red flag' priority symptoms (e.g. bleeding, difficulty breathing) and the process for escalating these • Be aware of practice protocols for particular scenarios (e.g. young children, abdominal pain) and apply these during triage encounters

Note
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TABLE 5 Additional dissemination activities including press coverage

Activity	Date	Audience and reach	Output
Safety paper and training and workforce paper press releases run by Oxford and Nuffield Trust comms team ahead of publication	November and December 2023	Media monitoring run 22 January based on press release 'Remote by Default' media mentions Two hundred and seventy-one mentions across both papers Suggested reach: 78 m SAFETY PAPER: *Daily Telegraph* (p.1) *Daily Express* (online) *The Times* (Online) *MailOnline* *Daily Mirror* (online) *The Independent* *The National* *Evening Standard* (online) Sky News (Online) GB News website and Television BBC Radio 4 Today Programme ITV Online Commercial Radio websites (Heart/Gold/) PA Media news agency – syndicated to local newspaper websites. *National World* Wales Online *BNN People's Network* Health Management.org *Perspective Magazine* Mental Health Today My Science	Nuffield Trust press release Media interviews by Trisha Greenhalgh, RR and Rebecca Payne
NHS resolution quarterly newsletter based on safety and training paper findings	November and December 2023	Clinical and academic	NHS Resolution Quarterly newsletter
NHS resolution letter (summarising safety and education papers findings circulated to all English practices and the mailing list of Aneurin Bevan University Health Board)	17 February 2024	Clinical, ~10,000	
Society For Academic Primary Care quarterly newsletter publication of safety paper findings	January 2024	Clinical and academic	January newsletter for SAPC Quality and Safety Special Interest Group (SIG) – Safety paper highlighted with high Altmetric score 1481
Rebecca Payne presented key findings from Safety paper to NHSRNHS Resolution and the implications for primary care	11 March 2024	Clinical	

TABLE 5 Additional dissemination activities including press coverage (*continued*)

Activity	Date	Audience and reach	Output
Pulse magazine article based on training paper findings	December 2023	Healthcare professionals, academic, general public	Article published Pulsetoday article
Redmore Health created a patient-facing infographic based on safety paper and created PDF/ guide for *Table 2* for education paper	January–April 2024	Clinical leads and 650 GP practices	Assets (PDF and infographics) shared across Redmore practice social media managed service – 650 practices. Redmore Newsletter
Educational Competencies table sent to second biggest Welsh board (Aneurin Bevan UHB – Medical Directors Office)	January 2024	Clinical, education leaders	Subsequently forwarded onto Primary Care and Community Division, and out-of-hours GP leads in Wales – January 2024
GP journal club twitter discussion on safety paper Trisha Greenhalgh and Rebecca Payne leading twitter discussion	19 January 2024	Clinical, academic, general public, ~100 followed on the day	@gpjournalclub