



Differences in the classification of hypertensive controlled patient in primary care: Cross sectional study

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DECLARATIONS

Competing Interests

None declared

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Summary

Objectives To examine differences in blood pressure control using the 2006 National Institute for Health and Clinical Excellence (NICE) guidelines and the 2007 Quality and Outcome Framework (QOF) standards.

Design Cross-sectional study.

Setting 28 general practices located in Wandsworth, London.

Participants Hypertensive patients aged 17 years and over.

Main outcomes measures Percentage of hypertensive patients classified as a hypertensive controlled patient (HCP) by each standard.

Results 79.5% of patients were classified as a HCP by the QOF target and 60.7% by the NICE target. 93% and 14% of practices had more than 70% of patients classified as a HCP by using the QOF and NICE targets respectively. By applying the QOF target, men aged 45–64 years and 65 years and over had significantly higher probability of being classified as a HCP compared to those aged 17–44 years, OR 1.34 (1.08–1.65) and OR 2.15 (1.61–2.87) respectively. Regardless of the target, for men the probability of being classified as a HCP increased with age.

Conclusion Better achievement of blood pressure control targets is present when the less stringent QOF target is used. Men aged 65 years and over were more likely to be classified as a HCP. Greater consistency is needed between the clinical targets in QOF and NICE guidance.

Background

High blood pressure is the main risk factor for cardiovascular disease, accounting for up to 54% of stroke and 47% of ischaemic heart disease cases

worldwide.¹ As cardiovascular risk is directly associated with blood pressure levels, the aim of interventions is to lower blood pressure. This aim results in a definition of the control of blood pressure which is currently understood as an

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Ethical Approval

The study was part of a research programme that received ethics approval from the Wandsworth Local Research Ethics Committee

Guarantor

Azeem Majeed

Contributorship

All authors participated in discussions about the analysis and have revised versions of the presented study.

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achievement of specific blood pressure levels or targets.²⁻⁴ These targets have been established in different guidelines based on the consensus views of experts because it is not possible to define a particular level as normal or optimal.⁵

Targets have been used for different purposes. In the clinical context, the guidelines established thresholds to help doctors guide the management of hypertensive patient.²⁻⁴ Decisions on drug therapy attempt to achieve the recommended target so that doctors classify patients into a hypertensive controlled or uncontrolled patient based on the achievement of that threshold.²⁻⁴ In the UK, the 2006 National Institute for Health and Clinical Excellence (NICE) established for adults over the age of 18 years, a target level equal to or above 140/90 mm Hg as diagnostic of hypertension and an achievement of this level or less as a definition of control.⁶ The last update of the NICE guideline preserved this target but for those aged 80 years and over set a target of 150/90 mm Hg.⁷

In primary care, targets have also been used as indicators to measure the quality of care provided by GPs.⁸ Since 2004 in the United Kingdom, the Quality and Outcomes Framework (QOF), a pay for performance programme, established the achievement of clinical targets as a condition for rewarding general practices with quality payments.⁹ The QOF defines those clinical targets as clinical indicators by each disease category based on available clinical evidence about the benefit of the intervention. For hypertension, the percentage of patients with blood pressure equal to or less than 150/90 mmHg is the criterion of performance.¹⁰ Although that level is the audit standard recommended by the British Hypertension Society (BHS) in 1999,⁴ evidence supporting its appropriateness to measure the performance of general practices on blood pressure control is scarce.

Whereas NICE attempts to establish a level at which the best reduction in hypertension-related cardiovascular risk without harm should be achieved, based on the current evidence, the QOF aims to produce an indicator which captures the differences in quality of care across general practices.¹¹ We compared differences in the classification of hypertensive controlled patients between the quality indicator established in the QOF guidance¹⁰ and the clinical target recommended by the NICE guideline.⁶

Methods

Setting and population

We performed a cross-sectional study with data collected in 2007 from 28 practices located in Wandsworth, South London. The data in our study were derived from electronic patient records used by general practitioners and other members of the primary care health team. We identified patients registered as hypertensive in electronic medical records by using the Read clinical classification codes.¹² Read codes are the clinical classification system used in primary care in the UK. We included patients aged 17 years and over and who had a record of systolic and diastolic blood pressure without missing or invalid data. Blood pressure record corresponded to the last measure recorded in 2007.

Definitions

Outcome variables

The classification of hypertensive controlled patient (HCP) was based on the definitions established in the 2007 QOF and 2006 NICE guidelines. The QOF guideline established clinical indicators for each disease category for interventions provided by practices. The achievement of a level of blood pressure equal to or less than 150/90 mm Hg is the recommended target for patients with hypertension.¹⁰ Blood pressure targets for patients with other cardiovascular disease categories are also specified in the QOF guidance.¹⁰

In 2004, NICE also produced guidelines on the management of hypertension in adults in primary care.¹³ In 2006, an update that integrated the British Hypertension Society guideline and the Royal College of Physicians recommendations was produced.⁶ The aim of the guideline is to provide recommendations on the management for patients with essential hypertension without pre-existing clinical conditions. For hypertensive patients without pre-existing clinical diseases, a level of 140/90 mm Hg blood pressure or less is defined as the target of therapy. There are lower blood pressure targets for hypertensive patients with diabetes or other cardiovascular disease in each NICE disease-related guideline. The targets in both the QOF guidance and the NICE guidelines

Reviewer apply to hypertensive adults 18 years or over, of both sexes, and of all ethnic origin.
 Fernando Prabhath

Dependent variables

We used data on patient characteristics extracted from the electronic primary care records of the general practice in this study. The data in these records were collected by primary care staff during the patient's clinical visits. We defined patients with additional cardiovascular comorbidity as those with at least one of the following: diabetes, coronary heart disease, stroke, atrial fibrillation or renal failure. Ethnicity origin was grouped into White, Black, South Asian, Other Asian, Other ethnic group and unknown.

Statistical methods

Characteristics of patients are reported as a percentage for categorical variables and mean with standard deviation for continuous variables. We tested differences in categorical variables between different strata using *chi square*. The main outcome was the percentage of patients who achieved blood pressure targets established in the QOF and NICE guidelines.^{10,6} The percentage was reported as the number of controlled patients divided by the total number of hypertensive patients included in the analysis. We also calculated this percentage by age, sex, ethnic groups, number of antihypertensive drugs prescribed and the presence of additional cardiovascular comorbidity.

We used multiple logistic regression to assess the relationship between patient characteristics and the probability of being classified as a hypertensive controlled patient. A separate logistic model for each target definition was performed. The patient characteristics included in each model were based on the following criteria: 1) Criteria which have been previously shown to influence blood pressure levels such as age, sex and ethnicity.^{14–15} We stratified age into three groups (younger 17–44 years, middle aged 45–64 years and older 65 years and over) based on cardiovascular risk changes that occur in these age groups.¹⁶ 2) Criteria which are used in the guidelines to classify patients at high cardiovascular risk as lower targets are established for these patients. Patients with at least one of diabetes,

renal failure, stroke, heart failure, atrial fibrillation and coronary heart disease were classified as patients with cardiovascular comorbidity.¹⁷ 3) Those which directly modify blood pressure levels such as number of prescribed drugs. Patients were grouped into having and not having been prescribed antihypertensive drugs.^{2–4}

The data was analysed using STATA version 11 (Stata Corporation, College Station, TX, USA).

Results

Of 17252 hypertensive patients aged 17 years and over registered with 28 practices in 2007, 15761 (91.3%) had a valid record for both systolic and diastolic blood pressure. The number of hypertensive patients registered in each practice ranged from 123 to 1274, mean 616. Most patients were white (53.5%), 52% were over 65 years and 56% were female. Thirty-eight percent had at least an additional cardiovascular comorbidity and diabetes (21.3%) was the most frequently associated disease followed by coronary heart disease (11.5%), stroke (7.2%), atrial fibrillation (4.7%), renal failure (4.2%) and heart failure (2.5%). A total of 25.2% (3977) of patients had other comorbidities such as depression (15.0%), chronic obstructive pulmonary disease (COPD) (13.0%) and asthma (10.4%). Only 10% of patients were not prescribed antihypertensive medication (Table 1).

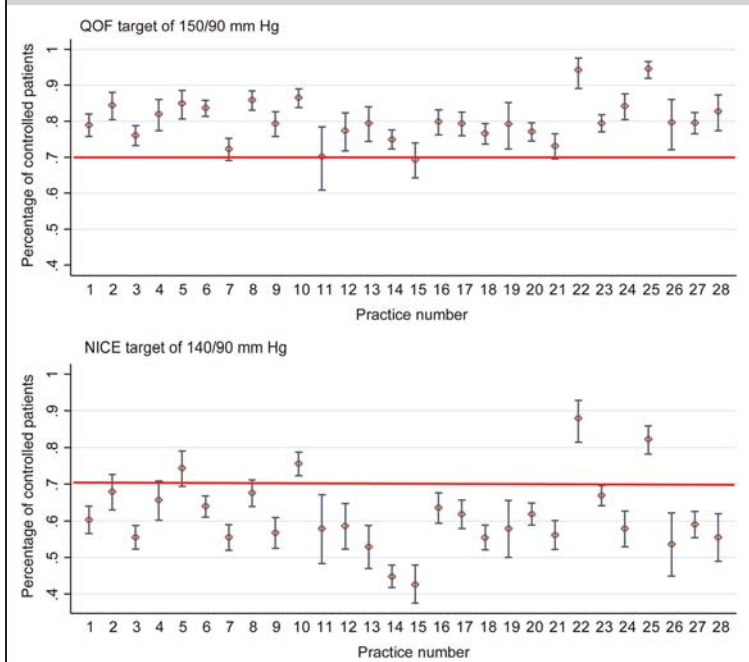
The QOF target produced a significantly higher percentage of patients classified as a HCP 12536 (79.5%), 95% confidence interval (CI) 78.9–80.2 than did the NICE target 9568 (60.0%), 95% CI 59.9–61.5 $p < 0.001$. Whereas 26 practices (93%) had more than 70% of patients classified as a HCP by using the QOF target, only 4 practices (14%) had more than 70% of patients classified as a HCP when the NICE target was applied (Figure 1). The two targets definitions also produced different distributions of HCP across the categories of patient characteristics (Table 2). Using the QOF target, 78.1% of men were classified as HCP and the highest percentage of HCP was in those who were 65 years and over, 82.4%. Conversely, by using the NICE target, this age group had the lowest percentage of HCP (59.4%) and overall 59.4% of men were classified as HCP. Regardless of the targets, a higher percentage of HCPs were found in patients of South Asian origin and in those with cardiovascular comorbidity.

Table 1
Characteristics of hypertensive patients. (Source: Wandsworth 2007)

	Overall	Without comorbidity	With comorbidity [‡]	P value
Number of Patients	15761	9776	5985	
Age (sd)*	64.3 (14.1)	61.5 (14.4)	68.8 (12.9)	0.000
Male no. (%)	7008 (44.5)	3922 (40.1)	3086 (51.6)	0.000
Ethnic group (%)				
White	8433 (53.5)	5265 (53.9)	3168 (52.9)	0.259
Black	3610 (22.9)	2264 (23.2)	1346 (22.5)	0.332
South Asian	1440 (22.9)	695 (7.1)	745 (12.5)	0.000
Other Asian	554 (3.5)	302 (3.1)	252 (4.2)	0.000
Other	687 (4.6)	428 (4.4)	259 (4.3)	0.880
Unknown	1037 (6.5)	822 (8.4)	215 (3.6)	0.000
Patients taking antihypertensive therapy number(%)	14153 (89.8)	8423 (86.2)	5730 (95.7)	0.000

[‡] Patients with at least one of the follow disease: coronary heart disease, diabetes mellitus, heart failure, atrial fibrillation, stroke or renal failure.
 *Standard deviation

Figure 1
Percentage of hypertensive controlled patients in each general practice. The mean percentage \diamond with 95% confidence interval (CI) of hypertensive controlled patients by the QOF and NICE target in each general practice is shown



The multiple regression models examined the associations between patient characteristics and the probability of being classified as a HCP (Table 3). Regardless of the target, men were less likely to be classified as a HCP. An increase in age of one year was associated with a 1% decrease in the probability of being classified as HCP in the NICE model, but this association was not present in the QOF model. Differences in the probability of being classified as a HCP among ethnic groups were only found in the NICE model in that patients of South Asian and Other Asian origin had a significant higher probability of being classified as HCP in comparison with White patients, OR 1.59 95% CI (1.35–1.897) and 1.32 (1.36–1.68) respectively. By using the QOF target, for those prescribed with antihypertensive drugs, there was a significant variation in the probability of being classified as a HCP compared with those patients prescribed no medication. In both models, having cardiovascular comorbidity significantly increased the probability of being classified as a HCP.

The regression models revealed that the probability of being classified as a HCP by age group is different for each sex (Interaction effect) (Table 3). By using the QOF target, men aged 45–64 years and 65 years and over had significantly higher probability of being classified as HCP

Table 2**Distribution of hypertensive controlled patients among age, sex, ethnic origin and drug prescription categories by presence of comorbidity[¥]**

	<i>QOF target</i>				<i>NICE target</i>			
	<i>Controlled patients [%]</i>				<i>Controlled patients [%]</i>			
	<i>Without comorbidity</i>	<i>P value</i>	<i>With comorbidity[¥]</i>	<i>P value</i>	<i>Without comorbidity</i>	<i>P value</i>	<i>With comorbidity[¥]</i>	<i>P value</i>
Male		0.000		0.000		0.133		0.422
17–44	370 (64.8)		96 (76.8)		288 (50.4)		89 (71.2)	
45–64.9	1350 (72.1)		804 (79.1)		1017 (54.3)		674 (66.3)	
>= 65	1193 (80.7)		1657 (85.2)		818 (55.4)		1274 (65.5)	
Female		0.000		0.099		0.000		0.000
17–44	521 (74.9)		68 (76.4)		481 (69.1)		62 (69.7)	
45–64.9	1900 (79.2)		678 (85.5)		1529 (63.7)		564 (70.3)	
>= 65	2247 (81.4)		1652 (82.3)		1542 (55.9)		1230 (61.3)	
Ethnic group		0.249		0.258		0.000		0.000
White	4093 (77.7)		2647 (83.6)		2962 (56.3)		2051 (64.7)	
Black	1736 (76.7)		1088 (80.8)		1333 (58.9)		854 (63.5)	
South Asian	562 (80.9)		622 (83.5)		473 (68.1)		517 (69.4)	
Other Asian	229 (75.8)		213 (84.5)		193 (63.1)		188 (74.6)	
Other	333 (77.8)		210 (81.1)		247 (57.7)		160 (61.8)	
Unknown	628 (76.4)		175 (81.4)		467 (56.8)		123 (57.2)	
Overall	7581 (77.6)		4955 (82.8)		5675 (58.1)		3893 (65.1)	

[¥] Patients with at least one of the follow disease: coronary heart disease, diabetes mellitus, heart failure, atrial fibrillation, stroke or renal failure

compared to those (men and women) aged 17–44 years, OR 1.34 (1.08–1.65) and OR 2.15 (1.61–2.87) respectively. Similar findings were found when the NICE target was used. By contrast for women, the probability of being classified as a HCP varied with each target. Women aged between 45 and 64 years and 65 years and over, were more likely to be classified as a HCP, OR 1.26 95% CI (1.01–1.57) and OR 2.15 95% CI (1.61–2.87) respectively, compared to those (men and women) aged between 17–44 years when the QOF target is used. However, using the NICE target, women aged 65 years and over were less likely to be classified as a HCP, OR 0.77 95% CI (0.60–0.99).

Figure 2 also illustrates the variation in the probability of being classified as a HCP between sexes across age strata. In comparison with women aged between 17 and 44 years, men at similar age had lower probability of being classified as HCP regardless of target used. However, the probability of being classified as a HCP

increased with age for men in comparison with women using both the QOF and NICE target. Men aged 65 years and over, had higher probability of being classified as a HCP than women at similar age regardless of the target.

Discussion

Our findings illustrate that among patients with hypertension registered with the 28 general practices in this study, significant differences in the percentage of hypertensive controlled patients are found when different targets are used. The use of the QOF target produces a higher percentage of controlled patients (79%). In comparison, the percentage of controlled patients decreases by nearly 20% when the NICE target is used. Only 14% of practices have more than 70% of patients classified as an HCP using the NICE target, whereas 93% of the practices have this percentage of controlled

Table 3**Odds ratio of significant patient characteristics associated with being classified as a hypertensive controlled patient**

Patient characteristic	QOF target		NICE target	
	Odds Ratio 95% CI‡	P value	Odds ratio 95% CI	P value
Men	0.64 (0.51–0.81)	0.000	0.50 (0.41–0.62)	0.000
<i>Referent women</i>				
Age (years)	1.00 (0.99–1.00)	0.904	0.99 (0.98–0.99)	0.001
Sex * Age Interaction				
Men*Age 45–64 years	1.34 (1.08–1.65)	0.006	1.31 (1.08–1.58)	0.005
Men*Age 65 years and over	2.15 (1.61–2.87)	0.000	1.61 (1.26–2.06)	0.000
Women*Age 45–64 years	1.26 (1.01–1.57)	0.033	0.91 (0.75–1.11)	0.367
Women * Age 65 years and over	2.15 (1.61–2.87)	0.000	0.77 (0.60–0.99)	0.047
<i>Referent group</i>				
<i>Men and Women Age 17–44 years</i>				
Ethnic group				
Black	0.91 (0.82–1.00)	0.067	0.97 (0.89–1.05)	0.485
South Asian	1.14 (0.98–1.32)	0.073	1.39 (1.23–1.56)	0.000
Other Asian	1.00 (0.81–1.24)	0.978	1.39 (1.16–1.68)	0.000
Other	0.97 (0.81–1.18)	0.824	0.94 (0.80–1.10)	0.473
Unknown	0.92 (0.79–1.08)	0.338	0.91 (0.79–1.04)	0.171
<i>Reference</i>				
<i>White</i>				
Presence of cardiovascular comorbidity¥	1.25 (1.15–1.36)	0.000	1.33 (1.24–1.42)	0.000
Number of antihypertensives prescribed				
One or more antihypertensive drug	1.17 (1.04–1.33)	0.011	1.01 (0.98–1.22)	0.084
<i>Referent group</i>				
<i>No antihypertensive prescribed</i>				

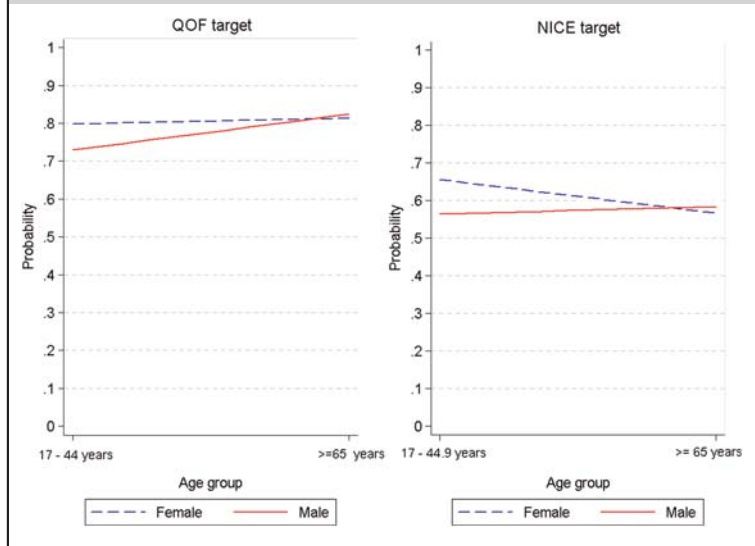
¥ Patients with at least one of the following diseases: coronary heart disease, diabetes mellitus, heart failure, atrial fibrillation, stroke or renal failure
‡ Confidence interval

patients when the QOF target is applied. Although reductions in variations of quality of care across general practices using the QOF indicators have been reported,^{18–19} our results show that the blood pressure QOF target could not capture the potential differences in blood pressure control between the practices in this study.

Because the diastolic blood pressure level is the same for both targets, the difference can be explained by variations in systolic blood pressure reductions among hypertensive patients. This finding might be expected because reductions in systolic blood pressure levels have been less well achieved in controlled clinical trials than reductions in diastolic blood pressure levels.^{20–21} Despite notorious improvements in blood pressure control, there seems that higher systolic blood pressure levels still account for most cases of uncontrolled hypertensive patients.²²

Our results revealed differences in the percentage of patients classified as an HCP by patient characteristics with each target. More than 80% of patients aged 65 years and over are classified as an HCP by the QOF target. By comparison, less than 60% are considered controlled by the NICE target. Several reasons could account for this finding. The progressive rising in systolic blood pressure levels with age.¹⁴ Clinical trials have also shown that for hypertensive patients over 65 years on treatment for systolic blood pressure levels are less sensitive to drug therapy. In those studies, the percentage of patients achieving blood pressure levels below 140/90 mm Hg in those aged over 65 years is rarely higher than 70%.²³ Additionally, the benefit of lowering blood pressure below 150/90 mm HG in those over 80 years is still debatable.²⁴ Hence the QOF target may be better for

Figure 2
Variation in the probability of being classified as a hypertensive controlled patient between male and female by age group



measuring the performance of blood pressure control in older patients.

The present study also supports the idea that classification of HCP is not only affected by the target definition but also by patient characteristics such as sex and age. Firstly, the descriptive analysis revealed an opposite trend of blood pressure control rates across age-sex groups for each target. The logistic regression model also shows that the probability of being classified as HCP varied by age-sex patient characteristics. Although overall women had a higher probability of being classified as HCP than men, men over 65 years had higher probability than older women. This finding has been reported by other authors but the reasons for this uncertain.²⁵ The well-known differences in age-related blood pressure levels between sexes could play a role in the probability of achieving a specific target.¹⁴ Other explanations may be related to differences in blood pressure response to antihypertensive therapy between men and women. However, evidence from two meta-analyses on differences in the effect of antihypertensive drug therapy between sexes did not reveal significant variations in blood pressure reductions between men and women.²⁶ Other potential causes may be differences in fat distribution, hormones or vascular response between

sexes.²⁷ Also, differences in lifestyle and behaviour could account for this effect.²⁸ Therefore more exploration on the contribution of sex and age in the probability of being a HCP is recommended to clarify whether or not a gender specific approach will be needed to improve the current differences in blood pressure control between sexes.

Strengths and weaknesses of the study

We illustrated the usefulness of medical registers to assess the performance of two definitions of blood pressure control. As the conditions and patients included in clinical trials usually differ from those in routine clinical practice, information collected in routine settings is an important resource to assess how achievable targets are in actual practice. Moreover, our register includes a large percentage of patients from ethnic minorities and women – groups that are often under-represented in clinical trials.²⁶

The study does however have some limitations. In line with observational studies, findings from this analysis may not always be generalized to patients with hypertension in other settings. The associations explored are limited to variables collected in routine clinical data. The percentage meeting targets are usually derived from one blood pressure measurement which could overestimate or underestimate the number of HCP due to the variability of blood pressure levels.²⁹ However, our findings show that the percentage of patients classified a HCP are consistent with other studies analysing QOF data.^{19–30}

Conclusion

Better achievement of blood pressure control targets with smaller variability between general practices was found when the QOF target is used, compared to the findings using the NICE target. The NICE target therefore produces lower proportions of HCPs in comparison with the QOF target and a greater variation between general practices. Whereas by using the QOF target older men and women have a higher significantly probability of being classified as a HCP than younger patients, by using the NICE target, older women have a significantly lower probability of being classified as a HCP. Greater consistency is therefore needed

between the QOF and NICE targets. Use of the most rigorous NICE blood pressure control target might also allow greater differentiation in the performance of general practices in managing their hypertensive patients.

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