

Meeting the National Service Framework for coronary heart disease: which patients have untreated high blood pressure?

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SUMMARY

Background: *The National Service Framework for coronary heart disease requires primary care teams to identify patients who are at high risk of cardiovascular events and treat those with high blood pressure. However, there are no data on how many must be assessed, how much cardiovascular disease can be prevented or which patients are most likely to benefit.*

Aim: *To estimate the potential number of patients who are eligible for blood pressure assessment, the number of preventable cardiovascular disease events and the relative efficiency of the strategy in different age groups.*

Design of study: *Modelling exercise.*

Setting: *Hypothetical population of 100 000.*

Method: *The age-sex specific prevalence of cardiovascular risk factors and of current anti-hypertensive treatment were obtained from published sources and combined with published estimates of the effectiveness of anti-hypertensive treatment. From these data were calculated numbers of persons eligible for assessment and treatment, and numbers of preventable cardiovascular events.*

Results: *There were 79 607 persons eligible for assessment and 5888 eligible for treatment. Treatment could prevent between 101 and 139 cardiovascular events annually. There were 11 571 persons aged over 65 years and eligible for assessment and 4655 eligible for treatment. Treatment could prevent 85 to 117 cardiovascular events annually. No cardiovascular events are prevented in persons aged under 45 years.*

Conclusion: *Confining assessment to the 16% who are aged over 65 years prevents 85% of the population's avoidable cardiovascular disease. Primary care teams should assess and treat persons aged over 65 years before assessing younger patients. No health benefit results from assessing persons aged under 45 years.*

Keywords: *cardiovascular risk factors; hypertension; general practice.*

Introduction

IN 1993, guidelines for the treatment of raised blood pressure were published in New Zealand. The guidelines signalled a paradigm shift in cardiovascular disease prevention. Previous guidelines recommended that treatment decisions should be based on a threshold blood pressure. The New Zealand guidelines recommended that the decision to offer treatment should be based primarily on patients' estimated absolute risk of cardiovascular disease.¹ The rationale for this was that patients' prior absolute risk of cardiovascular disease was the best predictor of the benefits of treatment. Since that date, targeting patients on the basis of their absolute risk has gained increasing currency. Recent British guidelines adopted a similar approach² and the rationale was endorsed by the World Health Organization: 'The best predictor of absolute treatment effects for any individual patient will be provided by application of the estimate of the relative risk reduction from trials to an estimate of the absolute disease risk for the individual in question'.³ There now is general acceptance of the principle that treatment should aim to prevent the most cardiovascular disease in the population. Does this mean that the main questions about the management of raised blood pressure have been resolved?

Clinical guidelines should identify key decisions facing clinicians and inform the decision-making process at each key decision.⁴ Targeting treatment at those who will benefit most helps inform the decision to treat. It is a clearly rational approach; if adopted it could increase the number of cardiovascular events prevented while reducing the number of people on treatment.⁵ But do guidelines based on this approach identify all the key decisions facing clinicians? Guidelines require clinicians to know their patients' blood pressures. The first key decision, therefore, is whether to check a patient's blood pressure. Checking blood pressures takes time; not every patient who is assessed requires treatment. Clinicians could make best use of their time by checking the blood pressures of those most likely to benefit. Risk targeting guidelines are uninformative on this point: the British guidelines give no indication of the age at which routine blood pressure estimation should begin;² those from New Zealand suggest adults aged over 30 years should have their blood pressure estimated five-yearly.¹ No guidelines give any indication of the prevalence of high blood pressure in men and women at different ages. Clinicians, therefore, cannot judge for themselves which patients should have their blood pressure checked. Commentaries on the Joint British Recommendations have ignored this problem, concentrating instead on the choice of drugs and the target levels of blood pressure.^{6,7} The National Service

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HOW THIS FITS IN

What do we know?

The decision to offer antihypertensive treatment should be based on a consideration of the patient's absolute risk of cardiovascular disease.



What does this paper add?

No patients under 45 years of age have high blood pressure and a 10-year cardiovascular risk greater than 30%. Virtually no health benefits result from assessing and treating blood pressure in patients under 45 years. Confining assessment and treatment of blood pressure to patients over 65 years would prevent 85% of preventable cardiovascular disease.

Framework for coronary heart disease adds urgency to this problem. Standard 4 of the National Service Framework requires practices, by April 2002, to identify all persons whose 10-year risk of cardiovascular events exceeds 30% and provide them with advice and treatment.⁸ It is known that not all persons with raised blood pressure are currently receiving treatment. Where should clinicians look for their untreated patients? In this paper we help clinicians answer this question.

Using published data on the prevalence of cardiovascular risk factors in the population, we estimate the number of untreated patients in each age-sex group who have both raised blood pressure and a 10-year cardiovascular risk greater than 30%. We then estimate the number of persons who must be assessed to find one needing treatment, the number of identified patients who must be treated to prevent one cardiovascular event and the number of persons who need to be assessed to prevent one cardiovascular event. We thus relate the workload implications to the health benefits of identifying and treating patients with untreated high blood pressure.

Method

Numbers of untreated patients

The Health Survey for England reports the numbers of persons with untreated raised blood pressures in each age-sex band.⁹ It defines raised blood pressure as systolic blood pressure greater than or equal to 140 mmHg or diastolic blood pressure greater than or equal to 90 mmHg. Untreated persons are not currently taking any blood pressure lowering medication. However, not all persons with raised blood pressure are at greater than 30% 10-year cardiovascular risk and, therefore, not all would be offered treatment under the National Service Framework. To estimate the numbers who are at greater than 30% 10-year cardiovascular risk, we obtained data on the distribution of cardiovascular risk factors in the population. Data on the age-sex-specific distribution of smoking were obtained from the Health Survey for England.⁹ Data on the age-specific prevalence of diabetes were obtained from the general practice research database.¹⁰ Data on the age-sex distribution of total cholesterol to high density lipoprotein cholesterol ratios were obtained from the Newcastle Heart Project.¹¹ These data were used to model the distribution of risk factors in a typi-

Table 1. The numbers of persons in a population of 100 000 with untreated blood pressure > 140/90 mm Hg and the numbers of these whose 10-year cardiovascular risk is greater than 30%.

Age group (years)	Men					Women				
	Population	Untreated population in this age group	Number (%) with untreated high blood pressure (>140/90 mmHg)	Proportion of untreated persons who are at >30% 10-year risk	Number with untreated blood pressure >140/90 mmHg and >30% 10-year risk	Population	Untreated population in this age group	Number (%) with untreated high blood pressure (>140/90 mmHg)	Proportion of untreated persons who are at >30% 10 year risk	Number with untreated blood pressure >140/90 mmHg and >30% 10-year risk
16-24	5919	5919	947 (16.0)	0.0%	0	5555	5549	222 (4.0)	0.0%	0
25-34	8288	8263	1674 (20.2)	0.0%	0	7788	7749	498 (6.4)	0.0%	0
35-44	6798	6642	1618 (23.8)	0.0%	0	6648	6488	718 (10.8)	0.0%	0
45-54	6441	5990	2280 (35.4)	10.9%	248	6382	5986	1570 (24.6)	0.6%	9
55-64	4922	4066	2087 (42.4)	37.4%	781	5004	4228	1801 (36.0)	10.8%	194
65-74	3929	3120	1937 (49.3)	85.1%	1648	4827	3379	2071 (42.9)	28.9%	598
75+	2454	1900	1232 (50.2)	97.9%	1206	4652	3172	2130 (45.8)	56.5%	1203
Total 65+	6383	5019	3169 (49.6)	90.1%	2854	9479	6552	4201 (44.3)	42.9%	1801
Total all ages	38 752	35 899	11 775 (30.4)	33.0%	3884	40 855	36 552	9011 (22.1)	22.2%	2004

Source: Untreated hypertensives - Health Survey for England 1998.

cal primary care group with a population of 100 000. We entered all data into an Excel spreadsheet and calculated the cardiovascular risk of each age, sex and risk factor combination using the Framingham risk equation.¹² From this we estimated the proportion of persons with raised blood pressures (systolic blood pressure 140 mmHg or higher) who were also at greater than 30% 10-year risk. We used these results to calculate the proportion of persons with raised blood pressures who were also at high risk (greater than 30% 10-year risk) and the proportion with untreated raised blood pressures who were at high risk. These are the persons who should be identified and offered treatment.

The benefits of treatment

At standard doses, anti-hypertensives typically lower systolic blood pressure by 10 mmHg.^{13,14} However, the aim of treatment is usually greater: up to a 30 mmHg reduction in systolic blood pressure. A reduction in systolic blood pressure of 10 mmHg reduces the risk of cardiovascular events by about 14%.¹⁵ It follows that each further 10 mmHg reduction will result in a further 14% reduction in risk. This amounts to risk reductions of 26% ($1 - [1-14\%]^2$)² and 36% ($1 - [1-14\%]^3$)³ for systolic blood pressure reductions of 20 mmHg and 30 mmHg respectively. In this paper we assume that the benefits of treatment in newly identified patients are a 26% to 36% reduction in risk of a cardiovascular event. We first calculated the expected number of cardiovascular events in patients with raised blood pressure (systolic blood pressure 140 mmHg or higher) who were also at high risk (greater than 30% 10-year risk). We then estimated the number of these events that would occur in persons with untreated high blood pressure. Finally, we calculated the number of cardiovascular events that would be prevented if these untreated persons were treated and their systolic blood pressure was reduced by 20 mmHg and 30 mmHg respectively.

Results

Numbers of untreated patients

In a typical primary care group we found that there are 5888

persons (3884 men and 2004 women) who should be identified and offered treatment. Of these, 79% (4655 [2854 men and 1801 women]) are aged 65 years or over. Table 1 shows the estimated prevalence of patients with untreated raised blood pressure and the proportion of these who are also at high risk (greater than 30% 10-year risk) of cardiovascular disease. The prevalence of untreated raised blood pressure is 49.6% and 44.3% respectively in men and women over the age of 65 years. Of these, 90.1% of men and 44.3% of women are also at high risk (greater than 30% 10-year risk) of cardiovascular disease.

Benefits of treatment

In a primary care group of 100 000, between 502 and 695 cardiovascular events could be prevented every five years (100 to 139 each year) by treating all untreated patients as directed by Standard 4 of the National Service Framework. Per whole time general practitioner, this is equivalent to preventing between eight and 12 cardiovascular events per five years (1.7 to 2.3 per year). By treating only patients aged over 65 years, 85% of these cardiovascular events could be prevented (Table 2).

Numbers needed to assess and numbers needed to treat

If every patient aged 16 years and over were assessed, one in every nine men and one in every 18 women would be found to need treatment. With appropriate treatment, one cardiovascular event would be prevented every five years for every 11 to 16 men treated and one for every six to eight women treated. It follows that 106 to 147 men must be assessed (and if appropriate, treated) to prevent one cardiovascular event every five years. For women, the number needed to assess to prevent one cardiovascular event every five years is 102 to 142. However, if assessment and treatment is confined to patients aged over 65 years, then the annual number needed to assess falls dramatically: to 19 to 26 for men and 20 to 28 for women (Table 3).

Table 2. The number of cardiovascular events which could be prevented in currently untreated persons in a population of 100 000.

Age group (years)	Men				Women			
	Untreated population in this age group	Additional patients treated	Additional events prevented five-yearly		Untreated population in this age group	Additional patients treated	Additional events prevented five-yearly	
			Lower estimate	Upper estimate			Lower estimate	Upper estimate
16-24	5919	0	None treated	None treated	5549	0	None treated	None treated
25-34	8263	0	None treated	None treated	7749	0	None treated	None treated
35-44	6642	0	0	0	6488	0	0	0
45-54	5990	248	11	15	5986	9	0	0
55-64	4066	781	40	56	4228	194	26	36
65-74	3120	1648	102	141	3379	598	101	140
75+	1900	1206	91	126	3172	1203	130	180
Total 65+	5019	2854	193	267	6552	1801	232	321
Total all ages	35 899	3884	244	338	36 552	2004	258	357

Table 3. The efficiency of assessing and treating patients for high blood pressure.

Age group (years)	Men					Women				
	Number needed to assess per treated patient	Number needed to treat per event prevented		Number needed to assess per event prevented		Number needed to assess per treated patient	Number needed to treat per event prevented		Number needed to assess per event prevented	
		Lower	Upper	Lower	Upper		Lower	Upper	Lower	Upper
16-24	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated
25-34	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated
35-44	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated	None treated
45-54	24	22	16	536	387	677	41	29	27	488
55-64	5	19	14	101	73	22	8	5	164	118
65-74	2	16	12	31	22	6	6	4	33	24
75+	2	13	10	21	15	3	9	7	24	18
Total 65+	2	15	11	26	19	4	8	6	28	20
Total all ages	9	16	11	147	106	18	8	6	142	102

Source: Persons not receiving treatment — Health Survey for England 1998. None treated: less than 1 person treated in a typical primary care group. Lower and upper estimates of effectiveness are based on 26% and 36% reductions in cardiovascular risk respectively. These correspond to 20 and 30 mmHg reductions in systolic blood pressure.

Discussion

Practices attempting to achieve the National Service Framework milestone face a very practical problem. Given the finite availability of staff time, they must find an efficient way to identify patients for inclusion on the treatment register. Table 2 provides practical information to answer this question. Almost nobody under the age of 45 years has raised blood pressure and a 10-year cardiovascular risk greater than 30%. It follows that a very large number will need to be assessed to find one who needs treatment. By contrast, every third untreated man and every fourth untreated woman over the age of 65 needs treatment.

Even if everyone under the age of 55 years in a primary care group was assessed (and where appropriate, treated) we estimate that, at most, 15 cardiovascular events would be prevented every five years (three each year). Most preventable cardiovascular events occur in those aged 65 years and over. We recommend primary care groups to assess and treat the 11 571 untreated persons who are 65 years and over before devoting time and effort to assessing those in younger age groups.

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