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Quality framework for remote antenatal care: qualitative study with women, healthcare professionals and system-level stakeholders

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ABSTRACT

Background High-quality antenatal care is important for ensuring optimal birth outcomes and reducing risks of maternal and fetal mortality and morbidity. The COVID-19 pandemic disrupted the usual provision of antenatal care, with much care shifting to remote forms of provision. We aimed to characterise what quality would look like for remote antenatal care from the perspectives of those who use, provide and organise it.

Methods This UK-wide study involved interviews and an online survey inviting free-text responses with: those who were or had been pregnant since March 2020; maternity professionals and managers of maternity services and system-level stakeholders. Recruitment used network-based approaches, professional and community networks and purposively selected hospitals. Analysis of interview transcripts was based on the constant comparative method. Free-text survey responses were analysed using a coding framework developed by researchers.

Findings Participants included 106 pregnant women and 105 healthcare professionals and managers/stakeholders. Analysis enabled generation of a framework of the domains of quality that appear to be most relevant to stakeholders in remote antenatal care: efficiency and timeliness; effectiveness; safety; accessibility; equity and inclusion; person-centredness and choice and continuity. Participants reported that remote care was not straightforwardly positive or negative across these domains. Care that was more transactional in nature was identified as more suitable for remote modalities, but remote care was also seen as having potential to undermine important aspects of trusting relationships and continuity, to amplify or create new forms of structural inequality and to create possible risks to safety.

Conclusions This study offers a provisional framework that can help in structuring thinking, policy and practice. By outlining the range of domains relevant to remote antenatal care, this framework is likely to be of value in guiding policy, practice and research.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ The COVID-19 pandemic disrupted the usual provision of antenatal care, with much care shifting to remote forms of provision. Yet, research on remote antenatal care undertaken prior to 2020 is surprisingly limited.

WHAT THIS STUDY ADDS

⇒ This large UK qualitative study enabled the generation of a framework of the domains of quality that appear to be most relevant to stakeholders who use, provide and organise antenatal care remotely: efficiency and timeliness; effectiveness; safety; accessibility; equity and inclusion; person-centredness and choice and continuity.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE AND/OR POLICY

⇒ By offering a systematic way of structuring thinking about quality in remote antenatal care, this new maternity-specific framework can guide policy and practice. Our findings suggest that a hybrid model should be on offer, but one that has sufficient flexibility to accommodate the needs and priorities of different groups and that is highly sensitised to equity and inclusion.

INTRODUCTION

Accessed by around 750 000 women in the UK in 2019 alone,[1–3] antenatal care is crucial in improving birth outcomes and in reducing risks of maternal and fetal

mortality and morbidity.[4–7] Traditionally delivered face-to-face, antenatal care monitors the well-being of pregnant women, promotes healthy pregnancies, discusses options for care during pregnancy, labour and birth and offers a safe space to answer questions and provide reassurance. Those under the care of England's National Health Service are, in normal circumstances, offered 10 antenatal appointments in their first pregnancy or 7 if they have previously given birth, with care provided according to defined best practice.

Though antenatal care normally involves a defined schedule of professional consultations, the COVID-19 pandemic created powerful imperatives to reduce in-person contact as a means of infection control. From March 2020, remote antenatal consultations (receiving care via telephone or video platforms) were recommended where possible, steered by guidance that was revised and updated over time.[8] A survey of over 80 UK obstetric units conducted between May and July 2020 reported that almost 90% of the available antenatal appointments were being conducted remotely, indicating a major shift in the organisation and delivery of care.[9] Some evidence of reduced attendance at antenatal care appointments has since emerged.[10]

Recent policy developments have shown an appetite to 'lock in' what appear to be promising solutions that were deployed during the pandemic.[11–14] Given emerging indications of increases in some adverse outcomes of pregnancy linked to the pandemic,[15] it is important that the future role, design and organisation of remote antenatal care is based on good evidence. Yet, research on the remote provision of antenatal care undertaken prior to 2020 is surprisingly limited.[16] Pre-pandemic studies reported promising findings in terms of safety and patient experience for remote antenatal care. However, these studies are typically small-scale and concerned only with low-risk women. They also tend to focus narrowly on just one component of care (e.g., gestational diabetes monitoring or blood pressure monitoring)[17 18] or to address only one aspect of quality, such as satisfaction.[19] Attention to issues of equity and inclusion has been notably weak.[20] Ethnic and socioeconomic diversity of participants has been mostly lacking in studies,[20–24] even though minority ethnicity and deprivation are strongly associated with poor pregnancy outcomes.[5 25 26]

The danger is that well-intentioned enthusiasm for realising a post-pandemic vision of remote antenatal care may, as in other areas, risk unintended consequences for quality and safety including the perpetuation and amplification of inequalities.[20 27 28] Recent work has drawn attention to the need for clear principles to guide and evaluate the quality of remote care.[29] While there is no universally agreed definition of quality in health systems, it is generally recognised as a multidimensional construct.[30–32] What those dimensions look like for specific areas of care needs to be grounded in understanding of what matters to the stakeholders—those who use, provide and organise care.[15 16 33–40]

In this article, we propose that this understanding is key to the design, operationalisation, delivery and evaluation of remote antenatal care.[41] We report a study that sought to use the real-world experiment of the shift to remote antenatal care during the COVID-19 pandemic in 2020–2021 to generate evidence about what quality would look like for remote antenatal care, based on the experiences and perspectives of pregnant women, the healthcare professionals who care for them and system leaders.

METHODS

Participants

Between September and December 2020, we undertook a UK-based qualitative study involving three groups:

1. People aged 16 or over who were or had been pregnant since March 2020. All participants self-identified as women, and so for simplicity of language, we use 'pregnant women' and 'women' to describe them.[42]
2. Healthcare professionals involved in delivering maternity care services, including community, unit-based and specialist midwives; maternity service support workers; consultant and trainee obstetricians and physicians with an interest in maternal medicine.
3. Managers of maternity services and system-level stakeholders, including individuals from local, regional and national maternity systems, royal colleges, charities and advocacy groups.

Recruitment

We intentionally sought diversity in terms of ethnic and socioeconomic backgrounds and geographical location and, for health professionals, a range of specialities, job roles and seniorities. Using purposive sampling,[43] we invited a subset of survey respondents to take part in the interview, aiming to identify a broad range of experiences. We also recruited using online network-based approaches, professional and organisational networks and snowball sampling.[44 45] Nine English NHS maternity units were purposively selected to increase diversity of participants and assisted in identifying participants in all three groups. Further, we recruited via organisations that support women underrepresented in research with the help of our Expert Collaborative Group as well as via professional organisations.[46] Vouchers were offered to service user participants (women) on completion of an in-depth interview. As data collection and analysis progressed in parallel, the size of the sample was adapted to ensure a variety of experiences were captured, in line with the principle of information power.[47]

Ethical approval

All participants were provided with information about the study and gave consent (online supplemental file

S3). We followed the Standards for Reporting Qualitative Research recommendations (online supplemental file).[48]

Data collection: free-text surveys and interviews

To comply with UK lockdown regulations, all data were collected remotely. The study comprised two elements: first, a survey inviting free-text responses and, second, remote semi-structured interviews either conducted live by an interviewer (over telephone or video platform) or asynchronously (using online prompts without an interviewer present). To enable broader participation from those without digital devices or internet availability, the survey could be completed either online or via telephone.

The survey was designed to generate qualitative data in response to free text questions and to support sampling for the interviews, to ensure we could recruit a diverse sample for in-depth interviews. Survey questions (online supplemental file S1) were developed and piloted by the research team with input from the study's Expert Collaborative Group. A Qualtrics survey was embedded in THIS Institute's online research platform Thiscovery [49] and was open for 6 weeks between September and October 2020.

Interview topic guides (online supplemental file S2) were developed following review of existing literature. They were discussed with the study's Expert Collaborative Group and clinical co-investigators and were piloted internally by members of the research team and tested on the Thiscovery platform. Interviews were completed between October and December 2020. The live interviews were conducted by one of four experienced qualitative researchers (LH, KK, FD, JW) and audio-recorded for transcription and analysis. Interviews were transcribed by a professional transcription service. Two health professionals were interviewed together in one interview. Two interviews with women involved a partner. Four interviews involved an interpreter from a community group supporting women through pregnancy in order to facilitate inclusion. Three-way telephone interviews, with the women, interpreter and researcher, were conducted with the interpreter simultaneously translating. The interviews were then full transcribed into English by a professional translator.

Data analysis

The two datasets (free text responses from the survey and interview transcripts) were analysed sequentially. Researchers at RAND Europe undertook an initial analysis of the free-text responses from the survey using a coding framework developed by researchers, with additional analysis by LH and FD to establish reliability and validity.[50] Interview analysis, supported by NVIVO,[51] was undertaken by LH, FD, KK and NB based on the constant comparative method, with a coding framework developed by LH in discussion with KK, NB and FD.[52] Analysis was adaptive, integrating thematic areas that researchers had generated with quality domains that we had identified from the literature on quality in healthcare[30–32 53] as sensitising concepts.[54] Consensus was reached through regular analysis discussions. The deductive codes were based on a literature review conducted by KK and included, for example, language and communication, practical barriers and practical benefits.

Service user, stakeholder and public involvement

A 13-member Expert Collaborative Group provided advice and guidance throughout the study. It included 'lay' people who were (or had recently been) pregnant, representatives from charities and healthcare professionals. Members helped frame the research question, design the study, provided feedback on study instruments, supported inclusive recruitment, provided guidance on analytic strategy and increased sensitisation at every stage to the needs and priorities of the groups under study.

RESULTS

In total, 211 people took part across the two elements (survey and interviews) of the study. Survey respondents (143) included 75 women who were or had recently been pregnant, 54 healthcare professionals and 14 managerial/systems-level staff (table 1).

We conducted 90 live interviews and two asynchronous interviews with 45 women, 34 healthcare care professionals and 14 managers and system leaders. One interview involved two healthcare professionals. Six managers held dual roles as clinicians and spoke from both perspectives. Twenty-five participants took part in both survey and interview. The duration of the interviews ranged from 24 to 164 min. Both survey and interview responses reflected a broad geographical spread across the United Kingdom (UK). We collected data on ethnicity for women only. Those who responded to the survey largely reflected makeup of the population of theUK by ethnic group. The interview sample for women (table 1) had greater representation from ethnic minority groups compared with the distribution in the UK population.[55]

In both survey responses and interviews, a widespread shift to remote antenatal care was described. Women reported receiving much of their antenatal care remotely via telephone or video platforms, and healthcare professionals reported providing care remotely from their clinical base or working from home, suggesting that their views were directly informed by experience. Our analysis enabled generation of a framework (table 2) of the domains of quality that appear to be most relevant to the key stakeholders in antenatal care: efficiency and timeliness; effectiveness; safety; accessibility; equity and inclusion; person-centredness and choice and continuity. Table 3 reports this framework with supporting quotations for the analysis we present below.

Table 1 Total study sample (created by the authors)

	Survey		Interview	
	Service users N (%)	Healthcare professionals, other stakeholders N (%)	Service users N (%)	Healthcare professionals, other stakeholders N (%)
Participants	75	68	45	48
Gender				
Female	75 (100.0)	64 (94)	45 (100.0)	42 (87)
Male	0 (0.0)	4 (6)	0 (0.0)	6 (13)
Ethnicity*				
White	64 (85)	60 (88)	24 (54)	
Black	5 (7)	4 (6)	9 (20)	
Asian	3 (4)	1 (2)	5 (11)	
Mixed Ethnicity	2 (3)	1 (2)	5 (11)	
Other	0 (0)	0 (0)	1 (2)	
Did not say	1 (1)	2 (3)	1 (2)	
ONS Region				
Greater London	19 (25)	18 (27)	22 (49)	16 (33)
West Midlands	4 (5)	15 (22)	3 (7)	6 (12.5)
South East England	7 (9)	11 (16)	1 (2)	6 (12.5)
East Midlands	12 (16)	4 (6)	4 (9)	1 (2)
East of England	7 (9)	3 (4)	3 (7)	6 (12.5)
North East England	8 (11)	0 (0)	0 (0)	()
Scotland	3 (4)	5 (7)	3 (7)	0 (0)
South West England	5 (7)	2 (4)	4 (9)	2 (4)
Wales	3 (4)	2 (4)	0 (0)	2 (4)
North West England	3 (4)	0 (0)	2 (4)	1 (2)
Yorkshire and the Humber	2 (3)	1 (2)	0 (0)	5 (10.5)
Northern Ireland	1 (1)	1 (2)	0 (0)	1 (2)
Channel Islands	1 (1)	0 (0)	0 (0)	0 (0)
Did not say	0 (0)	6 (9)	3 (7)	2 (4)
Totals				
Task	143		93	
Overall	236†			

*As categorised by the ONS recommendations for country-specific ethnic group data collection https://www.ons.gov.uk/methodology/classificationsandstandards/measuringequality/ethnicgroupnationalidentityandreligion.
†N=25 participants took part in both Task 1 and Task 2 (service users N=16, staff N=9).

Efficiency and timeliness

Efficient and timely care—avoiding wasted effort, waits and delays—is an important domain of quality for remote antenatal care that was identified across all participant groups. Potential efficiency advantages of remote care reported by women included saving time, stress, travel expenses and needing to take time off work or arranging childcare. Healthcare professionals suggested that remote consultations had the potential to be more time-efficient and allow increased flexibility, under optimal conditions. Among the aspects of care that were considered by participants to have potential for the efficiency gains associated with remote care were the form-filling components of the initial antenatal 'booking' appointment, discussions about birth after a previous caesarean section and conversations about induction of labour.

Participants also reported, however, that achieving the potential for efficiency through remote care was not straightforward. Digital infrastructure (compatible hardware, software and connectivity) was critical, but varied across different organisations. Some healthcare professionals had well-integrated electronic records that they were comfortable navigating, but others operated heterogeneous systems, where information was easily lost or hard to access. Remote consultations were often frustrated by inconsistently or incompletely digitised records/notes and incompatibilities between different care providers' record systems. Women and healthcare professionals reported technical issues affecting remote consultations including difficulties getting through, dropped calls and inability to use video.

Professionals and managers emphasised that remote care often generated hidden work that increased workload, describing many challenges in organising remote appointment lists and keeping to schedule. Women also found that the organisation of remote care was inefficient and inconvenient. They reported

Table 2 Framework for quality in remote antenatal care (created by the authors)

Quality domain	Key features of domain for remote antenatal care
Efficiency and timeliness *Avoiding waste of time, effort, supplies, ideas and energy*	Remote antenatal care should be convenient for both women and professionals. It should avoid wasting people's time, but women should not feel rushed. Safeguards should be in place to ensure that shared understanding between teams is not lost.
Effectiveness *Services are based on high quality evidence*	Care should be based on the best currently available evidence appropriate to women's clinical circumstances. There should be a commitment to building an evidence-base to compare outcomes of remote care with in-person care.
Safety *Care that minimises or eliminates risks of avoidable harm to mother and/or baby*	Safety should be broadly conceived to include both clinical outcomes (including mental health) and protection of vulnerable groups including those at risk of exposure to domestic violence and social isolation. There should be an emphasis on building evidence about the safety of remote care.
Accessibility *Care can be accessed easily by all without barriers to use*	Considerations of accessibility should focus on what forms of care are suitable for remote provision and for whom, and which forms of care are less suitable and for whom. The resource requirements for remote care should not pose barriers to accessing antenatal care.
Equity and inclusion *Care that does not vary in quality or accessibility according to characteristics such as location, ethnicity, socioeconomic status or sex-gender*	Remote antenatal care should be available and accessible to all, not just the digitally-enabled and health literate. The design of remote care pathways should be highly attentive to issues of equity, diversity and inclusion, including the disadvantages in relation to digital poverty, literacy and other forms of capital that may be experienced by groups at risk of marginalisation.
Person-centredness *Care that is respectful of and responsive to individual patient needs, preferences, needs and values*	Care should be delivered in a way that addresses individual circumstances and preferences, and supports relationships. People should feel able to raise concerns.
Choice and continuity *Care should be designed to respond to individual choices and preferences, with continuity of care where possible*	Continuity of care—particularly relational continuity—should be identified as an important consideration in antenatal pathways, including where they include remote components. Choices about modes of care should be offered where possible, with shared decisions made and reassessed in light of changing risk and preference.

often being offered an extended timeslot during which they might expect a call rather than a specific appointment time, but this led to missed or late appointments because they could not be reliably available throughout. Rescheduling appointments resulted in invisible work or compensatory labour for healthcare professionals,[56] including rework, extra steps or additional complexity, and for women it added to the burden of treatment.[57] Further, though remote care enabled faster throughput of appointments and thus apparent efficiency gains, women often described their appointments as feeling rushed. Crucially, healthcare professionals emphasised that providing care remotely resulted in the loss of shared professional spaces that are fundamental to teamwork, communication, cooperation and positive working relationships, resulting in potential efficiency and safety challenges.

Effectiveness

Effectiveness describes care that is based on high-quality evidence.[31] Participants expressed concern about whether remote care was as effective in achieving the same outcomes of antenatal care as in-person care. Some participants suggested that remote provision might improve effectiveness of some forms of care, for example, by enabling women to participate more actively in their own care through self-monitoring of blood pressure or blood glucose. However, there was consensus across all participant groups, from system level stakeholders and healthcare professionals through to women themselves, that there is not yet enough evidence available to demonstrate whether remote care has similar, better or worse effectiveness in achieving good outcomes of pregnancy compared with in-person models. Also clear is that effectiveness might vary according to outcome, including clinical outcomes such as live births and normal birth weights, or participant-reported outcomes such as user experience.

Safety

Ensuring safety—which can be defined as preventing or reducing risks of avoidable harm[58]—was consistently identified by participants as a key goal of antenatal care. An immediate safety benefit of remote care was that it reduced risks of COVID-19 transmission. However, participants were not always confident that remote antenatal care was reliably safe. In particular, concerns were raised as to whether remote care was as safe as in-person care, given the risk of missing physical and other signs.

Further concerns arose when harm was broadly defined beyond narrow clinical parameters. For example, healthcare professionals reported concerns that remote care suppressed opportunities for women to raise concerns, including those relating to domestic violence or abuse, previous trauma or to flag up complex social issues. When providing care remotely, even with video, professionals' view of the room, and who was in it, was restricted. They felt that remote care was likely to have adverse impacts on women's trust of professionals, particularly if continuity of care was low.

Healthcare professionals were concerned about what was missed through remote care, including touch, and picking up on vital visual and non-verbal

Table 3 Study findings on quality domains for remote antenatal care

Quality domain	Illustrative data on where remote antenatal care works well	Illustrative data on where remote care does not work so well
Efficient and timely *Efficient—avoiding waste, in particular waste of equipment, supplies, ideas and energy* *Timely—reducing waits and sometimes harmful delays for both those who receive and those who give care*	► Potential for more convenience for women and staff *'It's (remote care) flexible, so if I'm, like, feeling tired or unwell, I can just stay at home and still get the same level of care.' W03* *'That's been really useful actually, to be able to take phone calls, or video calls, because I'm at a desk Monday to Friday full-time. So if I would have had to go to the hospital more(…)it would have taken more time out of my day.' W05* *'They don't have to drive to the hospital, they don't have to park, they don't have to pay for parking, they don't need to organise childcare. There are some considerable advantages to it.' H01* ► Efficient *'Information-wise…you can do that quite quickly over the phone, whereas in person, because you have got that bit more of a rapport going, there's more of a conversational element to it, so they kind of can go off track and things.' H21* ► Flexible *'So we can be a lot more responsive to these women, by literally just picking up the phone and having that chat with them. You don't have the practical issues, is there a clinic room available, how long is it going to take her to come in, I haven't got a clinic slot for 3 weeks'.' M14*	► More operational work behind the scenes *'There's a couple of times where like you'd ring people and they'd be like oh, I'm just out. Can I call you back later? Like they didn't take it as seriously, like, this was your appointment.' H09* ► Compensatory labour *'You have a lot more leg work to make the two (Attend Anywhere and hospital appointment system) combine…well, they don't. I've got this form as I said, I have to fill in and then save it in their file and retrieve it when I need it. You know, that's a bit of a hassle.' H26* ► Invisible burdens *'It feels like you have to do so much detective work, looking at all the different sites like their results and their records, their letters from the past, what's happened in maternity, what happened in their past obstetric histories.' H23* ► Loss of communicative spaces for healthcare professionals *'We always function best when we've had a team meeting, so like one of us will go through all the emails we've received, and then we'll discuss them all, and that tends to embed it better.' H21*
Effective *Services are based on high quality evidence, with low value care minimised*	► Potential for new ways of working, reconfigured care pathways *'We've had accelerated innovations around home blood pressure monitoring, which again has been popular with women, it gives them a degree of autonomy. It reduces the footfall of unnecessary visits to the midwife or to hospital for blood pressure and urine checks.' H11*	► No evidence yet of effectiveness *'Frequently, there was not enough information to be able to provide safe care ensuring risks were not missed. The infrastructure is not in place and I don't feel satisfied with the care I can give.' H56* *'I don't yet have the evidence I would like about the impact on women, about the acceptability from women, about whether women prefer this style.' M08*
Safe *Care that does not cause avoidable harm*	► Helps in preventing COVID-19 infection since in-person contact is reduced *'Actually for a significant number of women who we were previously dragging to the hospital, they didn't need that. So I think one of the positives I think will be, moving forwards, we'll be a bit clever about how we triage women to who needs true face-to-face care.' H11* *'If I was high risk or if I had an issue, they would have told me to come in. But for me, at least it was completely over the phone, which I was fine with, because(…)I'd had no issues that I think needed to be seen in person.' W32*	► Remote care suppressing opportunities for women to raise concerns *'I'm a stranger that's just called them in their pregnancy, if it's over the phone, it's really difficult for them. One of the questions is have you had any life events that you feel might make pregnancy difficult, things like sexual abuse or domestic violence, parents breaking up a relationship in the past, anything that you feel might make a pregnancy difficult.' H20* *'Everything's been through the phone. It's been – maybe because of the anxiety of it being my first pregnancy – it was really impersonal, it was really short. Because it's over the phone it was just really brushed over.' W29* ► Loss of vital visual and non-verbal cues *'(W)e look at how swollen people are, we look at the colour of their skin, how pale they are, you know, whether or not they look anaemic, whether or not they look depressed…You know, we can't do that on the phone.' H15*

Continued

Table 3 Continued

Quality domain	Illustrative data on where remote antenatal care works well	Illustrative data on where remote care does not work so well
Accessible *Care that does not present barriers to use, including obstacles related to finance, transport, or design*	► Amplified modes of communication *'They have a 24 hour pregnancy advice line, so wherever I've had a worry I've been able to call that number(…)So it was very responsive.' W35* ► New ways of providing care, including multidisciplinary team meetings *'So, in the video clinics they will have a regular appointment with the diabetes specialist nurse and the diabetes specialist dietician, and for our ladies with Type one or Type two diabetes with the consultant as well. So, we can all still have that joint decision-making but just on a video, virtual clinic rather than a face-to-face clinic.' H14*	► Level of digital infrastructure and literacy required to deliver and receive remote care *'We just have it on our computer, so we don't have iPads or phones that can access it, so we have to be physically in the office to access it. So if we're not in the office or we're out somewhere else, we can't access those records at all.' H12* *'The maternity app, if it was done properly, it would have been really useful. Some of the appointments were in there, just not all, and some of the information were there and just not all(…)It's just half done, half completed, makes it a bit pointless sometimes.' W30* *I mean, the video calls are a bit of an issue, just because of the internet connection, and I think…I mean, I'm not 100 per cent sure but I…so I…I'm in a very rural area, I don't have broadband, I'm relying on my 4G hotspot, so that is a bit of a problem.' W05*
Person-centred *Providing care that is respectful of and responsive to individual patient preferences, needs and values*	► Can fit into women's needs, especially for providing information or test results without negative implications *'It provides flexibility, you know, I'm just thinking with the continuity of care model that's coming into Hospital D, you know, midwives are on call all day, you might be able to have a Zoom meeting at seven o'clock when they've put their little one to bed. That sort of sense of flexibility, people you hope are more able to access care.' H29*	► Care may become more transactional than relational *'I'll be honest, I don't think I have got a relationship with the midwives, because there isn't that face to face interaction.' W33* *'When done remotely everything feels more formal, like a business interaction.' W94* *'I feel very isolated on my own, that the midwife is simply interested in this baby and not interested in the family as a unit.' Participant W37* ► Appointments feel rushed *'In real face-to-face kind of appointments, you get more like chitchats, which somehow sometimes reveal things that you might not have thought of.' W30*
Enables choice and continuity *Care should be designed to respond to individual choices and preferences, with continuity of care where possible*	► Importance of choice *'I think choice to be seen remotely or face to face is important.' W93* *'First time mums should be able to have face to face appointments(…)Second time round mums should be given the choice as to whether they want face to face or remote.' W11* ► A hybrid pathway can support personalised care, with the right risk assessment *'I think that they really need to personalise the care to the individual.' W31* *'It's more about trying to develop a proper personalised understanding of that person's circumstances and working out what's appropriate and what's not appropriate.' M03*	► One size does not fit all *'I do think we should be allowed to use our clinical judgement, rather than just a blanket 'this is how it's got to be'.' H12* *'People have to feel comfortable with it, the actual using of the platforms, and, you know, there are a number of midwives that are approaching retirement age that would say they are not very digitally savvy, so it's been difficult for them. And they have probably used the telephone more than video appointments. So, that has certainly been a problem for people' H24* *If it was a longer term thing where we were talking about bringing in remote care as part of standard maternity then that should be communicated to you right at the beginning as part of your package of care.' W35* *'Remote consultation doesn't work for everyone equally. And I think that's really, really important and if someone, you are talking to someone on the phone and they do speak little to no English, then to insist on them having all of their consultations as remote until 28 weeks I think is really stupid and does a disservice. And I think there needs to be a bit of flexibility in the system and I don't think there is any currently.' W15*
Equitable *Providing care that does not vary in quality because of personal characteristics such as gender, ethnicity, geographic location and socioeconomic status*	► Works for some *'I think that most (patients/service users)find some positive elements to it, they don't have to drive to the hospital, they don't have to park, which is a major pain on our side, they don't have to pay for parking, they don't need to organise childcare. There are some considerable advantages to it.' H01* *'Remote assessment for the right person is probably absolutely fine, whereas remote assessment for the wrong person is not going to help. And it's knowing which person you're talking to or about.' M10*	► Does not work for some (see table 4 for expanded set of quotations for equity) *'Sometimes women appear to be a certain way but once they've got your trust you can find out so much and actually she might have a dreadful life and sometimes it's that midwife that helps that woman out.'* H18

cues and clues as to the pregnant woman's physical and mental well-being. Women reported they felt brushed over and found it harder to raise concerns. For those experiencing or at risk of domestic abuse, telephone appointments removed the safe space of face-to-face consultations and obscured many cues that midwives or other healthcare professionals would be able to spot in person. Other vulnerable groups identified included those with previous trauma or learning difficulties or those for whom remote care could increase social isolation.

Accessibility

Accessibility describes the ease with which care can be reached without barriers to service use.[59 60] Remote antenatal care was seen by participants as offering some advantages in increasing accessibility, for example, by expanding the ways care could be provided, reducing challenges to access associated with location and travel and offering opportunities for additional contacts between appointments. Examples of better accessibility cited by participants included provision of perinatal mental support and facilitating consultations requiring multidisciplinary teams or specialist obstetricians working at different hospitals. Some participants were also very positive about new modes of communication (e.g., mobile telephone, email, social media and apps) and digital resources (e.g., hospital trust webpages, videos and podcasts) that they saw as improving accessibility to information and support.

Again, however, remote care was not straightforward in its impacts on accessibility. Care that was more transactional in nature, such as information exchange during the initial antenatal 'booking' appointment, was identified by participants as increasing in accessibility when offered remotely. But action that relied on relational care or continuity, such as raising concerns or safeguarding, became less accessible.

Importantly, the resource requirements for delivering and engaging with remote care were cited by participants as a major influence on accessibility. All forms of remote contact assumed access to a quiet, private space. This was often difficult or impossible for women and not always straightforward for healthcare professionals either. Telephone calls required women to have a device, a phone signal and enough credit and charge on the phone. Video calls required clinicians *and* women to have access to a video-consulting platform, a stable internet connection and internet-enabled device and to be able to use them reliably. Remote care also relied on individuals having the skills and language competence to participate in remote consultations or information provision and to share in the sociocultural expectations of NHS-provided maternity care.

Equity and inclusion

Equitable care is care that does not vary in quality or accessibility because of personal characteristics such as sex/gender, ethnicity, geography or socioeconomic status.[31] We identified major concerns in relation to equity of remote care, detailed in table 4. Participants reported that remote care worked very well for digitally enabled and health-literate women who were confident in what to expect from their care, and for women who had pre-existing relationships with health professionals. However, all participant groups raised concerns about the potential for remote care to further disadvantage some groups and to risk amplifying existing structural inequalities.

Groups identified as especially vulnerable included those who were digitally excluded through lack of internet access or the hardware to connect and/or had low levels of digital literacy, a low base level of oracy and literacy in English language and challenges in reading instructions, inputting data and communicating effectively. Participants reported concerns that particular social, cultural and economic risk factors, often associated with communities at risk of marginalisation, could lead to inequality of access and other forms of exclusion.

Person-centredness

Person-centred care can be understood as care that is respectful of and responsive to individual needs, preferences and values, taking into account the preferences and aspirations of individuals and the culture of their community.[53] All participant groups reported that establishing and maintaining the relationships and trust necessary to achieve person-centred care was much harder to do remotely. The remote appointments that worked best were those that were largely transactional and protocol-driven in character. Such consultations were typically those that did not rely too much on non-verbal cues, for example, providing uncomplicated information or results without negative implications, or routine recording of blood pressure/glucose levels. However, women and health professionals emphasised that these 'content-focused' consultations were only one small part of antenatal care, or one part of a wider antenatal appointment.

Women often described a lack of rapport and reassurance associated with remote care. Because appointments were experienced as shorter and more transactional than therapeutic, women reported that they felt like a 'tick-box exercise' focused on the clinical aspects of care at the expense of the relational. They found it harder to raise concerns about symptoms or mental health issues. Healthcare professionals similarly worried that women found it harder to open up about what mattered to them. They reported that it was particularly challenging for women who did not speak sufficient English to follow rapid exchanges.

Choice and continuity

Responsiveness to individual choices and preferences is an important feature of quality of care.[31] A particularly

Table 4 Impacts of remote care on equity

Indicator of risk of disadvantage	Illustrative quotes
Digital poverty and exclusion *Access to care for women who did not have easy access to devices or video consulting platforms, the credit to connect, or may not have had a device at all*	*'There's constantly a push for things to be digital; and there are huge advantages of that, but, until you make internet free for everyone and give everyone a smart phone, then, you know, the people that really need us are the ones that get left behind.' H24* *'Some ladies, saying my phone's not working, my phone's broken, I haven't got credit. And then ringing up, well, I couldn't answer because I've got no credit on my phone or without a signal. Those things for the vulnerable women.' H13*
Domestic abuse/violence *For those experiencing domestic abuse, telephone appointments obscured many cues and clues that midwives would be able to pick up on in person*	*'Sometimes women appear to be a certain way but once they've got your trust you can find out so much and, actually, she might have a dreadful life and sometimes it's that midwife that helps that woman out.' H18* *'More often than not their partner didn't come, and so it provided a safe space for women to talk about their issues at home. And enabled us to pick on subtleties in terms of any domestic abuse, any physical abuse; you know, you'd sometimes be able to see that physically on their body. So, you don't necessarily see that remotely. And for a lot of people, they don't have an extra room where they could go in and have their appointment; they might be living in a one-bed bedsit, so a remote appointment is completely inappropriate. So, accessibility was certainly a problem.' H24*
Women who have experienced trauma or previous pregnancy loss	*'No, my booking wasn't face to face. That was over the telephone, and that was more difficult because you have to disclose a huge amount of information. So I was in a violent relationship before and had to tell her all about that over the phone(…)and that's a lot to do with somebody you've never met over the phone.' W35*
Multiple deprivation, cared for a cross multiple agencies	*'Most of our ladies are deprived financially, they don't have any Wi-Fi, they don't have a smartphone (or laptops) to be able to do that. So a language barrier can be very difficult as well. Because like you got a link sent, that person on the other end might not be able to read English and not be able to understand the simple instructions.' H30+H31*
Sociocultural influences	*'So the Asian women that we were looking after prior to lockdown who've stayed on as clients, all, one hundred per cent of them, told us they didn't need our support during lockdown. And the only reason that I can guess that was just because they didn't have space to talk to us, we're talking around about 50 women. They've said that they wanted to come back when we do face to face again, but they didn't want support via telephone, video or any online activity.' M02*
Women with learning difficulties or low levels of literacy	*'Obviously, the worry with it (provision of additional information online) is that there is always going to be somebody who can't quite access it because they just don't do computers or are a bit dyslexic or what have you.' H04*
Language barriers	*'I find it hard sometimes depending on the accent to follow through, so I felt like it was really…she was talking really fast, and maybe I could have said, like, for…ask for her to slow down a little bit. But, yeah, I think that the main barrier was actually getting a bit lost in translation, 'cause at the end of the call, for example, I didn't even realise the call was about to end (laugh) (… maybe there was)a sentence that maybe would be obvious for a native speaker, that that was the end of the call, but for me it wasn't. And then I realised I hadn't asked any of my questions, 'cause I was waiting for that moment of, like, do you have any questions (laugh).' W29*

important preference for healthcare professionals and women alike was for relational continuity, which they saw as underpinning trusting relationships in antenatal care.[61 62] Both choice and continuity were reported to have been adversely impacted by the turbulence of the pandemic. Some women reported that they felt lost in the system and unable to make choices about their care. Participants agreed that one size does not fit all, and that ideally women would be offered a blend and choice of care mode (for example between remote and in-person care), through shared decision-making. They proposed that choice should be supported by information about different pathways. They also emphasised the importance of clear guidance for healthcare professionals for risk assessments to consider the woman's medical, social and cultural histories, some of which would only revealed through trusting relationships over time.

DISCUSSION

Main findings

The COVID-19 pandemic has led to a new era of remote care, but the principles that should inform its development remain underdeveloped.[29] Given the enthusiasm for retaining aspects of remote antenatal care postpandemic, it is important that policy and practice are guided by clarity about 'what good looks like'.[11 12] Evidence in other clinical fields has mostly focused on consultations and on aspects of experience of care.[19–23 63–65] Our study suggests that remote care needs to be understood as a whole system—of which consultations are just one part—and that a much broader conceptualisation of the relevant dimensions of care along entire pathways is needed. This large qualitative study of the views and experiences of women, healthcare professionals and system-level stakeholders has generated a framework (table 2) that identifies relevant dimensions of quality and standards for remote antenatal care. The dimensions identified in our analysis map closely onto existing frameworks for quality in health systems, including the Institute of Medicine framework,[41] with the additional dimension of Choice and Continuity. The similarity between the two offers some confidence in the validity of the findings. By offering a systematic way of structuring thinking about quality in remote antenatal care, this

new maternity-specific framework can guide policy and practice.

Our findings suggest that there are both advantages and disadvantages of remote care across each of the domains. Although participants valued the potential convenience and flexibility offered by remote care, what may appear to be efficiency gains may also involve hidden burdens leading to invisible work and compensatory labour.[56 66] Permeating women's accounts were concerns about safety, effectiveness and person-centredness, linked to the risk that absence of in-person contact might undermine the quality of interactions and hinder safeguarding and recognition of other safety issues. The risks facing women vary and some may need antenatal care that is wholly face-to-face. There was also much concern about the potential for negative impacts of remote care on equality and inclusion, especially given disparities in digital access and variation in maternity outcomes linked to structural inequalities.[67–69] Our findings also highlight differences between modes of remote care. While telephones are often cheaper and more ubiquitous, video consultations provide visual as well as audio information. However, both telephone and video platforms are vulnerable to poor connections, and people do not always have access to the necessary hardware or subscriptions to data services. A high-quality evidence-base will need to be built to address these concerns.

In identifying that remote care should be regarded neither as a utopia nor a dystopia, our findings are suggestive of a number of recommendations for policy and practice if the potential of remote antenatal care is to be realised while the risks are mitigated. Optimising remote care for the future will require investment in high quality technology infrastructure, human resources and digital literacy skills and in codesigning pathways, work systems, workflows and processes to support efficiency and convenience for both service users and healthcare professionals. These are not solely practical considerations—they also have profound implications for structural equity. Given evidence of widespread digital poverty—a significant proportion of the UK public lacks adequate access to data infrastructures, such as broadband, connectivity and smartphones[69]—the design of remote care models will need to mitigate the risks that disproportionately affect some groups.

A particularly striking finding of our study was the emphasis across all participants on safety as a concern for remote antenatal care, including potential barriers to the role of trusting relationships and continuity[70 71] in achieving both safety and person-centred care. In foregrounding the central importance of relationships, our study emphasises that any lasting shift to remote provision will need to be highly attentive to designing care pathways so that they facilitate successful relationships between people who are pregnant and those who are caring for them.[72 73] Opportunities and mechanisms for reporting safety concerns will need to be built into these pathways[74] and should be broadly conceived. For instance, the loss of 'communicative spaces' for healthcare professionals to engage in debriefs, handovers and corridor conversations is likely to generate safety issues as well as impairing their experience of work.[75]

Strengths and limitations

A strength of this study is its large and diverse sample that brings together of the voices of pregnant women, healthcare professionals, managers and system-level stakeholders. The remote interviewing and survey approach supported the development of an ethnically and geographically diverse sample. The remote approach, however, favoured those we could reach with our study information as well as those with the resources, capacity and time to engage and take part in the survey and/or interviews. While efforts were made to mitigate against these barriers, inevitably we have not been able to capture all perspectives. Thus, the very nature of remote research, compelled by the pandemic, may have also created a self-selecting sample of more digitally-enabled participants. It was not possible to estimate a survey response rate owing to the recruitment methods used. Further, we were unable to measure clinical outcomes or to infer causal relationships. Accordingly, this paper does not make recommendations about the role of the routine physical and mental checks that should be maintained in future antenatal pathways.

CONCLUSION

The lure of digital transformation is powerful and hard to resist,[76 77] but introducing major changes into healthcare systems is rarely straightforward[78–82] and requires a systematic approach to quality and safety. Our study offers a provisional framework that can help in structuring thinking, policy and practice and, by drawing attention to the range of domains relevant to remote antenatal care, will help support the development of a codesigned evidence-base. Our findings suggest that a hybrid model should be on offer, but one that has sufficient flexibility to accommodate the needs and priorities of different groups and that is highly sensitised to equity and inclusion. Key areas for development and testing include the extent to which transactional and relational aspects of care are interlinked, the significance of continuity as a feature of quality in remote care and outcomes and experiences of different modes of remote antenatal care.

Details of ethics approval

All participants were provided with information about the study and gave consent (see Consent form in online supplemental file S3 File (redacted)). We followed the

Standards for Reporting Qualitative Research recommendations (online supplemental file S4).[48]

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Contributors The study was conceived by LH, MD-W and TD. Study setup for the survey and interview phases (including planning and approvals) were led by LH and FD, with design input from KK, MD-W and coinvestigators (TD, CW, RJM, LC, SC, EH). KK conducted a literature review to ascertain the existing evidence-base for remote care. The survey was built in Qualtrics by FD with support from Thiscovery team members. Researchers at RAND Europe undertook an initial analysis of the free text responses, with additional analysis by LH and FHD. Interviews were conducted by LH, FD, KK and JW. Interview analysis was completed by LH, FD, KK and NB using a coding framework developed by LH in discussion with FHD, KK and NB. LH, FD, KK and NB met frequently during analysis to discuss the results and confirm the reliability of each researcher's analyses before discussion with MDW, co-investigators and the Expert Collaborative Contributorship Group. MD-W is the guarantor.

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Competing interests TD is Vice President of the Royal College of Obstetricians and Gynaecologists. RJM has previously received BP monitors from Omron Healthcare for research purposes and is working with them on a telemonitoring system.

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