Management of patients with suspected angina, but without known myocardial infarction: a cross-sectional survey

Alessandro Filippi, Gianfranco Gensini, A Angelo Bignanimi, Andrea Sabatini, Giampiero Mazzaglia and Claudio Cricelli

SUMMARY

Background: *Although several studies describing the diagnostic and therapeutic management of patients with myocardial infarction (MI) by general practitioners have recently been published, little information exists about patients with angina without MI.*

Aim: *To describe the management of patients with angina without known MI in general practice.*

Design: *A cross-sectional survey.*

Setting: *Italian general practitioners providing data to the Health Search Database.*

Method: *Prevalent cases of angina, using the prescription of nitrates as a 'proxy' for disease status, in patients without known MI were selected from the Health Search Database. Data on patient demographics, clinical information, established therapies and cardiology visits were collected. A binomial logistic regression analysis was performed to test which variable made prescription more or less likely.*

Results: *There were 10 455 patients with angina. Blood pressure readings were available for 73.8% of patients; in this group 58.9% had inadequate (≥140/90 mmHg) blood pressure control. Total cholesterol was recorded in 61.6% of cases (mean value = 5.5 mmol/L). Antiplatelet or oral anticoagulant agents were used by 67.8% of the patients, while 24.1% of patients received lipid-lowering agents, 61% received ACE-inhibitors or angiotensin-II receptor antagonists, and 25.2% received β–blockers.*

Conclusions: *In patients treated with nitrates the monitoring of modifiable risk factors and the use of preventive drugs is lower than expected. New strategies aimed at improving secondary cardiovascular prevention among these easily identifiable high-risk subjects are needed.*

Keywords: *angina pectoris; coronary disease; patient care management; prevention and control; nitrates; vasodilator agents.*

A Filippi, MD, general practitioner; C Cricelli, MD, general practitioner, Italian College of General Practitioners, Florence. G Gensini, PhD, MD, cardiologist, Department of Internal Medicine and Cardiology, University of Florence, Florence. A A Bignanimi, PhD, statistician, School of Pharmacy, University of Milan, Milan. A Sabatini, BSc, statistician; G Mazzaglia, MSc, PhD, MD, clinical epidemiologist, Health Search Database, Florence.

Address for correspondence

Dr Giampiero Mazzaglia, The Health Search Database, Largo Cesare Cantù 8, 50143, Florence, Italy. E-mail: mazzaglia.giampiero@simg.it

Introduction

PREVENTION strategies among patients with coronary heart disease (CHD) is a top priority in general practice.[1] Data about patients with myocardial infarction (MI) have recently been published, but information about patients with angina, without known MI, is scarce.[2,3]

Prevalence estimates of angina vary according to the different epidemiological criteria used to detect patients with the disease. However, most of the studies aimed at estimating prevalence have suggested that patients with angina always outnumber patients with MI.[4-7] Secondary prevention for coronary patients without MI is therefore particularly relevant both because of the high level of risk of developing CHD, and because of the large number of patients involved.[8]

Despite this, identification of these individuals is not always straightforward. Using clinical records to assess how many patients are prescribed nitrates, and therefore have angina, may provide a quick 'snapshot' view of the prevalence of angina, but the methodology is likely to provide errors in estimates and risks some underestimation.[6] However, repeated prescriptions for nitrates issued for a 12-month period may indicate that such patients are at high risk of developing CHD, and they may potentially require specialised investigation and treatment.[5]

We therefore examined the management of patients prescribed nitrates among all patients registered in a population-based general practice database.

Method

Data source

We conducted a population-based retrospective study using information obtained from the Health Search Database, set up by the Italian College of General Practitioners in 1998. The quality of the information gathered has been assessed in previous studies.[9,10]

The Health Search Database currently contains data from over 550 Italian general practitioners (GPs) with a patient population of over 800 000 individuals. After intensive training, all participating GPs recorded data during their normal daily clinical practice. The software system used coded all the diagnostic records using the ninth revision of the International Classification of Diseases (ICD-9).[11] Prescription records were coded according to the Anatomical Therapeutic Chemical classification system.[12]

A unique patient code linked demographic and prescription information, clinical events and diagnoses, hospital admissions, and cause of death. Data were subject to a

HOW THIS FITS IN

What do we know?

Several guidelines suggest that prevention strategies among patients at high risk for coronary events is a top priority in general practice. No information is available about how recommendations on prevention are implemented in patients with angina, but without known myocardial infarction.

What does this paper add?

The monitoring of well established coronary risk factors and the prescription of drugs aimed at reducing the coronary risk in subjects with angina is lower than that recommended by the European and World Health Organisation guidelines.

range of quality checks. Any variations within agreed ranges were investigated and submitted to each participating GP. Physicians who failed to meet the standard quality criteria were not considered for epidemiological studies.[13] At the time this study was initiated, 477 GPs were considered up to standard.

Patient selection

From 730 586 subjects aged 15 years or older, we selected those who had received at least two prescriptions of nitrates between 1 April 2001 and 31 March 2002, and had no recorded diagnosis of myocardial infarction (ICD-9 codes 410–412).

For each patient, the following information was obtained: (*a*) age, (*b*) sex, (*c*) smoking habits, (*d*) recorded diagnosis of either diabetes (regardless of type), or stroke/transient

ischaemic attack (TIA), and (*e*) recorded cardiology visit within the last 3 years.

We also extracted information regarding blood pressure and/or total cholesterol (last recorded value during the 18 months before 31 March 2002), and the use of the following drugs (at least two prescriptions within the 12-month observation period): β-blockers, ACE-inhibitors or angiotensin-II receptor antagonists, antiplatelet or oral anticoagulant drugs, and lipid-lowering agents.

Statistical analysis

Results are expressed as proportions or as means with 99% confidence intervals (CIs). Proportion was compared by the χ^2 test and mean by the Student's t–test. We also tested the antiplatelet or oral anticoagulant drug use by using a binomial logistic regression analysis, to assess which covariates made a prescription more or less likely. Age, sex, recorded diagnosis of diabetes or stroke/TIA, cardiology referral (within 0–18 months, within 19–36 months, or never), and prescription of individual categories of cardiovascular drugs were used as predictors. The statistical significance was set with a value of $P < 0.001$. Calculations were made using STATA 7.0.

Results

Table 1 shows demographic and clinical characteristics of the study sample. Among 10 455 patients with angina, 45.7% were men and 54.3% were women, with an overall mean age of 76.2 years. Diagnosis of diabetes mellitus was reported in 23.7% of patients, while previous stroke/TIA was reported in 5.9% of patients. Available information on blood pressure and total cholesterol were found in 73.8% and 61.6% of patients, respectively. Among these, 58.9%

Table 1. Sex-specific demographic and clinical characteristics of patients with stable chronic angina.

	Men (*n* = 4780)	Women (*n* = 5675)	Total (*n* = 10 455)
Age in years (%)			
<54	206 (4.3)	105 (1.9)	311 (3.0)
55–64	652 (13.7)	402 (7.1)	1054 (10.1)
65–74	1501 (31.4)	1423 (25.1)	2924 (28.0)
>75	2421 (50.7)	3745 (66.0)	6166 (59.0)
Diabetes (%)	1090 (22.8)	1391 (24.5)	2481 (23.7)
Stroke/TIA (%)	275 (5.8)	347 (6.1)	622 (6.0)
Blood pressure control in mmHg[a] (%)			
<140/90	1592 (45.2)	1582 (37.7)	3174 (41.1)
≥140/90	1929 (54.8)	2616 (62.3)	4545 (58.9)
Blood pressure levels (SD)			
Mean systolic blood pressure	138.5 (18.5)	142.0 (18.5)	140.4 (18.6)
Mean diastolic blood pressure	79.3 (8.9)	80.5 (8.7)	80.0 (8.8)
Cholesterol levels in mmol/L[b] (%)			
<5.2	1361 (45.5)	1178 (34.2)	2539 (39.4)
5.2–6.2	1024 (34.2)	1254 (36.4)	2278 (35.4)
6.3–7.4	509 (17.0)	822 (23.8)	1331 (20.7)
>7.5	97 (3.2)	195 (5.7)	292 (4.5)
Mean total cholesterol (SD)	5.33 (1.2)	5.64 (1.2)	5.50 (1.2)
Cardiology referral (%)			
Never	1691 (35.4)	2321 (40.9)	4012 (38.4)
Within the last 0–18 months	2483 (51.9)	2623 (46.2)	5106 (48.8)
Within the last 19–36 months	606 (12.7)	731 (12.9)	1337 (12.8)

[a]Only 73.8% of sample had blood pressure recorded. [b]Only 61.6% of sample had cholesterol recorded. TIA = transient ischaemic attack; SD = standard deviation.

Table 2. Blood pressure and blood lipid levels among patients with angina according to the time of cardiology referral.

| Recorded information | Cardiology referral | | | | | | P-value |
| | 0–18 months (n = 5106) | | 19–36 months (n = 1337) | | Never (n = 4012) | | |
	n	% (99% CI)[a]	n	% (99% CI)[a]	n	% (99% CI)[a]	
Blood pressure	4208	82.4 (81.0 to 83.7)	1070	80.0 (77.0 to 82.2)	2441	60.8 (58.8 to 62.8)	<0.001
Cholesterol	3705	72.6 (70.9 to 74.1)	917	68.6 (65.2 to 71.8)	1818	45.3 (43.2 to 47.3)	<0.001
Blood pressure control (mmHg)[b]							
<140/90	1779	42.3 (40.3 to 44.2)	409	38.2 (34.4 to 42.1)	986	40.4 (37.8 to 42.9)	0.035
≥140/90	2429	57.7 (55.7 to 59.6)	661	61.8 (57.8 to 65.5)	1455	59.6 (56.5 to 61.7)	0.036
Cholesterol levels (mmol/L)[c]							
<5.2	1490	40.2 (38.1 to 42.3)	341	37.2 (33.0 to 41.4)	706	38.8 (35.8 to 41.8)	0.208
5.2–6.2	1322	35.7 (33.6 to 37.7)	343	37.4 (33.3 to 41.6)	613	33.7 (30.8 to 36.6)	0.134
6.3–7.4	739	19.9 (18.2 to 21.6)	187	20.4 (17.0 to 24.0)	407	22.4 (19.9 to 25.0)	0.096
>7.5	154	4.2 (3.3 to 5.0)	46	5.0 (3.3 to 7.1)	92	5.1 (3.5 to 6.5)	0.252

[a]Proportions and 99% CIs were estimated by using the total number of patients with recorded information as the denominator. [b]Only 73.8% of sample had blood pressure recorded. [c]Only 61.6% of sample had cholesterol recorded.

showed inadequate blood pressure control, and 60.2% had total cholesterol levels >5.2 mmol/L. In the total sample, 38.4% of patients had no recorded cardiology referral in the last 3 years. Referred patients (mean age = 74.1 years, 99% CI = 73.7 to 74.4 years) were significantly younger than those who were not referred (mean age = 77.6 years, 99% CI = 77.1 to 78.0 years), and men (64.6%, 99% CI = 62.8 to 66.3%) were significantly more likely to have recently visited a cardiologist than women (59.1%, 99% CI = 57.4 to 60.7%). Only 40.2% of patients had recorded smoking habits. Among patients with available information, 54.6% never smoked, 12.1% were current smokers, and 33.3% were former smokers.

Table 2 reports the clinical characteristics of patients treated with nitrates stratified by the time of the cardiology referral. Clinical information was more frequently recorded among patients referred to a cardiologist (P<0.001), but there were not relevant differences as far as blood pressure control and cholesterol levels were concerned.

The distribution of cardiovascular drug prescription by time of last cardiology visit is shown in Table 3. Overall, 67.8% of patients were prescribed either antiplatelet agents (60.3%) or oral anticoagulant drugs (7.5%), 62.0% were prescribed either ACE-inhibitors or angiotensin II receptor antagonists, 25.2% β-blockers, and 24.2% lipid-lowering drugs. The proportion of such drugs increased significantly with referral to a cardiologist, particularly among those more recently (0–18 months) referred.

The logistic regression analysis also showed that patients referred to a cardiologist within the last 0–18 months were likely to be treated with antiplatelet or oral anticoagulant agents, compared with those referred within 19–36 months (odds ratio [OR] = 1.57, 99% CI = 1.31 to 1.86) or those who were never referred (OR = 2.24, 99% CI = 1.98 to 2.52). Moreover, men were more likely to be treated than women (OR = 1.67, 99% CI = 1.50 to 1.87) as were those patients aged <65 years (OR = 1.60, 99% CI = 1.35 to 1.91), whereas the other considered variables did not show any significant predictive effect.

Discussion
Summary of main findings
In patients treated with nitrates, the monitoring of modifiable risk factors and the use of preventive cardiovascular drugs is lower than expected. In fact, only 61% of patients had their total cholesterol recorded, and only 74% of patients had their blood pressure recorded. Moreover, the analysis of cardiovascular drug use demonstrated a high degree of underprescribing among such patients. Our findings might be particularly relevant to plan preventive interventions to ensure high quality of care in this group of high-risk subjects. Angina is the initial manifestation of CHD in approximately 50% of patients,[8] thus affecting millions of individuals in Italy, with estimated associated costs for each CHD event of around €15 000.[14]

Table 3. Distribution of cardiovascular drug prescription broken down by time of cardiology referral.

| Type of drug | Cardiology referral | | | | | | P-value |
| | 0–18 months (n = 5106) | | 19–36 months (n = 1337) | | Never (n = 4012) | | |
	n	% (99% CI)	n	% (99% CI)	n	% (99% CI)	
Antithrombotic	3865	75.7 (74.1 to 77.2)	889	66.5 (63.0 to 69.7)	2334	58.2 (56.1 to 60.1)	<0.001
ACE-inhibitors/angiotensin II receptor antagonists	3378	66.1 (64.4 to 67.8)	775	58.0 (54.4 to 61.4)	2226	55.5 (53.4 to 57.5)	<0.001
β-blockers	1611	31.5 (29.8 to 33.2)	313	23.4 (20.4 to 26.5)	710	17.7 (16.1 to 19.2)	<0.001
Lipid-lowering agents	1560	30.6 (28.9 to 32.2)	305	22.8 (19.9 to 25.9)	656	16.4 (14.8 to 17.9)	<0.001

Consistency of the results

Our results are not totally unexpected, since under-recording even in high-risk patients has already been reported in the United Kingdom (UK).[15] Data regarding blood pressure control (41% of patients) are also similar to those reported in the EUROASPIRE II Study,[2] carried out in 15 countries among younger patients with recent acute CHD, where blood pressure control was reached in only 49% of cases. Slightly less than a third of the patients with uncontrolled blood pressure (more than 18% of all subjects with registered values) had blood pressure measurement of >160/100 mm/Hg, with the main problem being systolic hypertension. According to the World Health Organisation guidelines,[16] lowering blood pressure by 20/10 mm/Hg in high-risk patients could spare 17 cardiovascular events per 1000 patients per year, and even a more limited blood pressure reduction (10/5 mmHg) could avoid 10 cardiovascular events per 1000 patients per year, thus highlighting the importance of adequate blood pressure control.

In our study, among the 6440 subjects with recorded total cholesterol values, lipid-lowering drugs were largely under-prescribed and the majority of treated patients failed to reach the recommended target values.[1,8,16] Moreover, almost a third of patients had no prescription for antiplatelet or anticoagulant drugs. This figure is too high to be explained by possible contraindications, but it is still very close to that reported in general practice in the UK.[3,17] A likely explanation might be that patients with suspected angina are considered by GPs to be at lower risk than those subjects with acute CHD, although antiplatelet drugs could prevent 22 cardiovascular events per 1000 treated patients every 2 years among patients with angina.[18]

Referral to a cardiologist seemed to slightly improve both the recording and the control of blood pressure and total cholesterol values. Referral rates were higher among men and younger patients. Such differences may explain the varied prescribing rates reported, since women had fewer antiplatelet drug prescriptions and they were also prescribed significantly less ACE-inhibitors/angiotensin-II receptor antagonists and β-blockers (data not shown).

Differential management of men and women has been reported in several studies,[19-21] although there is a lot of disagreement about whether this can be explained by men having more severe symptoms than women with the same diagnosis. We have no data, other than for sex and age, to determine whether referred patients differ from those who were not referred, although this difference is probable. However, physicians' awareness among younger patients might also explain the differences in management of men and women, since in our sample the prevalence of women aged >75 years was significantly higher. Other possible hypotheses may explain our findings. First, patients with more severe angina were more frequently referred. Secondly, referral rates were less prevalent among subjects with an 'old' diagnosis of angina, who benefited less from the relatively new recommendations of practice guidelines.[1,8,16]

Strengths and limitations of the study

The main strength of this study is the large number of patients examined in a wholly 'naturalistic' setting.

Comparative analyses have in fact demonstrated the validity of the information gathered in the Health Search Database.[9] For example, the comparison between the Health Search Database and the Italian National Drug Use Monitoring Centre of the National Institute of Health[22] indicated lower, but not significant, rates of prescription of nitrates for the Health Search Database (24.4 versus 29.9 Defined Daily Dose per 1000 inhabitants per day). Therefore, it is likely that our results can be reasonably extended to the whole population of Italian GPs.

The main limitations of this study are directly related to the method used in detecting cases and obtaining the clinical information. First, we could not verify that all the patients treated with nitrates had received a diagnosis of angina by their doctor. It is therefore possible, although very unlikely, that some subjects under nitrate treatment had a different diagnosis, including an unrecorded MI. Furthermore, our findings do not necessarily indicate that the information was unknown to the GPs, since a 'registration bias' probably exists, leading to an under-recording especially in low-risk subjects or in invalid patients assisted only at home.[23] In Italy there is no available evidence of the proportion of patients receiving preventive care for cardiovascular disease outside primary care. However, even in the most optimistic hypothesis, a sizeable proportion of patients receiving a diagnosis of angina pectoris have had an unsatisfactory assessment of concurrent risk factors.

Secondly, we did not investigate patients with angina who were not treated with nitrates. In fact, Cannon *et al* showed that at least 30% of patients with stable chronic angina do not use nitrates.[5] Moreover, Hippisley-Cox *et al* suggested that this percentage should be even higher.[15] Therefore, it is possible that preventive therapies and smoking habits are different in subjects with and without nitrate therapy.

Implications for clinical practice

Well established coronary risk factors are largely under-recorded among Italian patients receiving nitrate treatment without known MI. Blood pressure and total cholesterol levels are elevated in the majority of patients, and prescription of cardiovascular preventive therapies is appreciably lower than that recommended by the guidelines.[1,8,16] Therefore, improvement of the preventive approach in patients could spare thousands of cardiovascular events every year among these high-risk patients, with considerable cost savings for the national health system in Italy.

References

1. Wood D, De Backer G, Faergeman O, *et al*. Prevention of coronary heart disease in clinical practice: recommendations of the Second Joint Task Force of European and other Societies on coronary prevention. *Atherosclerosis* 1998; **140:** 199-270.
2. EUROASPIRE II Study Group. Lifestyle and risk-factor management and use of drug therapies in coronary patients from 15 countries. *Eur Heart J* 2001; **22:** 554-572.
3. Campbell NC, Thain C, Deans HG, *et al*. Secondary prevention in coronary heart disease: baseline survey of provision in general practice. *BMJ* 1998; **316:** 1430-1434.
4. Giampaoli S, Pallrnieri L, Pilotto L, Vanuzzo D. Incidence and prevalence of ischemic heart disease in Italy: estimates from the MIAMOD method. *Ital Heart J* 2001; **2:** 349-355.
5. Cannon PJ, Connell PA, Stockley IH, *et al*. Prevalence of angina as assessed by a survey of prescriptions for nitrates. *Lancet* 1988; **1(8592):** 979-981.

6. Bottomley A. Methodology for assessing the prevalence of angina in primary care using practice-based information in northern England. *J Epidemiol Community Health* 1997; **51:** 87-89.

7. Krogh V, Trevisan M, Panico S, *et al*. Prevalence and correlates of angina pectoris in the Italian nine communities study. Research Group ATS-RF2 of the Italian National Research Council. *Epidemiology* 1991; **2:** 26-32.

8. Gibbons RJ, Chatterjee K, Daley J, *et al*. ACC/AHA/ACP-ASIM guidelines for the management of patients with chronic stable angina: executive summary and recommendations. A report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Committee on Management of Patients with Chronic Stable Angina). *Circulation* 1999; **99:** 2829-2848.

9. Filippi A, Bignamini AA, Sessa E, *et al*. Secondary prevention of stroke in Italy: a cross-sectional survey in family practice. *Stroke* 2003; **34:** 1010-1014.

10. Cricelli C, Mazzaglia G, Samani F, *et al*. Prevalence estimates of chronic diseases in Italy: exploring the differences between self-report and primary care databases. *J Public Health Med* 2003; **25:** 254-257.

11. World Health Organisation. *International Classification of Diseases. Manual of the international statistical classification of diseases: injuries and causes of deaths.* 9th revision. Geneva: World Health Organisation, 1977.

12. World Health Organisation Collaborating Centre for Drug Statistics Methodology. *ATC Index with DDDs.* World Health Organisation: Oslo, 2001.

13. Lawrenson R, Williams T, Farmer R. Clinical information for research: the use of general practice databases. *J Pub Health Med* 1999; **21:** 299-304.

14. Gandjour A, Kleinschmit F, Lauterbach KW; INTERCARE International Investigators. International comparison of costs and quality in health care. European comparison of costs and quality in the treatment of acute myocardial infarction (2000–2001). *Eur Heart J* 2002; **23:** 858-868.

15. Hippisley-Cox J, Pringle M. General practice workload implications of the national service framework for coronary heart disease: cross-sectional survey. *BMJ* 2001; **323:** 269-270.

16. Guidelines Subcommittee. 1999 World Health Organisation International Society of Hypertension guidelines for the management of hypertension. *J Hypertens* 1999; **17:** 151-183.

17. Khunti K, Sorrie R, Jennings S, Farooqi A. Improving aspirin prophylaxis after myocardial infarction in primary care: collaboration in multipractice audit between primary care audit group and health authority. *BMJ* 1999; **319:** 297.

18. Antithrombotic Trialists' Collaboration. Collaborative meta-analysis of randomised trials of antiplatelet therapy for prevention of death, myocardial infarction, and stroke in high-risk patients. *BMJ* 2002; **324:** 71-86.

19. Pearson TA, Laurora I, Chu H, Kafonek S. The lipid treatment assessment project (L-TAP): a multicenter survey to evaluate the percentages of dyslipidemic patients receiving lipid-lowering therapy and achieving low-density lipoprotein cholesterol goals. *Arch Intern Med* 2000; **160:** 459-467.

20. de Gevigney G, Mosnier S, Ecochard R, *et al*. Are women with acute myocardial infarction managed as well as men? Does it have consequences on in-hospital mortality? Analysis of an unselected cohort of 801 women and 1718 men. *Acta Cardiol* 2001; **56:** 169-179.

21. Hippisley-Cox J, Pringle M, Crown N, *et al*. Sex inequalities in ischaemic heart disease in general practice: cross-sectional survey. *BMJ* 2001; **322:** 832.

22. Osservatorio Nazionale sull'impiego dei Medicinali. *L'uso dei farmaci in Italia*. Anno 2001 [Trends in national health service drug use. Year 2001]. Rome: National Institute of Health, 2001.

23. Grundy E, Glaser K. Trends in, and transition to, institutional residence among older people in England and Wales. *J Epidemiol Community Health* 1997; **51:** 531.

Acknowledgements