

Predictors of normotension on withdrawal of antihypertensive drugs in elderly patients: prospective study in second Australian national blood pressure study cohort

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Abstract

Objectives To identify simple long term predictors of maintenance of normotension after withdrawal of antihypertensive drugs in elderly patients in general practice.

Design Prospective cohort study.

Setting 169 general practices in Victoria, Australia.

Participants 503 patients aged 65-84 with treated hypertension who were withdrawn from all antihypertensive drugs and remained drug free and normotensive for an initial two week period; all were followed for a further 12 months.

Main outcome measures Relative likelihood of maintaining normotension 12 months after drug withdrawal; relative likelihood of early return to hypertension after drug withdrawal.

Results The likelihood of remaining normotensive at 12 months was greater among younger patients (65-74 years), patients with lower "on-treatment" systolic blood pressure, patients on single agent treatment, and patients with a greater waist:hip ratio. The likelihood of return to hypertension was greatest for patients with higher "on-treatment" systolic blood pressure.

Conclusions Age, blood pressure control, and the number of antihypertensive drugs are important factors in the clinical decision to withdraw drug treatment. Because of consistent rates of return to antihypertensive treatment, all patients from whom such treatment is withdrawn should be monitored indefinitely to detect a recurrence of hypertension.

Introduction

A systematic review of predictors of maintenance of normotension after withdrawal of antihypertensive drugs indicated that if treatment is withdrawn from selected patients with mild to moderate hypertension, then approximately 42% of these patients are likely to remain normotensive after 12 months.¹ Predictors of success identified from these studies indicate that patients with long term, well controlled, mild hypertension on single agent antihypertensive treatment are most likely to maintain normotension, especially if they are also willing to undertake appropriate lifestyle changes.

Methods

Suitable patients aged 65-84 years with a history of treated hypertension were drawn from among patients volunteering for inclusion in the second Australian national blood pressure study.² Previous antihypertensive drug treatment was withdrawn gradually under the supervision of a research nurse. Only those patients whose blood pressure remained within the normotensive range at the two week post-withdrawal visit entered the present study. We defined "normotension" as a sitting systolic blood pressure below 160 mm Hg and a diastolic pressure below 90 mm Hg.

Candidate predictors of maintenance of normotension included body mass index, waist:hip ratio, blood pressure (on-treatment diastolic and systolic), heavy or higher weekend (binge) alcohol intake, recent exercise (walking or other vigorous activity), number of antihypertensive drugs taken, sex, and age. We selected these potential predictors on the basis of previous studies and ready availability to a general practitioner.

After a minimum of two visits to the nurse after cessation of all antihypertensive drugs, participants were followed up by their general practitioner. We reviewed the clinical notes of all participants six and 12 months after withdrawal of treatment and extracted data on blood pressure, drugs, and adverse cardiovascular events. A research nurse measured participants' sitting blood pressure with a standard sphygmomanometer at a 12 month visit.

Twelve months after their entry into the study we classified patients into three groups: (1) Remained off antihypertensive treatment and were normotensive at the 12 month visit ("maintain normotension"). (2) Met study criteria for return to hypertension according to measurement by the study nurse (seated systolic blood pressure ≥ 160 mm Hg or diastolic blood pressure ≥ 90 mm Hg where systolic blood pressure ≥ 140 mm Hg) or had restarted antihypertensive treatment because of a blood pressure level that the general practitioner considered to justify reinstatement of treatment at or before the 12 month visit ("return to hypertension"). We also analysed this group as "return to hypertension early" (< 70 days) and "return to hypertension late" (≥ 70 days). (3) Restarted antihypertensive treatment for reasons unrelated to blood pressure or died before classification—this group is referred to as "other."

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Characteristics that are independent predictors of “maintain normotension” status 12 months after withdrawal of all antihypertensive drugs versus “return to hypertension.” The results for “return to hypertension early” were very similar

Characteristic	Univariate analysis		Multivariate analysis	
	Relative risk (95% CI)	P value	Relative risk (95% CI)	P value
On-treatment systolic blood pressure (10 mm Hg increase)	0.82 (0.75 to 0.89)	<0.001	0.85 (0.81 to 0.89)	<0.001
Age (years):				
65-74	1.61 (1.16 to 2.24)	0.005	1.57 (1.13 to 2.17)	0.007
75-84	1.00		1.00	
Waist:hip ratio (0.1 unit increase)	1.12 (0.98 to 1.28)	0.11	1.22 (1.12 to 1.32)	0.02
Single drug treatment	2.44 (1.54 to 3.85)	<0.001	2.38 (1.50 to 3.76)	<0.001
Two or more drugs	1.00		1.00	

Statistical analysis

We assessed the relation between potential predictors and normotensive status at 12 months using Cox's proportional hazards regression in order to estimate relative risks, using a constant follow up time of one year with robust estimation of variance to account for clustering within doctor. We used a multivariate model to determine independent predictors, after standardising continuous predictors to account for differences in scale.

Results

All but five of the 503 participants were followed according to the protocol and reviewed 12 months after study entry. At this time 181 (36%) were classified as “maintain normotension,” 273 (54%) as “return to hypertension,” and 49 (10%) as “other.” Four participants had died during the interim period, two from cancer and two with vascular events. The remaining unclassified participant was known to be alive and not taking antihypertensive drugs at 12 months. In most instances, drug treatment in “other” participants was restarted because of ankle swelling (18) or heart failure (8).

The table shows the results of a multivariate analysis conducted to determine a set of independent predictors of maintenance of normotension. These are expressed as risk ratios, with “return to hypertension” as the comparison group. In both “return to hypertension” and “return to hypertension early” lower on-treatment systolic blood pressure was the major predictor. Other predictors were younger age (65-74 years), greater waist:hip ratio, and the use of a single antihypertensive drug.

The figure shows the proportion of the study population who remained normotensive at various times after drug withdrawal. It indicates that as many participants returned to hypertension in the first 70 days as in the subsequent 330 days.

Discussion

Thirty seven per cent of participants remained normotensive one year after drug withdrawal in this study. This finding has been replicated in other major studies and is similar to the 42% found in our systematic review.^{1 3-11}

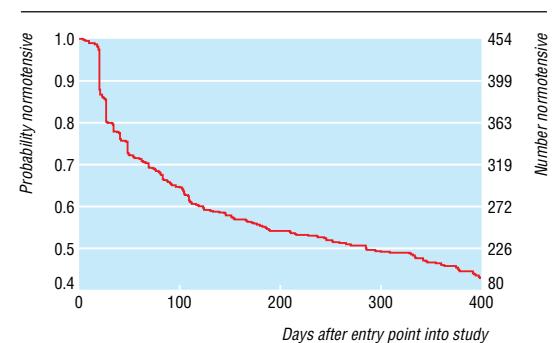
Study design

Certain limitations of the study design require comment. The study was largely observational and relied on judgment by doctors both for starting antihypertensive treatment and for determining whether it

was appropriate to restart treatment. Another limitation is the natural variability of blood pressure and its likelihood of being transiently elevated—for example, by alcohol intake, other drugs, or fluctuations in body weight.^{12 13} Predictors of successfully sustained normotension may also have a complex relation to their outcome variable. For example, they may reflect factors that have led to more frequent than normal measurement of blood pressure or a lower threshold for introduction of treatment (such as other illnesses or the presence of other cardiac risk factors); factors that have led to a transient elevation of blood pressure that has subsequently resolved or an exaggerated white coat effect; or factors that are associated with an increased likelihood of success of non-pharmacological blood pressure reduction.^{6 11} Alternatively, treatment may have been introduced inappropriately because of poor measurement technique, too few blood pressure measurements, or a failure to initiate behaviour modification before introducing drug treatment (misclassification error).^{12 13}

Utility of predictors

The predictors identified in this study probably fit into several of the above categories. The most relevant predictors of successful withdrawal are younger age (65-74 years), relatively low on-treatment systolic pressures, and minimal drug treatment, and are most useful in the first 70 days after drug withdrawal. On-treatment systolic blood pressure is the single most useful measure to exclude patients from a trial of antihypertensive drug withdrawal. We used a wide range of simple measurements in this study, but other more powerful predictors, such as physiological measures, may exist and could be used in future studies.



Survival plot of participants' (n=454) normotensive status over a 12 month period after cessation of antihypertensive treatment. Participants classified as “other” (n=49) were excluded from this analysis

What is already known on this topic

Systematic reviews have identified predictors of success of withdrawal of antihypertensive medication

The reviewed studies have mainly been in a hospital or specialist clinic setting, and their recommendations may not be practical in general practice

What this paper adds

This study has identified simple predictors of success that are readily available to general practitioners

On-treatment systolic blood pressure, the number of blood pressure lowering drugs, and the age of the patient are reliable indicators of who may successfully stop taking their drugs

General practitioner practitioners should not be dissuaded from offering drug withdrawal to patients with greater waist:hip ratios

Systematic follow up of all patients offered withdrawal of antihypertensive drug treatment is mandatory and should continue indefinitely. Withdrawal of antihypertensive drug treatment should be offered only to patients with uncomplicated hypertension.

Conclusion

In view of the substantial cost of antihypertensive treatment, this study emphasises the value of a trial of withdrawal of treatment with systematic follow up in patients who are younger, with blood pressure well controlled on relatively minimal treatment.

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Erving Goffman revisited

Thirty years ago, when I was a medical student, I read two of Erving Goffman's books. *Asylums* (1961) examined "total institutions" such as mental hospitals and prisons and showed how inmates can become degraded and dehumanised. The other was *Stigma* (1963), which I found harder to read, the core of which was about the persona projected by people who carry a feeling of different-ness (or stigma). Compared with the standard texts on psychiatry we were advised to read, these books, written by a Canadian sociologist, were refreshing, particularly to a student who was less interested in psychiatry than in considering the whole human condition.

In thinking now how doctors interact in working teams, I am re-reading another of Goffman's books, *The Presentation of Self in Everyday Life* (1959). Since the publication of that book, much has been written about group interaction—most of it favourable, so that initiatives taken by individuals seem to be regarded less favourably than those undertaken by groups, and "doing it in groups" seems to be the preferred method for both undergraduate and postgraduate education.

Goffman uses the analogy of actors performing in front of an audience to show how people working together in groups affect a performance. Although he didn't write about this in the context of health care, his generalisations about the methods used to achieve a performance have given me insights into the

functioning of a primary care trust executive committee and a primary healthcare team.

He describes the secrets kept by the team in order to be able to cooperate and maintain a performance. He defines three types of secrets—dark secrets, which may never be disclosed to the audience (rest of trust or patients); strategic secrets, which are disclosed when the work is completed; and inside secrets, which define the members of the group but which are neither dark nor strategic.

The concept of secrets leads on to group behaviours that are condoned but not desirable. "Treatment of the absent" is what teams do when away from the "audience." A primary healthcare team may use derogatory terms to describe patients when talking in a team meeting. Another thing teams can do he calls "team collusion": teams may give out messages that are misleading so that they can keep up their outward appearances.

Throughout the book he uses examples ranging from Queen Victoria to sales techniques to keep up interest and make difficult ideas easier to grasp. At the end of the book, he tells us to remember that all the world isn't a stage.

Books which help to rewrite our view of reality are worthy of recommendation to others. Revisit Erving Goffman.

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