

A B S T R A C T

Adherence to pharmacologic therapy of hypertension is low (in the range of 50-70%) and has important implications both for blood pressure control and cardiovascular complications. Based on a review of the literature using the levels of evidence grading technique, determinants of adherence to the pharmacologic therapy of hypertension have been assessed. Additionally, interventions to improve compliance were evaluated. Patient-centred, health care provider-centred and drug-specific factors have all been shown to affect adherence rates. We conclude that the extent of adherence to pharmacologic therapy is modifiable. Measurable improvements in adherence can be obtained from simplified medication regimens and a combination of behaviour strategies, including the tailoring of pill-taking to patients' daily habits and rituals, the advocacy of self-monitoring of pills and blood pressure, and the institution of reward systems.

A B R É G É

L'observance des pharmacothérapies pour le traitement de l'hypertension est faible (de l'ordre de 50 à 70 %) et a des implications importantes tant sur le contrôle de la tension artérielle que sur les complications cardiovasculaires. À partir d'un examen de la littérature se servant des niveaux de la technique de graduation des preuves, on a évalué les déterminants de l'observance des pharmacothérapies pour le traitement de l'hypertension. En outre, on a aussi évalué les interventions visant à améliorer l'observance. Les facteurs propres aux patients, aux soignants et aux médicaments ont tous indiqué qu'ils avaient une influence sur les taux d'observance. Nous en concluons que la portée de l'observance des pharmacothérapies est modifiable. Des améliorations mesurables de l'observance sont possibles grâce à des régimes médicamenteux simplifiés et à une combinaison de stratégies de comportement comprenant l'adaptation de la prise des médicaments aux habitudes et aux rituels quotidiens des patients, l'encouragement de l'autosurveillance de la tension artérielle et de la prise des médicaments, ainsi que l'établissement d'un système de récompenses.

Adherence to Pharmacologic Management of Hypertension

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The failure of patients to adhere to medical management is an important impediment to disease control. This report summarizes our understanding of the prevalence, and impact, of the failure to adhere to the medical management of hypertension. We will summarize the factors linked to improved adherence (primarily from observational studies) and describe randomized controlled studies that have assessed strategies for improving adherence.

What is the proportion of patients who are adherent to the pharmacologic treatment of hypertension?

Estimates of the extent of patients' adherence to the pharmacologic therapy of hypertension vary widely. Such variation relates to the differences in study groups, duration of follow-up, methods of assessing compliance, and therapeutic regimens used. Estimates of compliance rates also depend on the duration of therapy prior to the assessment of compliance. For example, those studies in which compliance rates were assessed immediately after the initiation of patient therapy show lower adherence rates than studies in which com-

pliance was assessed with chronic therapy [reviewed in references 1 and 2]. This may reflect the net effects of both non-adherence and loss to follow-up. This initial drop-out rate can be quite high, with one-year rates in the range of 16 to 50% and two-year rates in the range of 16 to 42%.^{1,2} Estimates of longer-term adherence range from 50 to 80% (using variable criteria for defining "acceptable" compliance). In two studies^{3,4} that defined adherent patients as those taking more than 80% of their prescribed doses (a cutoff which may have some implications re: blood pressure control – see below), compliance rates were 49% and 67%, respectively.

It should be noted that while complex approaches have been used to monitor adherence, simple methods, such as patient self-reports, are probably the most useful clinically. Not only are they easy to do, they have also been found to be fairly accurate with a sensitivity of 55% and a specificity of 87%.³ In other words, if asked, more than half of non-adherent patients will be truthful and tell their physicians they are non-adherent, while only a small percentage of adherent patients will falsely claim they are not.

Does adherence to medical management of hypertension have an impact on control of blood pressure and blood pressure-related complications?

Approximately 50% of patients with poor blood pressure control have adherence problems (defined as taking less than 80% of medication).³ Further, blood pressure control was significantly better in hypertensive subjects, with adherence rates of greater than 80%, as compared to those with adherence rates of less than 50%.² What is not yet known is whether minimal

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TABLE I
Factors Predictive of Adherence to Medical Therapy of Hypertension

A. Behavioural Determinants
Extent of disease-specific education pharmacist education patient education patient's family's education
Extent of patient self-management
Extent of medical supervision
B. Drug-related Determinants
Dosing frequency
Adverse effect incidence

adherence rates can be improved by switching from a short-acting medication to a long-acting one.

The primary goal in the treatment of hypertension is avoidance of hypertensive complications. But do patients demonstrating better adherence to an antihypertensive regimen actually have lower complication rates? This implicit belief of caregivers has not been proven conclusively. We found one prospective study⁵ that compared complication rates in patients with different adherence rates. They found that patients with the highest adherence rates had significantly fewer cardiovascular complications than those with the lowest adherence rates. Moreover, in a short-term case-control study of hypertensive subjects treated with beta adrenergic antagonists,⁶ those who did not adhere to therapy for hypertension were 4.5 times more likely to have coronary heart disease complications than those who did. Whether this increased complication rate was directly related to non-adherence with antihypertensive management, however, is not certain. In studies on the treatment of other chronic diseases,⁷ patients who were non-adherent to medical management were more likely to suffer complications from the specific disease for which they were being treated, as well as other medical complications.

What are the predictive factors of adherence to medical therapy of hypertension?

Generally, non-adherence to medical management is most likely to be a problem for those diseases in which chronic therapy

TABLE II
Features of Studies Reviewed of Interventions to Improve Adherence with Medical Management of Hypertension

Trial	Interventions vs Control	Effect on	
		Adherence*	Outcome†
Baird 1984 ₁₄	once vs twice daily metoprolol	yes	no
Becker 1986 ₁₅	special "reminder" pill packaging vs separate vials for each medication	no	no
Haynes 1976 ₁₆	tailoring, self-monitoring of pills and BP, rewards vs usual care	yes	no
Johnson 1978 ₁₃	self-monitoring of BP vs home visits vs both vs neither	no for each intervention	no for each intervention
Logan 1979 ₄	worksite care by nurses, tailoring, self-monitoring, rewards vs usual care at family doctors' offices	yes	yes
Sackett 1975 ₁₇	worksite care vs instruction vs both vs neither	no	no

* Yes = statistically significant improvement in adherence, comparing intervention group with control group.
No = no significant effect.
† Yes = statistically significant improvement in one or more treatment outcomes, comparing intervention group with control group.
No = no significant effect

is required, and where the perceived benefit of therapy is not readily apparent. Hypertension is a classic example of just such a disease.

Fortunately, there are several additional factors that have been identified as contributing to the rates of adherence for pharmacologic therapy of hypertension. These include behavioural and drug-related factors (Table I).

Behavioural Determinants

Among the behavioural factors linked to adherence are education, extent of self-management of the disease, and patterns of medical supervision.

Education: The relationship between compliance and educational programs, to enhance patient understanding of a disease and its management, can be assessed at multiple levels. In general, patients with enhanced understanding—both of the disease and of the practitioner's management plan—tend to have higher adherence rates^{5,8,9} but this is not always the case.¹⁰ Enhanced education of pharmacists, with respect to counselling and communicating with hypertensive patients, has been associated with improved adherence.¹¹ Better rates of adherence have also been linked to

family involvement, not only in a patient's care but also in understanding the patient's prescribed regime.^{5,8}

Extent of patient self-management: A patient's participation in management of their own disease has been associated with higher adherence rates than the rates for those who are less involved in their own care. This includes self-monitoring of blood pressure¹² and participation in selection of antihypertensive medication.^{12,13} However, these studies included only patients with low adherence rates to begin with, so it is not known whether this relationship holds true generally or only among patients with low adherence rates.¹³

Patient monitoring and supervision: Most studies that found adherence rates positively associated with education and self-management factors (as noted above) tended to include a confounding factor. In these studies there was a direct correlation between enhanced education and increased supervision or monitoring by health care professionals. Thus, it is not known whether education is independently correlated with adherence, or is dependent upon increased levels of monitoring/supervision implicit in carrying out the education programs.

Drug-related Determinants

Among the drug-specific factors linked to rates of adherence are dosing frequency and adverse effects.

Dosing frequency: Dosing frequency has been positively correlated with adherence rates in the management of hypertension; that is, the longer the dosing interval, the greater the adherence rate. This is most evident for medications that must be taken more than twice a day;^{1,2} however, a reduction of dosing frequency from twice to once a day has also been found to improve adherence.¹⁴

Adverse effects: In the therapy of several other diseases, frequency of side effects has been inversely correlated with adherence rates. It is still a moot point, however, as to whether differences in side-effect profiles between the four major classes of antihypertensive agents (diuretics, beta blockers, calcium channel blockers, and ACE-inhibitors) are important in determining the extent of adherence to medical regimens.

Which interventions improve compliance with medical adherence to hypertension?

Most studies testing the efficacy of behavioural interventions to improve medication adherence have used multiple strategies. This tendency probably reflects the implicit belief that there is a complex mix of behavioural and environmental factors associated with non-adherence that necessitates a combination of approaches. Thus, these studies cannot determine the efficacy of any one particular factor in improving adherence.

We analyzed six randomized clinical trials of a broad range of interventions, in which at least 80% of participants had a minimum of six months follow-up (Table II). Overall, what seems to have been most effective was a combination of behavioural strategies that included the tailoring of

blood-pressure management, advocacy of self-monitoring of pills and blood pressure, and a reward system, both alone and in combination with worksite monitoring (Table II). Of note was that neither self-monitoring of blood pressure nor home visits, either alone or in combination, was effective in improving adherence. Similarly neither worksite care nor patient education, alone or in combination, was effective. Once-daily versus twice-daily medication regimes significantly improved adherence (Table II).

CONCLUSION

To summarize our findings, we have evaluated them using the levels of evidence technique, as previously outlined in the recommendations document.¹⁸

Based on this evidence-based system, we conclude that:

1. Non-adherence to pharmacologic therapy is prevalent and is an important factor in both poor blood pressure control and the incidence of hypertensive-related complications (Grade 2).
2. Patient-centred, health care provider-centred, and drug-specific factors affect adherence rates (Grade 2).
3. The extent of adherence to pharmacologic therapy is modifiable (Grade 1).
4. Measurable improvements in adherence can be obtained from simplified medication regimens and a combination of behaviour strategies, including the tailoring of pill-taking to patients' daily habits and rituals, the advocacy of self-monitoring of pills and blood pressure, and the institution of a reward system (Grade 1).

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