# Nurse-led repeat prescription for patients with controlled hypertension: a randomised controlled trial

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## KEY MESSAGES

1. Nurse-led repeat prescription is well accepted by patients with good compliance.
2. Clinical outcomes of nurse-led repeat prescription are non-inferior to doctor consultation.
3. Policy makers may explore and expand the role of nurses in public primary care settings.

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## Introduction

Repeat prescription of medication for patients with well-controlled chronic diseases without a direct consultation does not necessarily indicate suboptimal care; one examination a year may be more effective than six short consultations with brief exchanges of courtesies.[1] In fact, repeat prescription is convenient to and welcomed by patients, as it facilitates access to medicines and utilisation of economic and human resources.[1]

In Hong Kong, 30% of the population has chronic conditions, of which hypertension is the most common.[2] More than 87% of patients with chronic diseases receive follow-up in the public sector.[2] Most patients with hypertension are under satisfactory control, but they still receive follow-up every 2 to 4 months for repeat prescription. The amount of medications dispensed per prescription is limited, thus controlling the cost per prescription. However, this comes at the expense of general outpatient clinic appointments, which could be used for patients with other problems.[3]

## Methods

This was a 1-year, prospective, randomised, two-arm intervention study. Patients were recruited from Lek Yuen General Outpatient Clinics in Shatin, Hong Kong, between 28 March 2014 and 30 January 2015 by referrals from 15 primary care doctors. Informed consent was obtained from each participant. The inclusion criteria were (1) diagnosis with hypertension with systolic blood pressure (SBP) of <140 mm Hg and diastolic blood pressure (DBP) of <90 mm Hg at recruitment, (2) no medication titration in the previous 12 months, and (3) no history of cardiovascular diseases, diabetes mellitus, or hypertension complications (as per annual blood and urine checks). Patients were excluded if they were (1) unable to give consent, (2) concurrently in another clinical trial, (3) planned to become pregnant in 1 year or were pregnant at recruitment, or (4) had a known history of renal impairment or cardiovascular disease.

Participants were equally randomised into intervention and usual care groups using computer-generated random numbers. Blood pressure (BP) was measured by a clinical assistant using validated automatic BP monitoring machines. Clinical parameters were retrieved from the Hospital Authority Clinical Management System. Patients received follow-up at months 0, 4, and 8. Usual care resumed at the end of the study (month 12). Patients were encouraged to book episodic appointments for acute illnesses.

In the intervention group, repeat prescription was led by a research nurse. A protocol was developed to ensure consistency: (1) drug compliance and BP of patients were checked at every visit; (2) if BP was normal, a repeat prescription that was pre-signed by the case doctor was issued (as prescriptions can only be provided by medical doctors in Hong Kong); (3) if SBP was >140 mm Hg and/or DBP was >90 mm Hg, the BP was rechecked; (4) if the rechecked BP was between 140/90 mm Hg and 160/95 mm Hg, medication was prescribed and the follow-up was shortened to 1 month; if the patient had abnormal BP during the subsequent visit, the nurse consulted the doctor; (5) if the rechecked BP was >160/95 mm Hg, the nurse consulted the doctor within the same day; (6) the nurse could consult with the attending doctor about complications, side-effects, and concerns about the medication.

The primary outcome measures were SBP and DBP at month 12. The secondary outcome measures were the patient enablement index (which comprises

six questions with a total score of 0-12, with a higher score indicating greater enablement), patients' health service utilisation, frequency of consultations in general and special outpatient clinics, number of admissions to accident and emergency departments, number of hospitalisations, and self-reported private clinic visits.

To assess potential changes to prescriptions, five types of anti-hypertensive prescriptions were recorded at baseline and month 12: (1) angiotensin-converting enzyme inhibitors or angiotensin II receptor blockers such as lisinopril and losartan, (2) beta-blockers such as atenolol and metoprolol, (3) calcium channel blockers such as amlodipine and nifedipine, (4) drugs containing thiazide diuretics such as indapamide, hydrochlorothiazide, and moduretic, and (5) other prescriptions such as alpha blockers or central acting agents such as methyldopa and prazosin. A score of 1 indicated a change of prescription, and 0 indicated the same prescription as the previous one.

## Results

Of the 406 recruited patients, 13 were excluded because of elevated BP (n=4), diabetes (n=2), not receiving hypertension medications (n=1), lack of an annual assessment (n=1), lack of electronic records (n=1), and cognitive impairment (n=4). The remaining 393 participants were randomised to the intervention (n=194) and usual care (n=199) groups. In the intervention group, seven participants dropped out because they felt more secure seeing the case doctor (n=4) or were referred to doctors for newly diagnosed diabetes mellitus (n=1), skin problems (n=1), or hyperthyroidism (n=1). In the usual care group, seven participants were lost to follow-up. The modified intention-to-treat analysis was based on 194 and 192 patients, and the per-protocol analysis was based on 187 and 192 patients in the intervention and usual care groups, respectively (Fig 1).

The mean patient age was 63.5 years; most patients were female, married, non-smokers, had a primary to secondary education level, and about half had been diagnosed with hypertension >7 years prior (Table). Calcium blockers were the most common anti-hypertensive used, followed by beta-blockers. The two groups were comparable in terms of demographics, years since hypertension diagnosis, anti-hypertensive prescriptions, and primary and

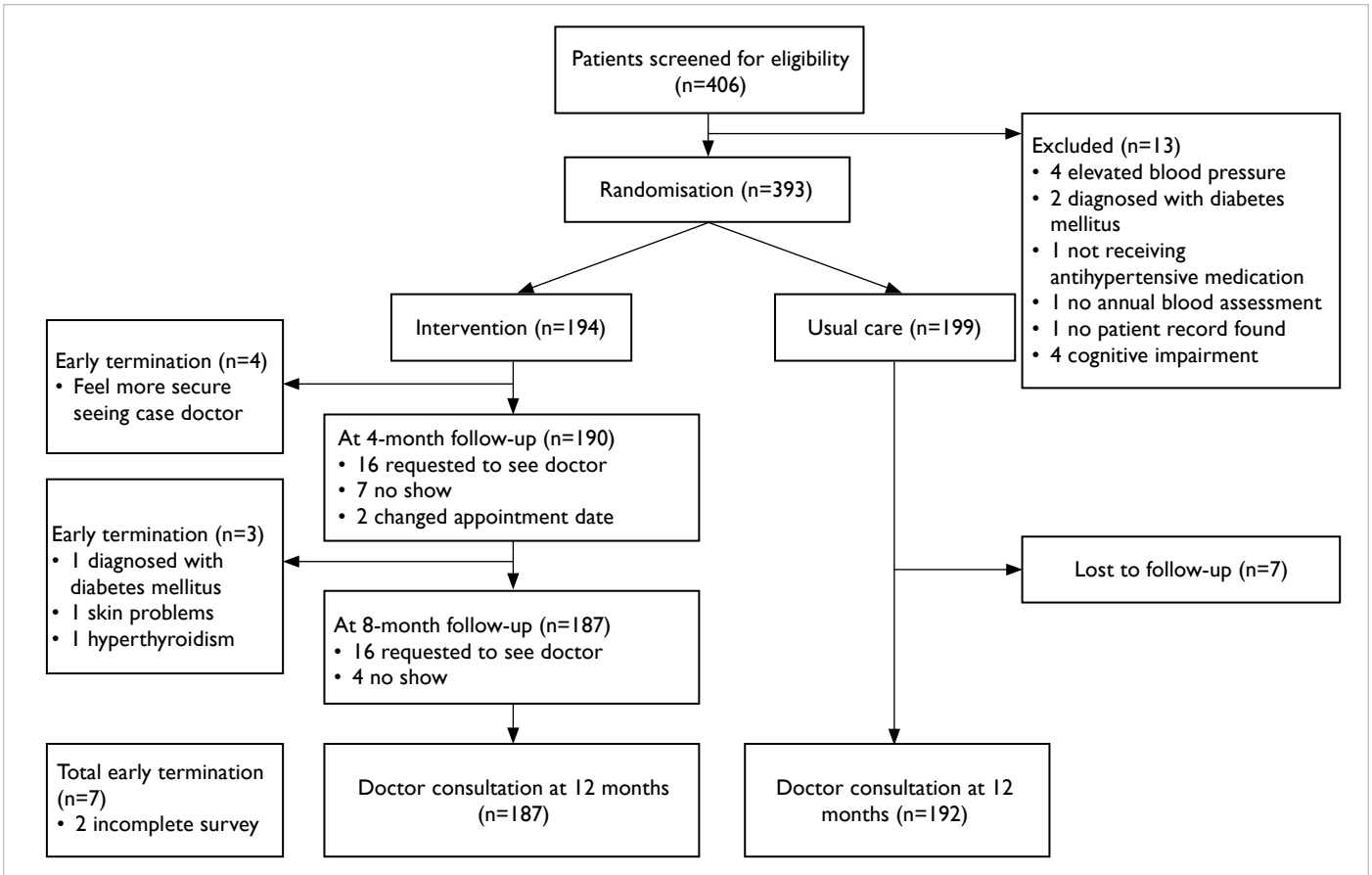


FIG 1. CONSORT flow diagram

TABLE. Participant characteristics at baseline

| Variable | Usual care (n=199)* | Nurse-led repeat prescription (n=194)* | P value* |
|---|---|---|---|
| Systolic blood pressure, mm Hg | 123.4±10.8 | 123.8±9.7 | 0.666 |
| Diastolic blood pressure, mm Hg | 72.3±9.0 | 73.1±9.4 | 0.429 |
| Age, y | 62.9±8.3 | 64.0±9.1 | 0.197 |
| No. of male participants | 72 (36.2) | 85 (43.8) | 0.149 |
| Marital status | | | 0.347 |
| Single | 15 (7.5) | 7 (3.6) | |
| Married | 149 (74.9) | 151 (77.8) | |
| Widowed | 24 (12.1) | 22 (11.3) | |
| Separated | 11 (5.5) | 14 (7.2) | |
| Education level | | | 0.330 |
| Illiterate | 21 (10.8) | 21 (10.8) | |
| Primary 1-6 | 79 (40.5) | 90 (46.4) | |
| Secondary 1-7 | 85 (43.6) | 79 (40.7) | |
| Tertiary or above | 10 (5.1) | 4 (2.1) | |
| Smoking status | | | 0.301 |
| Current | 13 (6.5) | 14 (7.2) | |
| No | 167 (83.9) | 152 (78.4) | |
| Past | 19 (9.5) | 28 (14.4) | |
| Years since hypertension diagnosis | | | 0.338 |
| <2 | 35 (17.7) | 32 (16.6) | |
| 2-7 | 63 (31.8) | 75 (38.9) | |
| >7 | 100 (50.5) | 86 (44.6) | |
| Patient enablement index | 3.1±2.9 | 2.71±2.9 | 0.175 |
| Anti-hypertensive prescription | | | 0.081 |
| Angiotensin converting enzyme inhibitors (lisinopril) or angiotensin receptor blockers (losartan) | 26 (13.1) | 42 (21.6) | |
| Beta-blockers (atenolol, metoprolol) | 68 (34.2) | 56 (28.9) | |
| Calcium blockers (amlodipine, nifedipine) | 145 (72.9) | 149 (76.8) | |
| Diuretics (hydrochlorothiazide, moduretic) | 21 (1.0) | 20 (10.3) | |
| Others (methyldopa, prazosin) | 2 (1.0) | 8 (4.1) | |

* Data are presented as mean±standard deviation or No. (%) of participants

secondary outcomes such as SBP, DBP, and patient enablement index.

After adjusting for baseline values, patients in the intervention group had a non-significantly higher estimated SBP (mean group difference, 0.53 mm Hg; 95% confidence interval [CI], −2.05 to 3.11 mm Hg) and DBP (mean group difference, 1.23 mm Hg; 95% CI, −0.27 to 2.73 mm Hg) than those in the usual care group at the end of the trial (Fig 2). Repeat prescription was non-inferior to usual care because the lower boundary of the 95% CI did not cross the pre-set non-inferiority margin for SBP (6.6 mm Hg) or DBP (3.7 mm Hg). The results were similar between the modified intention-to-treat analysis and the per-protocol analysis, mainly owing to high compliance to the intervention.

The patient enablement index scores at 12 months were similar in the two groups, irrespective of the type of analysis.

In terms of health care utilisation, private hospitalisation was rare (n=12), but consultations in private clinics were more common. A bimodal pattern was observed: <50% of patients did not visit private clinics, but about 36% received care in private clinics on >10 occasions in the 12 months of the study. In addition to regular visits for anti-hypertensive prescriptions (about 4-5 times annually), >27% of the patients made additional general outpatient clinic visits. About 15% of the patients visited accident and emergency departments, and similar percentage of

patients were admitted to public hospitals. Generally, there was no change (>90%) to the type and dose of anti-hypertensive prescribed. Health care utilisation and rate of change to anti-hypertensive prescriptions were comparable between groups.

## Discussion

The safety of nurse-led repeat prescription was supported by the similar BP outcomes observed, lack of dropout from the intervention group, lack of adverse events, similar medication change in both groups, and similar rates of seeking alternate sources of medical attention. Nurse-led repeat prescription seems to be acceptable by patients; only four patients opted for assessment by their case doctors. Similar observations have been previously reported.[4] Patients believe that repeat prescription may reduce doctors' workload.[5] Patients also reported receiving longer consultations, more information about their condition, and medication information from the repeat prescription pharmacist.[5]

For repeat prescription to be implemented widely in primary care, a system with good communication is needed. Similar programmes involving doctors, nurses, and pharmacists were introduced in the UK in 2003.[5] Although nurses and pharmacists generally have increased job satisfaction,[5] they are concerned about professional consequences of any errors, risks to patient safety, legal considerations, lack of competency, and lack of definition of their role in patients' care.[4] There is a need for continuing education for nurses and pharmacists who participate in the programme.[5] In addition, doctors might be professionally defensive about the erosion of doctors' traditional roles, professional hierarchies, and safety.[5]

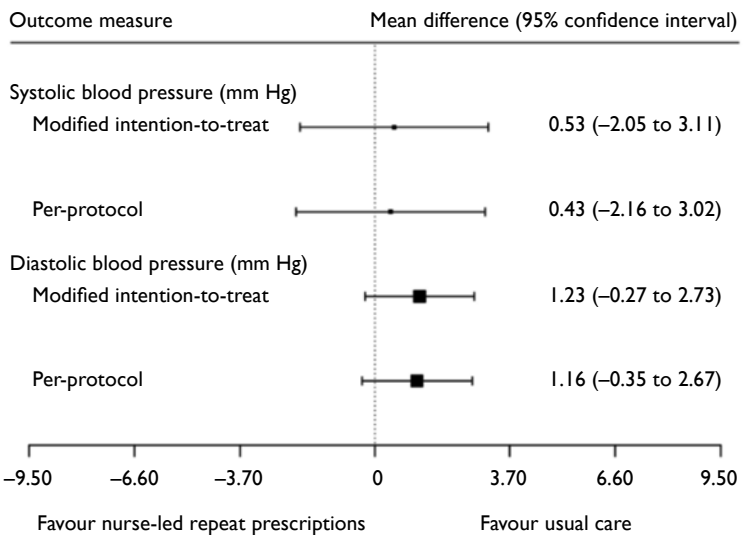


FIG 2. Estimated mean difference between systolic blood pressure and diastolic blood pressure

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