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Patients' and clinicians' views on the optimum schedules for self-monitoring of blood pressure:

a qualitative focus group and interview study

Abstract

Background
Self-monitoring of blood pressure is common but guidance on how it should be carried out varies and it is currently unclear how such guidance is viewed.

Aim
To explore patients' and healthcare professionals' (HCPs) views and experiences of the use of different self-monitoring regimens to determine what is acceptable and feasible, and to inform future recommendations.

Design and setting
Thirteen focus groups and four HCP interviews were held, with a total of 66 participants (41 patients and 25 HCPs) from primary and secondary care with and without experience of self-monitoring.

Method
Standard and shortened self-monitoring protocols were both considered. Focus groups and interviews were recorded, transcribed verbatim, and analysed using the constant comparative method.

Results
Patients generally supported structured schedules but with sufficient flexibility to allow adaptation to individual routine. They preferred a shorter (3-day) schedule to longer (7-day) regimens. Although HCPs could describe benefits for patients of using a schedule, they were reluctant to recommend a specific schedule. Concerns surrounded the use of different schedules for diagnosis and subsequent monitoring. Appropriate education was seen as vital by all participants to enable a self-monitoring schedule to be followed at home.

Conclusion
There is not a 'one size fits all approach' to developing the optimum protocol from the perspective of users and those implementing it. An approach whereby patients are asked to complete the minimum number of readings required for accurate blood pressure estimation in a flexible manner seems most likely to succeed. Informative advice and guidance should incorporate such flexibility for patients and professionals alike.

Keywords
blood pressure; focus groups; hypertension; primary health care; secondary care; self-monitoring.

INTRODUCTION

Self-monitoring of blood pressure (SMBP) provides a better estimation of underlying blood pressure than measurements taken in the clinic for the diagnosis and management of hypertension.[1–3] A previous survey highlighted an increasing number of individuals with hypertension undertaking SMBP in the UK.[4] Many prefer it, primarily because it promotes independence and control over an individual's own health.[5–7] However, self-monitoring largely takes place within the privacy of the patient's home, and thus can be hidden from the patient's clinical care provider.[8]

Although the National Institute for Health and Care Excellence (NICE)[1] and international guidelines[3,9] recommend a week of readings for diagnosis, most primary care healthcare professionals (HCPs) use self-monitoring for ongoing management,[10] for which there are no evidence-based recommendations on what type of self-monitoring schedule to implement. Consequently, wide variation in practice has been reported by both patients and HCPs.[4,10] This includes the interpretation of self-monitoring results, which may be haphazard.[10,11] Previous work suggests only small incremental benefit in terms of prognostic ability from longer schedules of self-monitoring.[12] Few qualitative data exist

regarding what patients think of different monitoring routines, perhaps because they are generally only exposed to one regimen, and professionals have previously reported uncertainty as to the optimum schedule.[13,14] This study aimed to explore attitudes towards an optimum schedule for home monitoring of blood pressure from the perspectives of primary care patients and HCPs to determine the most acceptable and feasible blood pressure home monitoring schedule to use in clinical practice.

METHOD

Participants and recruitment
Patients and HCPs at primary and secondary care sites in Birmingham, UK, were invited to take part in this focus group study. Primary care participants were recruited via general practices from a pool of individuals who had taken part in a previous trial (including people in both intervention and usual care groups) investigating the self-management of hypertension.[15] Clinical staff attached to these practices were also invited to take part. Secondary care patients and HCPs were recruited using convenience sampling,[16] through verbal invitation at specialist hypertension clinics at a teaching hospital. Patients agreeing to take part were grouped based on the

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How this fits in

Self-monitoring of blood pressure is common but guidance on how it should be carried out varies and it is currently unclear how such guidance is viewed. This qualitative study highlights patient and professional opinion on operationalising the use of schedules for self-monitoring. Clinicians and patients largely favour the move towards using a schedule for self-monitoring; however, they describe practical difficulties in terms of implementation. An educational approach outlining to patients how to measure blood pressure correctly, under what conditions (for example, seated or after 5 minutes of rest), and with specific detail whereby patients are asked to complete the minimum number of readings required for accurate blood pressure estimation in a flexible manner, seems most likely to succeed.

following attributes: setting (primary or secondary care), socioeconomic status[17] (by Index of Multiple Deprivation [IMD] score of practice's postcode), and experience of SMBP (Figure 1).

Focus groups were held in patients' and HCPs' own general practice/hospital clinic sites to ensure that participants could easily attend.[18] Face-to-face interviews were offered where logistics precluded participation in focus groups.

Topic guide and procedure

A structured topic guide was developed, informed by the literature (Appendices 1 and 2). Two potential self-monitoring schedules were discussed: a longer one based on current NICE/European Society of Hypertension clinical guidance[1,2] (twice daily monitoring for a week) and a shorter one based on the minimum data required for accuracy,[19] that is, for at least 3–4 days. Discussions were facilitated using emoji visual aids.[20] The topic guide was adjusted depending on participants' attributes, that is, primary or secondary care; patient or HCP; and experience of SMBP or no experience.

Each focus group was facilitated by two people who were non-clinical researchers, with one leading the discussion and another taking notes. Each lasted approximately 1.5–2.0 hours, whereas interviews lasted 45–60 minutes.

Focus groups and interviews were digitally recorded and transcribed verbatim along with contemporaneous field notes.

Analysis

Data were analysed using a constant comparative method, whereby a coding frame was inductively constructed and systematically applied to the data.[21] Data from focus groups and interviews were analysed concurrently using the same methodology, that is, data were extracted from the transcripts and relevant field notes, and placed on charts according to emergent thematic references, so enabling analysis of the similarities and differences within and between each focus group and interview. All data were managed using NVivo software (version 10.0).

Members of the research team from different clinical and non-clinical disciplines (health psychology and sociology) individually read and reread two transcripts each. These were then independently coded and, after collaborative discussion, codes were further developed from the data. Following this, the team collectively developed higher-level codes. This process of investigator triangulation increases internal validity.[22] Subsequent coding was then undertaken.

RESULTS

Participant characteristics

Eighteen of the 24 practices participating in the original trial[15] were approached. Six were excluded due to geographical distance from the research team. Eleven agreed to participate; however, it was not necessary to extend recruitment beyond nine practices as, by this point, data saturation had been achieved.[23] Participants, as previously identified in the original trial, were all patients with hypertension, treated with

Figure 1. Participant sampling flowchart. FGs = focus groups. HCPs = healthcare professionals. SES = socioeconomic status. SM = self-monitoring.
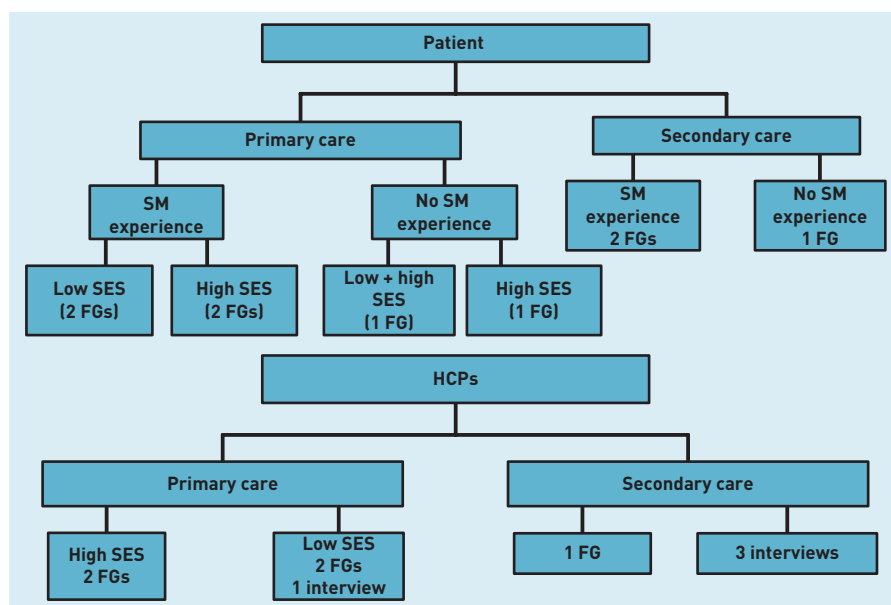
at least one or two antihypertensives.[15] Participants from these practices formerly agreeing to take part in further research were identified and initially invited (*n* = 155). Of these, 42 declined, 64 did not reply, 18 participants replied 'yes' but were subsequently not contactable, resulting in a sample of 31 patients. Of 78 primary care HCPs employed within these practices and invited to participate, 11 declined and 50 did not reply, resulting in a sample of 17 (13 GPs, three practice nurses, one healthcare assistant). In secondary care, 17 patients were invited to take part, 10 of whom agreed to participate, and seven declined. All of the eight secondary care professionals (five specialist nurses, one consultant physician, one renal registrar, and one consultant nephrologist) who were verbally invited agreed to take part.

Focus groups

Thirteen focus groups were held in total, with between three and nine participants. The baseline characteristics of patients and HCPs are given in Table 1. Half of the participants (primary and secondary) were female and nearly two-thirds (28/41; 68%) were self-monitoring or had some self-monitoring experience. Four interviews were held with HCPs (one primary care, three secondary care) resulting in a total of 66 participants (41 patients, 25 HCPs).

Analysis revealed a series of themes from patients and HCPs that emerged from the interviews and focus groups, some of which were shared, while others were unique to a particular group or setting (Table 2).

Positive views for using a schedule versus *ad hoc* monitoring

Patients in both primary and secondary care considered that self-monitoring schedules improved adherence to medication and allowed understanding of blood pressure variability:

'*I've become even more, almost regimented about it, so I can actually have a better pattern as to what is working and what isn't working and which tablets I'm taking might be working and which aren't working.*' (Focus group [FG] 2, patient, female [F], secondary care [SC])

Similarly, HCPs supported the use of a schedule on the basis of allowing patients to take greater ownership of their condition, increasing adherence to regular monitoring, and subsequently facilitating treatment decisions. Implementing a schedule therefore appeared well supported:

It [monitoring with a schedule] *gives them some ownership of the problem and they tend to actually find it interesting … what*

Table 1. Participants' characteristics

Focus group type	Healthcare level	Self-monitoring experiences	Socioeconomic status[a]	Focus group/ interview	Focus group/interview identification number	*N* (male, female)	Occupation
Patients	Primary care	Yes	High	Focus group	5	5 (2, 3)	N/A
				Focus group	9	9 (5, 4)	N/A
			Low	Focus group	1	3 (2, 1)	N/A
				Focus group	3	4 (3, 1)	N/A
		No	Low/high	Focus group[b]	11	4 (1, 3)	N/A
			High	Focus group	8	6 (4, 2)	N/A
	Secondary care	Yes	–[c]	Focus group	2	4 (2, 2)	N/A–
				Focus group	4	3 (0, 3)	N/A
		No	–	Focus group	14	3 (1, 2)	N/A
Healthcare professionals	Primary care	N/A	High	Focus group	6	6 (3, 3)	6 GP
		N/A	Low	Focus group	10	6 (4, 2)	5 GP, 1 PN
		N/A	High	Focus group	12	4 (1, 3)	1 GP, 2 PN, 1 HCA
		N/A	Low	Interview	13	1 (1, 0)	GP
	Secondary care	N/A	–[c]	Focus group	7	5 (0, 5)	5 SN
		N/A		Interview	15	1 (1, 0)	CP
		N/A		Interview	16	1 (1, 0)	RR
		N/A		Interview	17	1 (0, 1)	CN

[a]IMD score based on threshold of 15% most deprived Lower Layer Super Output Area (LSOAs) nationally versus practices in the 85% least deprived according to IMD 2010.[17] High socioeconomic status = least deprived; low socioeconomic status = most deprived. [b]Combined focus group; n = 4 (two participants high socioeconomic status; two participants low socioeconomic status). [c]Socioeconomic status data not collected. CN = consultant nephrologist. CP = consultant physician. HCA = healthcare assistant. N/A = not applicable. PN = practice nurse. RR = renal registrar. SN = specialist nurse.

Table 2. Series of themes revealed in clinician and patient focus groups and interviews

Theme	Clinician[a]	Patient[a]
Positive views for using a schedule versus *ad hoc* monitoring	Y	Y
Flexibility	Y	Y
Variation in practice	Y	Y
Education needs	Y	Y
Length of protocol	Y	
Preferred monitoring regimen		Y
Initiation and change of monitoring		Y

[a]Focus groups and interviews. Y = yes. Y theme: light blue = clinician and patient; red = clinician only; dark blue = patient only.

the medication is doing, and ... helps them to appreciate the variability of BP that one minute it might be slightly high and then it might go down again when you repeat the testing, which is sometimes reinforcing what we are doing when we are rechecking the pressures in the surgery and seeing it come down for the second or third week.' (FG12, healthcare professional [HCP], male [M], primary care [PC])

Determining a more accurate estimate of blood pressure through more readings was perceived as an advantage for both the patient and the health professional alike:

'If you know ... I think it would help, if you can get them to follow it and they are willing to do it then I think it could help patients because you know it's got more readings.' (Interview 17, specialist consultant, F, SC)

In contrast to secondary care clinicians, those in primary care considered the negative impacts of a schedule:

'... these people do panic about one-off readings, if they had that in front of them and said OK, if you get a high reading, do another 6 days of readings before you contact us. That might actually stop their panic and reduce that workload potentially ... therefore, I've got to do 7 days now ...' (FG10, HCP, M, PC)

'Or they get 6 more days of panic.' (FG10, HCP, F, PC)

A number of patient focus groups agreed with HCPs' views that complying with specific instructions regarding home measurements could cause more anxiety, making it no different from the anxieties experienced within the clinic:

'I think I'd prefer to [not monitor on a set day]. As I say, I just do it and, you know, I think if it's not right, you've got to do it a certain day at a certain time. You can get more agitated.' (FG1, Patient, M, PC)

'I think half of it's [preference for home monitoring] because they [the doctor] tell you to sit it up on your table, because you're going to have your arm like this, certain height, your wrist, wrist certain height, level you've got to be sitting comfortable and this and that.' (FG1, Patient, M, PC)

'...all that's more stressful.' (FG1, Patient, M, PC)

Flexibility

Finding a balance that combines rigour with a degree of flexibility within a schedule was discussed in more than half of the 13 patient focus groups in both primary and secondary care. Patients mentioned a range of issues about fitting self-monitoring within their daily life. Those with more spare time felt that scheduling monitoring could undermine their 'free time' when they were at their most relaxed. Unpredictable situations were also considered, such as illness, when patients might want to increase the frequency of the measurements:

'... you would have to look at your own circumstances really because with some people it would work for 3 days, some people work it every other day, some people you need to review it every day, especially if your medication has just been changed and you want to see if it's working but then at the same time, depending on how you react to the results.' (FG2, patient, F, SC)

'It depends on your lifestyle. Sometimes it might be difficult, I have a 4-year-old grandson that I have occasionally, it wouldn't really be practical when he's around because it's not always that easy really.' (FG9, patient, F, PC)

Through further discussion, questions were raised concerning how or whether a rigid schedule should be followed during more relaxed time periods, such as holidays and weekends:

'What if you're on holiday and ... stuff, are you still able to do that?' (FG14, patient, F, SC)

'In terms of the internet, you can still connect from anywhere.' (FG14, patient, M, SC)

'… you wouldn't want to do it on holiday though.' (FG14, patient, F, SC)

'That's correct, but you might be more relaxed.' (FG14, patient, M, SC)

'… if you were doing it for x amount of months and you were on holiday during that period, what would you do?' (FG14, patient, F, SC)

Patients felt measuring blood pressure at home should allow for flexibility rather than complying with a strict imposition of rigid times, although some alluded to how such measurement variation could influence results. Work and family were perceived to influence ability to monitor with a degree of rigour:

'You get up in the morning at a certain time … you can monitor then and lunchtime if you've got time, but obviously for those people who work may not be in a position to do that.' (FG2, patient, F, SC)

'It just depends on your circumstances, doesn't it, whether you go to work or whether you've got a family, if it's young children and dealing with children, you know, it depends.' (FG11, patient, F, PC)

'It depends if it's taken the same time every day or in the evening … would it work if one night you took it at 7:00 [pm], because you know you're going out and you'd have a late night … but the next night … you stay in and you do it at 10:00 at night.' (FG11, patient, F, PC)

For HCPs, consideration of whether a schedule was feasible related to what was 'doable' for the patient and this varied between patients. Factors brought up included people's personal routines, carer responsibilities, and job patterns, along with each individual's attitude to their own health:

'It completely depends on their social … whether they've got four, five kids, whether they've got a job they need to be at 6 o'clock in the morning, whether they work nights, it's all very subjective to what … I think it [following a schedule] is doable.' (FG7, HCP, F, SC)

'It depends on the patient how you feel in their consultation how comfortable they are.' (FG10, HCP, M, PC)

Variation in practice
Capturing current home monitoring experiences revealed substantial variation among patients and HCPs. There were some expected individual differences in the number and times of day measurements were taken and in logging readings. There were also some unexpected accounts:

'I usually disregard the highest reading; I do it three times and disregard the highest reading than the other two.' (FG3, patient, M, PC)

'If I do mine, I take the best of three, a good average.' (FG3, patient, M, PC)

'I take measurements in just one arm.' (FG4, patient, F, SC)

'I do both [arms].' (FG4, patient, F, SC)

'Yeah. … one would be higher, one would be lower.' (FG4, patient, F, SC)

'And I'd always, look at the higher one because that's normal for me.' (FG4, patient, F, SC)

Across primary and secondary care sites, HCPs described variability in the advice they gave to patients. 'Eyeballing averages' appeared to be the most common technique described:

'I will tend to try and work out a ballpark average by eyeballing the figures … I will look at them and see if there are several over 90 [mmHg, diastolic blood pressure] or if there are others that are sort of within the normal range then I will be more comfortable, but I would be looking at a pattern of generally lower BP than before and managing a patient on treatment … I will often say two or three times a week is a reasonable amount and then assessing in a month's time, that gives you enough readings to make a judgement.' (FG12, HCP, M, PC)

'As long as you give them a general view about the volume of readings, you know, that you feel would be helpful to … you know, for, for them and us to manage their BP, then that's usually fine.' (Interview 15, consultant physician, M, SC)

These behaviour patterns were corroborated by patients' accounts. Other guidance given to patients was around aspects of measurement, for example, discarding readings, length of time between measurements, whether to measure before or after blood pressure medication, and measurement technique, again with little consensus on a unified recommendation:

'I think to do it properly they need to be sitting down with the cuff on for 5 minutes at rest, and then obviously take a measurement, a minute, take a measurement, a minute, and if you're going to do a third, another minute. I tend to say before medication, before they've taken the tablets, sort of first thing.' (FG7, HCP, F, SC)

Not surprisingly, clinicians appeared to draw on national guidelines as their primary source of guidance when interpreting SMBP data:

'I tend to ignore the first couple of readings to be honest because they usually tend to be a bit higher, so I actually tend to ignore the first few and then take the average and the rest of the readings.' (FG12, HCP, M, PC)

'Yes and then when I get the results I exclude the first day and work out the readings from the remaining six.' (FG12, HCP, F, PC)

Guidelines appeared to give clinicians a basic framework from which to provide advice:

'I think since the NICE 2011 [guidelines] *that sort of gave healthcare practitioners a bit more of a definitive sort of thing to tell patients. Because up until then it was very much ad hoc, and there was less sort of stringent guidelines. But I've found that's a useful tool, you know, telling them exactly how to do it in NICE, as per the diagnostic criteria.'* (FG7, HCP, F, SC)

Length of protocol
Longer and shorter schedules were presented to participants, as seen in Appendices 1 and 2. Comparison of patients' and HCPs' discussions revealed a key difference of opinion on implementing each of the schedules. Clinicians in both primary and secondary care felt the need for clarity about whether SMBP was being used for diagnostic purposes or for ongoing management because these would involve using different schedules:

'With the diagnosis there's a root work that would have to be followed, and you discard the first day's readings and then average up the rest basically and then do it over a week, twice daily, so there's a different process to ongoing monitoring which can be very ad hoc *and just you look at the lowest reading I think, because that probably correlates best with the average doesn't it?'* (FG6, HCP, M, PC)

Some HCPs suggested that a longer monitoring schedule with more frequent measurements over a week would be needed for diagnostic purposes, and a 3-day home monitoring schedule would be sufficient for longer-term monitoring. Others felt that the evidence base for this was lacking, whereas most secondary care clinicians stated that this was a standard recommendation to patients:

'What we're probably saying is 7 days for diagnosis and 3 days for monitoring, aren't we really?' (Interview 13, GP, NC, PC)

'Three days would be great for the patients but if you want to get a true, accurate reflection of the BP probably 7 days is more appropriate, if you're treating them … this is the problem as a clinician, because the evidence base is not there to say well, actually, if you monitor for 3 days this month the reading … it equates to monitoring for 7 days over this amount of … you know, so you know, as a clinician it's very hard to just rely on those 3 days of … of monitoring.' (FG7, HCP, F, SC)

Preferred monitoring regimen
Although the focus for the HCPs was on matching schedules to the type of clinical decision being made, patients (in primary and secondary care) focused more on feasibility, whether a protocol was easy to implement in daily life. On this basis the 3-day schedule was preferred:

'Those 3 days are more convenient than the 7 for obvious reasons. It's time isn't it?' (FG3, patient, M, PC)

'… 3 days two readings, I'd be happy to kind of wrap it up and get it sorted rather than stretch it out over 7 days a week.' (FG14, patient, M, SC)

For many of the secondary care patients, the shorter schedule was already recommended by their HCP. All patients discussed benefits of the 7-day schedule, with patients in primary care expressing willingness to comply with monitoring over 1 week if a clear clinical reason for doing so was given. Among the study sample, if instructed to do so by an HCP, patients would generally comply with a 7-day schedule:

'So, if somebody said, "Well, it's best to do it every morning for 3 days", … I would probably fit in with whatever I was told would be best.' (FG11, patient, F, PC)

'I'd probably say yes if it was 1 week a month because you could plan around that week.' (FG8, patient, M, PC)

Initiation of monitoring

Starting to self-monitor in primary care tended to be an individual decision, with patients devising their own regimen for measuring blood pressure. Most were comfortable with monitoring blood pressure independently. A few primary care patients were reluctant to change their schedule once they had established a routine:

'I take medication twice a day and I take it first thing in the morning and middle of the evening. So we're used to that sort of routine, it's just that I don't want to do more [measurements] *in terms of this sort of thing, where I'm satisfied with what I do at the moment.'* (FG9, patient, M, PC)

'The trouble is now, I'm quite happy with routine, I take it [measuring BP] *once a fortnight and it's kept me going for 15 years.'* (FG9, patient, M, PC)

In secondary care, monitoring with some degree of schedule was commonly advised, therefore patients appeared more informed about the reasons for adopting a schedule:

'This is … another reason why it's important to home monitor because at least you can get an accurate picture of when you're watching … you can identify the times when it is not OK, then you and the GP or Doctor X [hypertension consultant] *can discuss that and then address how you can control that.'* (FG2, patient, F, SC)

Education needs

A number of other issues arose as a result of discussing the use of schedules. Patients felt that understanding the rationale behind the basic instructions for SMBP needed to be improved:

'I mean, I never … I never quite understand why they do the best of three and record the best of three.' (FG8, patient, F, PC)

Some appeared confused about their own blood pressure thresholds and identified that education was needed regarding interpreting SMBP results:

'That's the problem. I mean, the doctors say 200 and above is very, very high and I think it's normal for me. So when it's 180 at home, I'm worried that something is wrong.' (FG4, patient, F, SC)

'I think it could be very useful, indeed … you know, educating the patient. Making sure they're aware of [schedules], *you know, what they're doing, how to do it, and what to do with the information.'* (FG4, patient, F, SC)

When discussing morning and evening blood pressure measurement, some indicated a preference regarding the time of day, most notably evenings:

'I tend to take mine of an evening.' (FG5, patient, F, PC)

'Apparently it naturally changes throughout the day, doesn't it, there's like a peak and a trough, isn't there?' (FG5, patient, M, PC)

'I'm not good in the mornings, I'm better at night time. I'm more of a night person, I'm more relaxed at night. I'm a natural night worker I used to be, you know, so I tend to do anything complicated then.' (FG5, patient, F, PC)

Reflected in both primary and secondary care was the consensus that a clearer understanding of the basic elements of blood pressure measurement and how to accurately interpret and act on blood pressure results was necessary before any additional guidance could be absorbed. Patients viewed provision of such education as the HCP's responsibility:

'Yes. I mean to me I wouldn't know, because I'm new to it, when to do it, what number is particularly high, what number I should be at, you know.' (FG5, patient, F, PC)

'Something would have to be defined per person, I think, to do it.' (FG14, patient, M, SC)

'Give some guidance as to what's your norm.' (FG14, patient, F, SC)

Patient and HCP focus groups revealed synergy between the lack of education patients described and gaps in HCPs' knowledge regarding SMBP. Clinicians felt that, although there was national guidance available on how patients should self-monitor for diagnostic purposes, there was a lack of guidance regarding longer-term management. A central problem was that every patient was different and therefore there was no universal rule of thumb when it came to SMBP:

'It's patient education and if we don't educate

them then it's down to them knowing what to do and how to do it, I guess … it is difficult to know where to start.' (FG7, HCP, F, SC)

'The people who'll search the web for these sites are the ones that are going to be more proactive and engaged in their care, it's the ones that haven't got access to internet and haven't got access to this and that equipment are the ones that you need to focus on more, really.' (FG7, HCP, F, SC)

Consequently, clinicians felt there should be more informative guidelines provided on all aspects of home monitoring, but more so if a schedule was implemented. Descriptions of the reference sources for guidance on SMBP appeared to vary from clinician to clinician and within primary care; even within the same practice:

'The trust here, it's very sort of ad hoc *… There's no sort of indication … is it a validated monitor, or when are you doing it? … So I think there is a huge sort of disparity around with what actually sort of advice is given and there's no sort of real check.'* (FG7, HCP, F, SC)

'I think there's something online and even on Facebook about self-monitoring and you can print out a chart for patients but no substantial guidance for us.' (FG6, HCP, M, PC)

'I mean I think these days the world runs on guidelines really and actually the more explicit and the more clear and evidence-based our guidance is the better … so yes, more structured guidance is really important here.' (Interview 15, HCP, M, SC)

DISCUSSION
Summary
This study draws together for the first time opinion from patients and HCPs across primary and secondary care about the use of a defined schedule for SMBP. Patients were inclined towards some form of self-monitoring schedule rather than *ad hoc* monitoring, believing it to aid adherence to medication and allow understanding of blood pressure variability, although with a caveat to remain flexible and sensitive to patients' lifestyles. HCPs also supported the use of a schedule, believing that this could allow patients to take greater ownership of their condition, potentially increasing adherence to regular monitoring and subsequently facilitating treatment decisions. Devising an optimal schedule combining rigour with flexibility

and consideration of a patient's individual background was equally recognised as a challenge by HCPs and patients. In primary care, HCPs and patients considered that overly rigid regimens were likely to lead to increased anxiety. Such disturbance of usual routines for home monitoring could have the potential for transferring patients' anxieties about clinic blood pressure evaluations into the home, and is an area for further study.

Although both groups considered a shorter schedule most practicable, clinicians favoured longer periods of monitoring, particularly for diagnosis. Although both schedules considered were compliant with current national NICE guidance and supported by the literature,[1] the longer schedule was more prominent in current UK NICE guidance, which probably explains why primary care clinicians favoured it in particular.

For most patients and HCPs, the idea of using a schedule seemed logical, but there were practical difficulties raised in terms of implementation. This study highlights that HCPs felt challenged in deciding who they should suggest home monitoring to, and indeed who may be able to comply. It could be argued that a standardised approach could address this; however, clinicians have to take into consideration the needs and abilities of their patients. Given that there is no clear consensus on the optimal approach to home monitoring, it appears that this then makes it harder for HCPs to educate their patients.

Strengths and limitations
To the authors' knowledge, this is the first qualitative study combining the views of clinicians and patients, with and without experience of SMBP, about using schedules to operationalise self-monitoring. The study had good representation of participants in terms of sex and diversity in socioeconomic status. However, two-thirds of potential participants for this study either refused to be interviewed or were not contactable, and it may be that non-participants had divergent views.

Although a range of settings and experience were included, participating primary care patients and HCPs had previously taken part in a trial of self-management,[15] which may have influenced the results. However, the heterogeneity in monitoring regimens that emerged suggested that the trial which reported in 2010 had not overly influenced participants' subsequent behaviour. Furthermore, study personnel facilitating the focus groups and

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interviews were not familiar with the patients or professionals. In terms of secondary care, participants were drawn from one teaching hospital and hence may be expected to have more uniform views than more dispersed sampling. Overall, the use of 13 groups with 66 participants achieving theoretical saturation is reassuring in this regard.[23]

Only two regimens were discussed: a decision made for logistical reasons, and it may be that other suggestions would have given different responses. The choice of regimen was made based on data from the literature (and from the NICE guidance) that shorter than currently recommended schedules are similar to longer schedules in their ability to capture mean blood pressure.[19]

Comparison with existing literature

There is a sizeable amount of evidence from clinical trials and qualitative studies showing that self-monitoring with clinician involvement is effective in the management of hypertension.[15,24] However, there are few studies specifically looking at preferences for and the acceptability of using a home blood pressure monitoring schedule. The key original finding from the current study is in identifying that using a schedule was largely acceptable for most primary care patients with particular schedules favoured over others. Secondary care patients appeared to be already complying with some sort of schedule.

Implications for practice

For a schedule to be implemented into clinical practice it is important to consider why it is needed, and to ensure that it is accepted and usable by both HCPs and patients. Implementation of a schedule for home monitoring whether for diagnosis or for ongoing monitoring appears to be, for some HCPs, a preferable solution to the unguided haphazard routines currently performed by patients. Shorter monitoring schedules were the preferred option of patients in this study. Given evidence that few additional data are gained from longer regimens,[12] coupled with evidence that patients may drift from pre-specified advice,[8] a simpler approach might be appropriate. Rather than asking for 28 readings taken at specific times (for example, two in the morning and two in the evening over 7 days), GPs might gain better adherence by emphasising that a flexible regimen will give similar data provided that at least 3 days of self-monitoring are included.

The present study suggests that using a schedule could result in more patient-centred encounters between the patient and the professional, which could in turn lead to improved adherence to medication and ultimately blood pressure control. The vital ingredient, however, appears to be education. This is necessary for those HCPs who are in a state of flux between adhering to guidelines and being receptive to those patients who welcome a sense of empowerment in managing their health needs. Likewise, patients need specific instruction if they are to adhere to any stated blood pressure measurement regimen including technical instruction, how to measure blood pressure and under what conditions, such as seated after 5 minutes' rest period, and clarity over how essential it is to monitor at specific times of day and whether to discard the first readings. Effective education could reassure patients that a schedule would not eliminate flexibility and would be adaptable to suit the lifestyle and existing routines of the individual.

Joint decision making involving patients has been shown to increase the likelihood of compliance,[25] with clinical recommendations and self-managing blood pressure using a pre-specified protocol previously trialled with success.[15,26] Clear and simple education for HCPs to feel confident about what schedule to implement for which type of patient will be crucial to implementing this effectively in real practice. Measuring blood pressure at home is potentially a powerful tool; however, maximum impact requires proper interaction between HCP and patient. Such an evidence-based practical guide with resources for patients and doctors on how to measure blood pressure at home has been developed in Australia.[27] Similar materials are available in the UK via the British Hypertension Society.[28] Both could potentially be adjusted to add the flexibility discussed above.

REFERENCES

1. National Institute for Health and Care Excellence. *Hypertension in adults: diagnosis and management*. CG127.2011. https://www.nice.org.uk/guidance/CG127 (accessed 14 Jun 2016).

2. Parati G, Omboni S. Role of home blood pressure telemonitoring in hypertension management: an update. *Blood Press Monit* 2010; **15(6):** 285–295.

3. James PA, Oparil S, Carter BL, *et al*. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). *JAMA* 2014; **311(5):** 507–520.

4. Baral-Grant S, Haque MS, Nouwen A, *et al*. Self-monitoring of blood pressure in hypertension: a UK primary care survey. *Int J Hypertens* 2012; **2012:** 582068.

5. McGowan N, Padfield PL. Self blood pressure monitoring: a worthy substitute for ambulatory blood pressure? *J Hum Hypertens* 2010; **24(12):** 801–806.

6. Jones MI, Greenfield SM, Bray EP, *et al*. Patients' experiences of self-monitoring blood pressure and self-titration of medication: the TASMINH2 trial qualitative study. *Br J Gen Pract*. 2012; DOI: 10.3399/bjgp12X625201.

7. Ovaisi S, Ibison J, Leontowitsch M, *et al*. Stroke patients' perceptions of home blood pressure monitoring: a qualitative study. *Br J Gen Pract* 2011; DOI: 10.3399/bjgp11X593893.

8. Grant S, Greenfield SM, Nouwen A, McManus RJ. Improving management and effectiveness of home blood pressure monitoring: a qualitative UK primary care study. *Br J Gen Pract* 2015; DOI: 10.3399/bjgp15X687433.

9. O'Brien E, Pickering TG, Asmar R, *et al*. Working Group on Blood Pressure Monitoring of the European Society of Hypertension International Protocol for validation of blood pressure measuring devices in adults. *Blood Press Monit* 2002; **7:** 3–17.

10. McManus RJ, Wood S, Bray EP, *et al*. Self-monitoring in hypertension: a web-based survey of primary care physicians. *J Hum Hypertens* 2014; **28(2):** 123–127.

11. Brook RD. Home blood pressure: accuracy is independent of monitoring schedules. *Am J Hypertens* 2000; **13(6):** 625–631.

12. Niiranen TJ, Asayama K, Thijs L, *et al*. Optimal number of days for home blood pressure measurement. *Am J Hypertens* 2015; **28(5):** 595–603.

13. Fletcher BR, Hartmann-Boyce J, Hinton L, McManus RJ. The effect of self-monitoring of blood pressure on medication adherence and lifestyle factors: a systematic review and meta-analysis. *Am J Hypertens* 2015; **28(10):** 1209–1221.

14. Jones MI, Greenfield SM, Bray EP, *et al*. Patient self-monitoring of blood pressure and self-titration of medication in primary care: the TASMINH2 trial qualitative study of health professionals' experiences. *Br J Gen Pract* 2013; DOI: 10.3399/bjgp13X668168.

15. McManus RJ, Mant J, Bray EP, *et al*. Telemonitoring and self-management in the control of hypertension (TASMINH2): a randomised controlled trial. *Lancet* 2010; **376(9736):** 163–172.

16. Patton MQ. *Qualitative evaluation and research methods*. 2nd edn. Newbury Park, CA: Sage Publications, 1990.

17. Communities and Local Government. *The English Indices of Deprivation 2010. Neighbourhoods statistical release*. 24 March 2011. https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/6871/1871208.pdf (accessed 22 Jun 2016).

18. Barbour RS, Kitzinger J, eds. *Developing focus group research: politics, theory and practice*. London: Sage Publications, 1999.

19. Nunan D, Thompson M, Heneghan CJ, *et al*. Accuracy of self-monitored blood pressure for diagnosing hypertension in primary care. *J Hypertens* 2015; **33(4):** 755–762.

20. Barbour RS. The case for combining qualitative and quantitative approaches in health services research. *J Health Serv Res Policy* 1999; **4(1):** 39–43.

21. Ritchie J, Lewis J, eds. *Qualitative research practice: a guide for social science students and researchers*. London: Sage Publications, 2003.

22. Pope C, Ziebland S, Mays N. Qualitative research in health care. Analysing qualitative data. *BMJ* 2000; **320(7227):** 114–116.

23. Mason M. Sample size and saturation in PhD studies using qualitative interviews. *Forum: Qualitative Social Research*. 2010; **11(3):** 8.

24. Hanley J, Ure J, Pagliari C, *et al*. Experiences of patients and professionals participating in the HITS home blood pressure telemonitoring trial: a qualitative study. *BMJ Open* 2013; DOI: 10.1136/bmjopen-2013-002671.

25. Vermeire E, Hearnshaw H, Van Royen P, Denekens J. Patient adherence to treatment: three decades of research. A comprehensive review. *J Clin Pharm Ther* 2001; **26(5):** 331–342.

26. O'Brien C, Bray EP, Bryan S, *et al*. Targets and self-management for the control of blood pressure in stroke and at risk groups (TASMIN-SR): protocol for a randomised controlled trial. *BMC Cardiovasc Disord* 2013; DOI: 10.1186/1471-2261-13-21.

27. Sharman JE, Howes F, Head GA, *et al*. How to measure home blood pressure: recommendations for healthcare professionals and patients. *Aust Fam Physician* 2016; **45(1):** 31–34.

28. British Hypertension Society. Home blood pressure monitoring. 2014. http://bhsoc.org/resources/hbpm/ (accessed 24 Jun 2016).

Appendix 1. Patient topic guide: implementing schedules

Proposed schedules
- There are two proposed frequencies that have been suggested from previous studies and clinical guidelines, which are:

  '3 days of monitoring at least twice a day' OR *'7 days, twice in the morning, twice in evening'*.

  Also between readings it is suggested to *'take a rest of 1 or 2 minutes'*.

Visual aided discussion
What do you think about the length and time that are involved in the proposed schedule(s)?

- Is it feasible to monitor at both times of day? Yes/no/indifferent.
- Is it feasible to monitor with a rest in between readings of 1–2 minutes?
- Is it feasible to discard the first reading on each occasion?
- Do any of you currently follow a schedule like this?
- Does home monitoring make you feel more in charge of your blood pressure management?
- Do you think this schedule(s) is/are acceptable to your daily routine or living, lifestyle modifications, or working life? How would this schedule fit in if you are at work? To what extent does this schedule restrict your daily/weekly lifestyle?
- What problems might there be for you to adhere to this schedule?
- How do you feel about making lifestyle changes based on the proposed schedules? Do you think this schedule would make it easier or harder for you to monitor your blood pressure?

Patient experience of measuring blood pressure at home
- Does blood pressure monitoring make you feel more anxious or reassured?
- Do you ever take repeated measurements until your blood pressure settles down?
- What would you prefer … 24-hour ambulatory care readings versus 3/4 or 7 days of self-monitoring? Which one is better? More reliable?
- Have you had any experience of telemonitoring?
- If so, did you find it reassuring or did it make you anxious?
- Would you prefer readings to be sent as you do them or to be reviewed later on?
- [Practical one] Do you know how to text?
- What do you feel are the main issues to consider when thinking about:
  1. The timing
  2. Frequency, and
  3. Duration of self-monitoring at home, that is, two readings am/pm with 1–2 minutes, for 3 or 7 days?

Patient recommendations of optimum monitoring schedule
- If you had to decide a schedule what would it be like?
- What would you choose for your next blood pressure evaluation? Home blood pressure, clinic blood pressure, or ambulatory blood pressure monitoring?

Appendix 2. Health professional topic guide: implementing schedules

Proposed schedules
- There are two proposed frequencies that have been suggested from previous studies, which are:

'3 days of monitoring at least twice a day' OR *'7 days, twice in the morning, twice in evening'.* Also between readings it is suggested to take a rest of 1 or 2 minutes.

- Do you recommend a schedule of this kind to your patients? [If yes] what do you currently say?
- What do you think about the length and time that is involved in the proposed schedule(s)?
- Do you think it is feasible for your patients to self-monitor:
  1. At both times of day? Yes/no/indifferent;
  2. To monitor with a rest in between readings of 1–2 minutes; or
  3. To discard the first reading on each occasion?
- [Depending on what schedule they agree on] Overall do you think this schedule is realistic?
- Do you think patients will find it easy or difficult to adhere to this schedule? Why?
- Do you think this schedule would make it easier or harder for patients to monitor their blood pressure?
- Have your patients ever suggested to you that they find self-monitoring worrying or reassuring? Which method, home blood pressure monitoring or clinic, do you think evaluates blood pressure more reliably?
- What would you prefer to recommend for patients 24-hour ambulatory care readings versus 3/4 or 7 days of self -monitoring? Which one is better? More reliable?
- What do you feel are the main issues to consider when thinking about the timing, frequency, and duration of self-monitoring at home?

Training
- Do you feel there is enough or adequate information about self-monitoring blood pressure to enable you to recommend the practice to patients?
- Do you feel patients have enough information and guidance to self-monitor effectively?
- Where do you look to for guidance or advice on self-monitoring?
- Do you feel able to communicate self-monitoring information effectively to your patients? Could there be more? If so, what methods would you prefer?

Recommendations on the optimal self-monitoring schedule
- What type of readings is the easiest method for you to use and why? (They may bring up benefits of ambulatory blood pressure monitoring over self-monitoring of blood pressure here, or discuss clinic over self-monitoring of blood pressure.)
- What format of obtaining the results would you prefer? For example, telemonitoring, paper, or text? Why?