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## Stroke patients' perceptions of home blood pressure monitoring:

a qualitative study

### Abstract

#### Background

Stroke is the leading cause of adult disability in the UK. Hypertension is the leading modifiable risk factor for stroke. There is increasing interest in home blood pressure monitors for self-monitoring, but no published research on the experiences of stroke patients who do self-monitor.

#### Aim

To explore stroke patients' experiences of self-monitoring with nurse-led support.

#### Design and setting

A qualitative study of 26 (66%) patients from the first 39 participants to complete the intervention arm of a community-based randomised controlled trial (RCT) of home blood pressure monitoring in 381 patients recruited from hospital stroke clinics in south London.

#### Method

Semi-structured face-to-face interviews were conducted with 26 patients. Interviews were digitally recorded and transcribed, and a thematic analysis of the data was undertaken.

#### Results

Participants were highly motivated to avoid a further stroke and developed a strong focus on blood pressure control and attaining a 'good result'. Only a minority reported anxiety about their blood pressure. Participants gained a welcome sense of empowerment and control over managing their health; some felt confident and 'experimented' with their medication doses. Eight patients required physical help to self-monitor and there was uncertainty about where responsibility lay for such help. Patients who lived alone and were functionally impaired had the least positive experience. Active engagement with the home blood pressure monitoring process by GPs was variable.

#### Conclusion

Patients in this study generally reported increased knowledge and empowerment about blood pressure control and avoiding further strokes. The technique is overall welcome, acceptable, and successful, even in patients with disabilities. Since home blood pressure monitoring can also lead to improved blood pressure control, this simple, pragmatic intervention might be more widely used.

#### Keywords

home blood pressure monitoring; patient participation; stroke.

### INTRODUCTION

Stroke is the leading cause of adult disability in the UK, with an estimated 72 000 first-time strokes per year,<sup>1</sup> and is the third most common cause of death worldwide.<sup>2</sup> Approximately one-quarter of all strokes are recurrent strokes.<sup>3</sup> Hypertension is a major risk factor for stroke. The PROGRESS (perindopril protection against recurrent stroke study) trial has shown that the risk of recurrent stroke can be reduced by improved blood pressure control.<sup>4</sup> Unfortunately, management of hypertension in the community is often inadequate, with only around 50% of patients on treatment achieving target values.<sup>5</sup>

The availability of validated electronic blood pressure monitors allows patients to self-monitor at home, and this has been associated with improved blood pressure control.<sup>6,7</sup> However, no studies of self-monitoring have been performed specifically in stroke patients, who may have practical difficulties through disability, but who also may have high motivation to control their blood pressure to avoid another stroke.

This study describes the experiences of home monitoring among stroke patients with hypertension recruited from hospital stroke clinics. Participants had been given a home blood pressure monitor, a target home blood pressure of <130/80 mmHg, and nurse support for a year, in the context

of a randomised controlled trial in 381 stroke patients to see if home monitoring was associated with lower blood pressure after a year.<sup>8</sup> By choosing a qualitative methodology, it is possible to explore the feasibility and acceptability of this intervention.

### METHOD

#### Participants

Full details of the trial protocol are reported elsewhere.<sup>8</sup> Patients were eligible to participate if they had suffered a stroke or transient ischaemic attack within the last 9 months, had been discharged and were living in the community, and had hypertension (blood pressure above 140/85 mmHg or on antihypertensive medication). Patients with poor cognition (64 out of 1181 considered for inclusion) or significant comorbidity (48 out of 1181 considered for inclusion) likely to dominate care were excluded. Eighty one per cent of eligible clinic patients (250 out of 309) agreed to participate in the trial.

Intervention patients were visited at home by a research nurse, given a blood pressure monitor and shown how to use it. The training took, on average, 11 minutes (range 5–30 minutes). Participants were asked to take their blood pressure daily for the first week, then weekly, taking three readings each time and recording them in a booklet. The target blood pressure (<130/80 mmHg)

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## How this fits in

Home blood pressure monitoring is technically feasible and acceptable and associated with better blood pressure control. In people with stroke, disabilities may cause difficulties with self-monitoring. This qualitative study of 26 stroke patients with hypertension who were given blood pressure monitors found that most felt empowered by blood pressure monitoring and developed a strong focus on blood pressure control. Patients who were disabled or lived alone had a less positive experience, and GP involvement was variable.

was clearly displayed on the monitor and in the booklet. Patients received a further visit after 1 month and telephone support for the following year. If blood pressure was consistently above target, patients were advised to see their GP. A letter was sent to the GPs of participants, informing them of the study and explaining that recommended home blood pressure targets (<130/80 mmHg) were less than clinic targets (<140/85 mmHg).

In the current qualitative study, a convenience sample of all 39 participants who had completed the intervention arm of the trial by 31 December 2008 were invited to be interviewed about their experiences of self-monitoring. Semi-structured, face-to-face interviews with participants were conducted at home between January and March 2009 by a research GP. The study was approved by Redbridge Research Ethics Committee, and all participants gave written consent.

### Topic guide and procedure

A theoretical model for the effect of the complex intervention was developed, which focused on patient-related factors (such as anxiety levels, knowledge, social networks); GP-related factors (such as knowledge and attitudes towards blood pressure control); and the interaction between GP and patient. From this model, a topic guide for the interviews was produced, which included: general impressions of the trial; motivation to take part in the trial; ease or difficulty of self-monitoring; impact of self-monitoring on GP consultations; and the patient's relationship with their GP.

Each interview lasted 30 minutes on average and was audiorecorded and transcribed verbatim. In addition, field notes were made during the interview to provide background information for analysis.

## Analysis

Initial coding was undertaken by one researcher, with the use of the computer package Max QDA. Three members of the research team individually read and reread the transcripts and developed codes from the data. Following this, the team collectively developed higher codes from the data. This process of investigator triangulation allows for internal validity.<sup>9</sup>

## RESULTS

### Characteristics of patients

Of the 39 patients invited to take part, nine declined and four did not reply, which left a convenience sample of 26 (66%). The mean age of 26 participants was 70 years (range 47–86 years), nine were female, and five were from ethnic minorities. Characteristics of participants and refusers were similar, including the proportion reporting they were self-monitoring at the end of the trial (Table 1). The mean age of all trial patients was 72 years, 57% were male and 43% female, as compared with the participants who took part in this qualitative study who had a mean age of 70 years and 65% were male and 35% female. Only four patients required assistance with activities of daily living. For eight participants, carers contributed to the interview.

Of the 26 participants, 23 continued to use their blood pressure monitor after the 12 months of the trial, 12 on a weekly basis and 11 less frequently. Three had discontinued because the trial had finished, or they were no longer physically able to use the monitor, or did not have a carer to help. Of 23 participants who continued to self-monitor, eight had their blood pressure taken by carers.

### Major themes

Four major themes emerged from the analysis: motivation to avoid a further stroke; the positive experience of self-monitoring; knowledge, control, and empowerment; and the patients' relationship with their GP.

### Motivation to avoid a further stroke

All of the participants had suffered a stroke, and the majority expressed a strong desire to not have another one. Patients had therefore willingly learnt about blood pressure and continued to focus on achieving their blood pressure target which participants interpreted as a 'good result':

**Interviewer:** *'Why are you continuing to monitor?'*

**Patient:** *'Because I don't want another one'*

**Table 1. Characteristics of participants and refusers in the qualitative study compared with participants of the main trial of home blood pressure monitoring in stroke patients with hypertension**

	Participants, n = 26, % (n)	Refusers, n = 13, % (n)	Whole trial participants, n = 337 <sup>a</sup> , % (n)
<b>Age group, years</b>			
25–39	0 (0)	0 (0)	2 (6)
40–54	8 (2)	23 (3)	9 (35)
55–69	42 (11)	15 (2)	24 (91)
70–84	42 (11)	39 (5)	54 (192)
≥85	8 (2)	23 (3)	15 (57)
<b>Ethnicity</b>			
White	81 (21)	77 (10)	77 (260)
Black African or Caribbean	11 (3)	8 (1)	12 (41)
Other	8 (2)	15 (2)	11 (36)
<b>Sex</b>			
Male	65 (17)	69 (9)	57 (193)
Female	35 (9)	31 (4)	43 (144)
<b>Rankin disability scores</b>			
0 No symptoms at all	19 (5)	22 (3)	29 (97)
1 No significant disability despite symptoms	27 (7)	39 (5)	26 (89)
2 Slight disability	38 (10)	39 (5)	27 (91)
3 Moderate disability	8 (2)	0 (0)	6 (19)
4 Moderately severe disability <sup>b</sup>	8 (2)	0 (0)	10 (35)
5 Severe disability	0 (0)	0 (0)	2 (6)
<b>Use of home blood pressure monitoring at time of interview (telephone information for refusers)</b>			
Regularly	54 (14)	54 (7)	
Infrequently	35 (9)	0 (0)	
Not at all	11 (3)	23 (3)	
Not contactable <sup>c</sup>	0 (0)	23 (3)	

<sup>a</sup>Of 381 patients randomised at the start of the trial, 337 patients were followed up at 12 months; the remaining patients had either died or were lost to follow-up (n = 44). <sup>b</sup>Includes two patients with moderate expressive dysphasia. <sup>c</sup>Three refusers were not contactable.

of these [stroke]! I don't want another. You know, once you've had an experience like this, I want to do everything to avoid another one, you know, so that's why. I want to live!' (patient 17, 57-year-old male)

#### The positive experience of self-monitoring

Almost all patients expressed positive sentiments in relation to home monitoring. They felt an increased confidence and sense of control about their blood pressure and recurrent stroke prevention. Many expressed confidence that there was information about blood pressure targets, telephone support, and advice from the GP if readings were high. Some patients also commented that they liked the fact that someone was taking an interest in them and their blood pressure. Patients cited various advantages of self-monitoring: easy to use the monitor, trust in the 'professional' monitor provided, convenience, saving time, less need to visit their GP, positive effect on mood, reassurance, relief, and peace of mind:

'I wouldn't know what the signs are of my

blood pressure getting high. The monitor will tell me that and as it's a professional monitor, I have faith in it. It's not one ordinary little thing that perhaps you buy cheap on the side or anything like that; it's a professional monitor, so I have faith and I'm able to monitor it as professionally as professionals can.' (patient 12, 67-year-old male)

All but four patients found having the monitor was reassuring and reduced their anxiety about having another stroke. Three patients said they felt anxious if readings were high, and the fourth was anxious about the possibility of another stroke because she had a monitor but no one to operate it. The fluctuating nature of blood pressure also made some carers anxious:

'That was actually quite hard, the fact it says in the trial if there's a high reading to take the blood pressure again later on in the day. But I spent the whole day worrying then, until I took the second reading ... It didn't do a lot for my blood pressure [little laugh]!' (carer 3)

One carer thought that home monitoring was a health task that should be carried out by healthcare professionals. Participants who relied on carers to do their blood pressure check also had mixed experiences of self-monitoring. A female housebound patient living alone was keen to use the monitor, but as she was severely disabled she was dependent on others to check her blood pressure as she could not use it herself. She felt let down by her GP as she was not offered home visits to check her blood pressure.

### **Knowledge, control, and empowerment**

As a result of increased knowledge concerning blood pressure targets, some patients questioned why their blood pressure had not been managed more aggressively by their GP prior to their stroke and were, in hindsight, critical of their management:

*'I think GPs should be made more aware of this blood pressure thing and not say, "Well, it's a bit high, but you'll live, don't worry!" and off you go, because you think, fine, everything's safe. I think that's the criminal part of it ...'* [patient stopped as tearful] (patient 17, 57-year-old male)

Empowerment is 'a process through which people gain greater control over decisions and actions affecting their health'.<sup>10</sup> Patients discussed using the blood pressure monitor as a tool to take control of their health and legitimise seeking specific help from professionals for blood pressure control at an earlier stage. This sense of empowerment and control is particularly apparent in the following quotation:

*'But when you're taking your blood pressure yourself, you have a hold on what's going on. I can't explain it very clearly; the words just don't seem to come at the moment, but you feel that you have some knowledge of what's going on. I think that's it. I know the doctors always like, say, "Have you any questions?" but the thing is, you can't really think of many questions when you're there. It's only about 3 weeks later that something crops up! [little laugh] But mostly I do feel that most of the doctors do explain clearly what they're going to do or what they're expecting. But having a finger in the pie, helps [laughter]!'* (patient 20, 73-year-old female)

Another example of such empowerment is where several participants described how they used the monitor when they felt dizzy or

'odd', to exclude high blood pressure as a cause of their symptoms:

*'And it always comes in handy; you feel a little bit dodgy, you can always take it to see what your blood pressure is ...'* (patient 2, 75-year-old male)

Some patients who had an elevated reading felt confident to defer seeing their GP until they had repeated the measurement. In one case, a woman whose early morning readings were significantly elevated chose not to record these readings, and she would repeat them later in the day when they were lower:

*'Well, I'd been told that if it got high, I was to contact the GP and go and get it read over at the surgery. But I didn't report any of the ones that are higher, because I thought, well, I'll take it again, I won't panic. I'll take it again tomorrow, which I did and then it had gone down again, so I didn't go.'* (patient 5, 61-year-old female)

Three patients felt that they could make autonomous decisions regarding their treatment, and as a result they 'experimented' with their medications:

*'If it [blood pressure] goes up, on many occasions, OK, I used to take extra tablet (...) I take two type of blood pressure: one is 10 mg and one [pause] er, the 10 mg twice a day, and 5 mg once a day. So when I see it's high up, I take straight away another 5 because I don't want to overdose myself.'* (patient 6, 50-year-old male)

A different participant omitted an antihypertensive medicine for several weeks to prove to his GP that his blood pressure was perfectly well controlled without medication.

All participants said that they understood the importance of high blood pressure readings and the need to communicate this to a healthcare professional. However, some of them did not seek medical advice when readings were elevated. On questioning, 15 patients did see either their GP or practice nurse for a blood pressure review, whereas 11 patients said they had not as they did not want to 'bother the doctor' and/or when they repeated their blood pressure the reading was lower, which reassured them.

### **Patients' relationship with their GP**

Overall, the increased empowerment had an impact on participants' relationship with

their GP. A number of participants commented that their GPs reacted positively to them being involved in the trial. Some said that their GP would look at their home blood pressure readings and compare them to clinic values:

*'I could use it because the GP says to do a few readings before I go to see her next, so that she can compare her readings with mine. The last time I took three readings up to her ... she was pleased to have that to compare it with ...'* (patient 5, 61-year-old female)

However, several patients remarked that their GPs were not as involved or 'interested' in their blood pressure as they would like.

## DISCUSSION

### Summary

Participants in this study were highly motivated to avoid a further stroke. Taking part in the trial increased their knowledge about blood pressure targets and what to do if blood pressure rises. While there may be a degree of uncertainty about when to seek help, it shows that participants were aware of and appreciated the fluctuating nature of blood pressure, and incorporated this knowledge into their interpretations of readings. Participants felt more empowered to manage their own health, and some felt confident about monitoring; for example, some participants took responsibility for high blood pressure readings by repeating them before reporting to their GP, and some patients 'experimented' with their medication doses. Patients living alone and who were functionally impaired had the least positive experience. For some patients, increased knowledge of the importance of blood pressure control led them to feel regret and a sense of being 'let down' in the past when pre-stroke blood pressure had not been well controlled.

### Strengths and limitations

To the authors' knowledge, this is the first qualitative study of home blood pressure monitoring in stroke patients.<sup>11</sup> All eligible patients attending stroke clinics were invited to take part in the original trial, and only 20% declined. This suggests the participants are likely to be reasonably representative of patients who might be advised to buy a blood pressure monitor by outpatient or stroke services. Participants of differing age, sex, ethnicity, and functional impairment were interviewed. The use of qualitative methodology nested within a trial allows for a richer insight into the process of

the intervention, by adding participants' interpretations and experiences of self-monitoring.<sup>12</sup> Finally, this study has shown that the complex intervention involved in the trial is simple, relatively cheap, and pragmatic for users.

One-third of potential participants for this study either refused to be interviewed or were not contactable, and it may be that these patients had a less positive experience of self-monitoring. However, those who refused appeared to be similar to those interviewed and were just as likely to be monitoring at the end of the trial. The original trial excluded patients with poor cognition, and patients needed to be well enough to be discharged from hospital into the community. In fact this was a small proportion of those with strokes, but the findings of this study cannot be applied to stroke patients with poor cognition.

The participants were reporting experiences specific to the home blood pressure monitoring intervention in this trial, which included a home visit and telephone nurse support, but which may be different from the content of other self-monitoring interventions. However, the study findings are consistent with similar work in the field regarding patient perceptions of self-monitoring,<sup>13-16</sup> and highlight the importance of the doctor-patient interaction for home monitoring and how patients can feel empowered by this complex intervention, even self-adjusting their medication. One potential bias could be that the interviewer herself is a GP and associated with the main trial. Participants may have felt obliged to make positive comments about the intervention. However, the interviewer was aware of this and emphasised her role to participants as a researcher rather than a GP. This is evidenced by the open criticism of some participants about the lack of involvement of their GP in their care and the openness of some participants about altering medication without telling their GP. Finally, the findings may not be generalisable to other patients with hypertension who have not suffered a serious event like a stroke as a consequence of high blood pressure, and may be less motivated to monitor their blood pressure

### Comparison with existing literature

Other studies have shown that home monitoring is an acceptable method of measuring blood pressure, but there are no studies specifically in stroke patients.<sup>13</sup> Unlike other new technologies where older

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### Ethics committee

Redbridge research ethics committee approved the study (REC 08/H0701/98).

### Funding body

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### Provenance

Freely submitted; externally peer reviewed.

### Competing interests

The authors have declared no competing interests.

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people are less frequent users, self-monitoring of blood pressure has 'peak penetrance in middle-aged and older people'.<sup>14</sup> This may be due to the increased prevalence and awareness of high blood pressure among older age groups.<sup>17</sup> Further research is required to see if more sophisticated technologies such as remote blood pressure monitoring using mobile phones<sup>18</sup> would be equally acceptable.

GPs have expressed concern that patients will become anxious or preoccupied with home readings,<sup>19</sup> and among patients newly diagnosed with diabetes increased depression was found in those randomised to self-monitoring blood glucose.<sup>20</sup> However, anxiety was not a major theme for self-monitoring in stroke patients in this study.

#### **Implications for clinical practice**

Not only are average blood pressure measurements obtained from self-

monitoring better predictors of stroke risk than office or clinic readings,<sup>21</sup> but this intervention also provides an opportunity to measure day-to-day variability in blood pressure. Blood pressure variability itself is an important determinant of recurrent stroke risk.<sup>22</sup> For most stroke patients in this study, home monitoring is technically acceptable, reassuring, and empowering. If self-monitoring is to form part of the future of stroke prevention, practical issues of support in using the blood pressure monitors (particularly for those who require help with monitoring) need to be resolved. Finally, informed, engaged, and consistent primary care involvement, including intensification of antihypertensive treatment to achieve recommended blood pressure targets, is a prerequisite if the potential benefits of this technology are to be fully realised for stroke patients with hypertension.

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