

BMJ Open Quality Community stroke team use of home blood pressure monitoring improves blood pressure control after stroke: a quality improvement report

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INTRODUCTION

The National Health Service (NHS) England and Improvement (NHSE/I) blood pressure monitoring at home (BPM@Home) initiative was launched in 2020 in response to the COVID-19 pandemic to improve hypertension control while reducing GP appointments.¹

Home blood pressure (BP) monitoring (HBPM), a better indicator of long-term morbidity and mortality than clinic readings,² may reduce costs and complications of unnecessary antihypertension treatment in at least 10%–15% of the population with white coat hypertension,³ while facilitating appropriate treatment of elevated high home BP not detected in clinic. Overall, 25%–30% of patients who had a stroke have a subsequent cardiovascular event,⁴ especially within the first few weeks. A 5 mm Hg systolic BP (SBP) reduction reduces the risk of serious cardiovascular events by approximately 10%.⁵ The Greater Manchester Neurorehabilitation and Integrated Stroke Delivery Network (GMNISDN) used the BPM@Home scheme to assess whether BP management after stroke could be improved.

METHODS

Trained community stroke teams (CSTs) provide repeated multidisciplinary team visits to patients discharged from stroke units, with specialist rehabilitation, assessment and advice for risk factor modification including hypertension. Previously General Practitioners, informed of single CST BP measurements $\geq 140/90$, asked to consider adjusting hypertension treatment, responded often slowly and inconsistently, especially during COVID-19 restrictions.

Within 8 weeks of BP measurement and management training by webinar⁶ with subsequent interactive updates nurse-led CSTs identified all patients with an initial BP at home $>130/80$ mm Hg (average of the last 2 of 3 manual or automated readings). These patients were issued with an appropriate BP monitor and cuff (Omron M2 or M8 Intellisense if in atrial fibrillation (AF)) and they, a carer or relative were trained to record sitting BP (or supine if bed bound) in duplicate morning and evening for 4 days giving a 'baseline' average (avHBPM). CST members took the BP readings otherwise. All subsequent data and decisions were based on similar 4-day avHBPMs prior to the next CST visit.

If baseline avHBPM was $\leq 130/80$ mm Hg, patients exited the BPM@Home programme. If avHBPM was $>130/80$ mm Hg, hypertension medication was amended either through stroke nurse prescribers (in two teams) or via the patients' GPs previously alerted to the programme and emailed following each visit including avHBPM and a SNOMED code for inclusion in the GP record. This facilitated a prompt response with little exception. After 2 weeks to allow effect of medication changes, another avHBPM was recorded. This continued every 2 weeks until the avHBPM was $\leq 130/80$ mm Hg. Full data collection was completed within 6 months.

Demographics, the presence of pre-existing AF and patient and staff evaluations were collected. SBPs are reported reflecting the priority of SBP control in stroke reduction.⁷

RESULTS

Ten of 11 CSTs involved had a stroke nurse within their team who delivered avHBPM results and expedited GP responses.

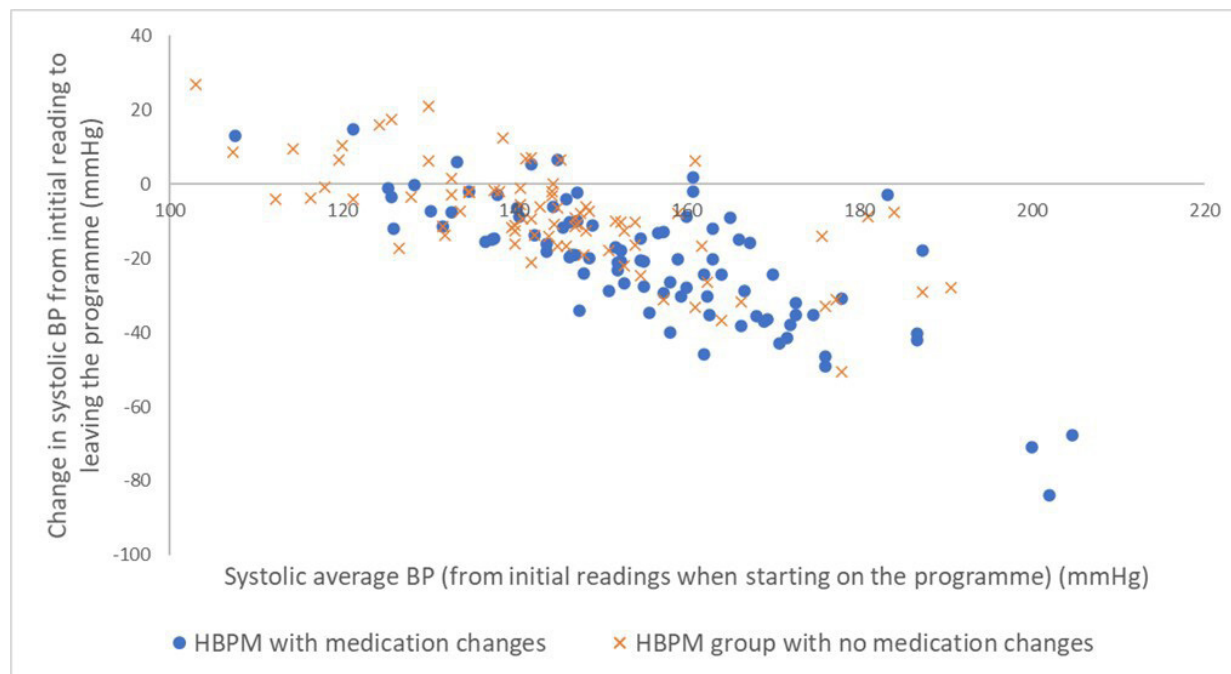


Figure 1 Scatter plot to highlight the patients' initial systolic BP reading average against the patients change in BP during their participation

A total of 168 patients who had a stroke had HBPM (median age 71 years, 63% male, 90% white British, 21% with AF). Fifty-four per cent had hypertension medication introduced or changed with avHBPM beyond baseline. Systolic avHBPM fell in 87% (average 15 mm Hg) (figure 1). Of the 46% with baseline avHBPM $\leq 130/80$ mm Hg, BP had fallen in 80% compared with the initial BP. No patient continued beyond 8 weeks of HBPM because

of reaching target. Less than 2% declined participation or chose to leave the programme.

CST feedback reported improved confidence in managing BP resulting from training (enhancing pre-existing standardised operating protocols), regular interactive group updates and better GP communication with fewer patients needing BP assessment visits beyond 4 weeks (figure 2). Patients favoured providing HBPM

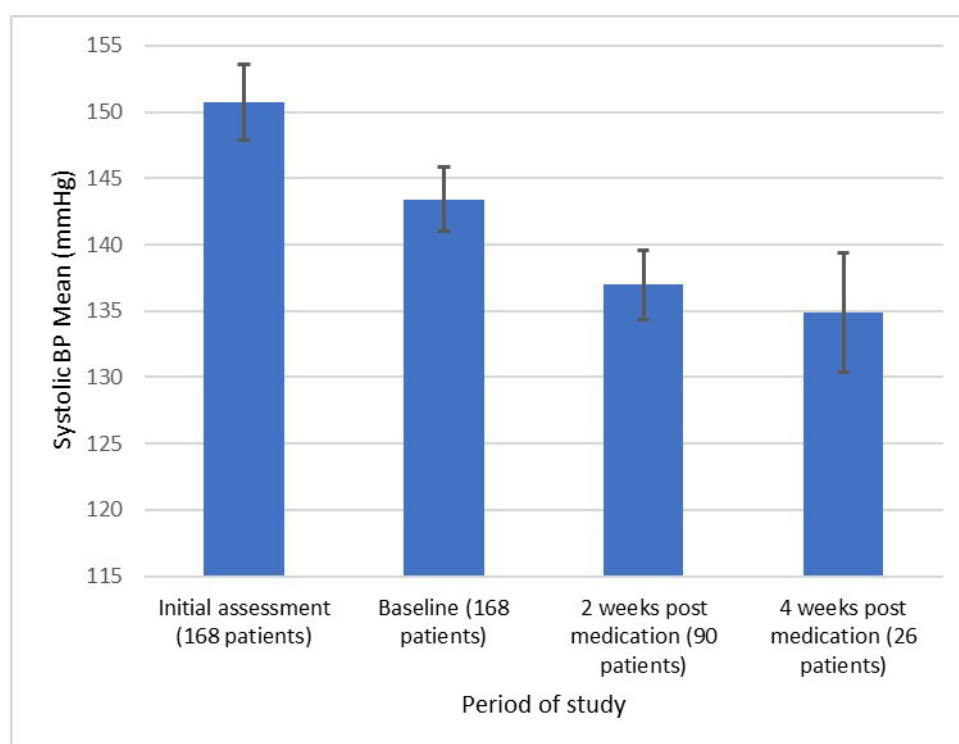


Figure 2 Mean systolic BP readings with 95% confidence intervals for periods within the study (including participant numbers)

results at CST visits or by telephone rather than by texts or email.

DISCUSSION

BPM@Home can be implemented rapidly in a community stroke setting where thoroughly trained CST nurses supervise and cascade training to other staff and patients and expedite timely HBPM control. Half of patients who had a stroke were able to have unnecessary hypertension medication withdrawn. GP medication changes in the remainder could be made speedily. Before HBPM was introduced, medication changes based on single BP readings were delayed awaiting review by GPs or stroke physicians, risking under or over treatment with possible symptomatic hypotension or increased strokes through delayed BP control.

With stroke nurse appointments, BPM@Home has become preferred practice within every CST in GMNISDN. This could be implemented in other community services.

This study was limited by the necessary urgent response required by NHSE/I to improve BP control of clinically vulnerable patients during the pandemic and precluded collecting comparative data to look at natural BP variability,^{8,9} those who withdrew, and inter team variations. Further detailed stroke outcome and economic analysis is required to comparing the new service with that preceding BPM@Home.

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Contributors SR, CS, LW and TW contributed to the service development work. CS and LW were involved as two of the participating Community Stroke Teams within the project. CJA and SR conducted the analysis described. All authors contributed to the subsequent editing and review of the final manuscript. SR is responsible for the overall content as guarantor.

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