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ORIGINAL ARTICLE

Improvement of cardiovascular risk profile in an elderly population of low social level: the ICON (Improving Cardiovascular risk profile in Older Neapolitans) study

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Older age and low socio-economic conditions are associated with poor control of cardiovascular risk factors (RFs). We assessed the prevalence and awareness of cardiovascular RFs in 503 elderly outpatients of low social status attending two public Internal Medicine clinics in Naples, and studied the interaction of education and employment level with risk profile. The therapeutic intervention was oriented to improve patients' motivation through a positive patient–physician relationship, in keeping with the current guidelines for hypertension. The effect of treatment was evaluated by comparing retrospectively the level of cardiovascular RFs at baseline and at the last follow-up examination performed within 31 October 2005. Only 33.3% of patients (age = 68 ± 6 years) had attended primary school. Overall (current or previous) employment level was also low. Obesity, hypertension and dyslipidaemias were present in most patients, diabetes in 17.3% of them. In all 8.0% of hypertensives, 16.1% of diabetics and 24.7% of dyslipidaemics were unaware of their diseases. Cardiovascular risk profile was worse at lower educational and employment levels. Odds ratios for the metabolic syndrome were 0.28 (95% confidence interval (CI) = 0.15–0.52) and 0.35 (0.20–0.62) in the most qualified of three education and employment groups, respectively, compared to the lowest ones. The level of all cardiovascular RFs was effectively reduced during treatment. Control rate of most RFs improved significantly (for hypertension, from 12.8 to 36.5%, $P < 0.001$). These patients had a high prevalence of cardiovascular RFs, which correlated with their educational and work activity levels. Awareness of their health status was unsatisfactory. Treatment, specifically addressing patient–physician relationship, favourably affected cardiovascular risk profile.
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Introduction

The increasing age of the population is one of the main determinants of the global epidemics of cardiovascular disease. Beside its role as cardiovascular risk factor (RF) *per se*, old age is often accompanied by social isolation and psychological derangements, which contribute to poor awareness of health problems, low compliance to treatment, impaired control of cardiovascular RFs and ultimately, increased number of cardiovascular events.[1–4] Moreover, cross-sectional[5–6] and prospective studies[7] have demonstrated that educational and socio-economic levels also exert a remarkable effect on the prevalence of cardiovascular RFs, patient awareness and compliance and clinical outcomes.

The role of psychological and relational factors in cardiovascular prevention is nowadays more recognized than in the past.[8,9] The Seventh Report of the US Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure (JNC7) states that therapy can reach its goal only if the patient is sufficiently motivated to follow prescriptions, and this can be achieved through a positive relationship with the clinician.[10] An efficient 'therapeutic alliance'[11] is a potent motivator for patients.[8,10]

The present study was performed in two outpatient clinics of the city of Naples, both part of the Italian National Health Service (Servizio Sanitario Nazionale, SSN). Both clinics serve deprived segments of the city population: one is mainly attended by people living in the so-called 'Spanish Quarters',

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in the historical centre, the other in the suburban district of Scampia. SSN outpatient clinics are easily accessible facilities spread throughout the territory, where people can obtain inexpensive or even free, specialized medical care. Patients are normally referred to these services by family doctors.

Our aims were to evaluate, in a large series of elderly patients attending the Internal Medicine office of the two outpatient clinics: (a) prevalence and patient awareness of the main cardiovascular RFs; (b) whether an association exists between a patient's social level and his/her cardiovascular risk profile. We also aimed at retrospectively assessing, in patients whose general practitioners (GPs) requested specialized follow-up care, the effect of therapeutic intervention complying with current guidelines for the treatment of cardiovascular RFs, and oriented to join the patients in a therapeutic alliance.[10,11]

Patients and methods

All patients referred to the two clinics between the period they were set up (1 September 1996, for the one in the historical centre and 1 September 1998, for the one in Scampia) and 31 October 2005, aged 60 years or more at the last examination, were included in the analysis. GPs sought specialist's advice for one of the following reasons: help in the diagnosis, occasional assessment of clinical conditions, treatment setting or reappraisal, legal issues that require certification by the SSN (exemption from Health Service fees, disability assessment, work-related issues and so on). When deemed appropriate, they also requested a consultant's temporary or permanent advice for follow-up. Most patients were referred for obesity, dyslipidaemia, arterial hypertension or other cardiovascular RFs. Less frequently, consultations were requested for gastrointestinal, hepatologic, rheumatologic or other medical problems.

At the first visit, clinical history was taken. A structured questionnaire was administered about lifestyle: in particular, smoking was categorized into five levels, from 1 (no tobacco at all) to 5 (more than 20 cigarettes per day). A full physical examination was performed, including the measurement of blood pressure, taken at least two times in the sitting position with a standard mercury sphygmomanometer. When the difference between values was wide, blood pressure was measured again, until stabilization. The last two measures were then averaged. On the same occasion, the appropriate laboratory and instrumental tests were prescribed: patients were recommended to perform them at the internal laboratory of the clinic. In a second visit, clinical parameters were reassessed, laboratory data were evaluated and, when necessary, therapy was prescribed (unless it was urgently needed already at the first visit). The clinical data of this visit were used for statistical calculations. Impaired biochemical parameters were retested for confirmation and the mean values were used for statistics.

Overweight was defined as body mass index (BMI) $\geqslant 25.0\,kg/m^2$, obesity as BMI $\geqslant 30.0\,kg/m^2$. Arterial hypertension[12] and impaired glucose[13] and lipid metabolism[14] were diagnosed according to current guidelines. In particular: arterial hypertension was defined as blood pressure $\geqslant 140/90$ mm Hg; diabetes mellitus as fasting plasma glucose $\geqslant 7.0$ mmol/l or $\geqslant 11.1$ mmol/l after a 75 g oral glucose load; impaired glucose tolerance as plasma glucose $\geqslant 7.8$ and < 11.1 mmol/l 2 h after the glucose load; impaired fasting glucose as fasting plasma glucose $\geqslant 6.1$ and < 7.0 mmol/l; hypercholesterolaemia as fasting total plasma cholesterol $\geqslant 5.2$ mmol/l or cholesterol in low-density lipoproteins (LDL) $\geqslant 3.4$ mmol/l; hypertriglyceridaemia as fasting total plasma triglyceride $\geqslant 1.7$ mmol/l. Cholesterol concentration in LDL was calculated by the Friedwald formula, as total serum cholesterol – cholesterol in high-density lipoproteins (HDL) – 1/5 serum triglyceride (if lower than 4.5 mmol/l). The diagnosis of metabolic syndrome (MS) was made according to the criteria of the third report of the US National Cholesterol Education Program (ATPIII)[14] and the new criteria of the International Diabetes Federation (IDF) for Europid populations.[15]

All patients were prescribed and explained a diet, which, unless contraindicated, was rich in fibre (40–50 g daily) and, when necessary, low in sodium (< 4 g/daily) content. Overweight patients were given a moderately low calorie diet (typically, 1200–1600 kcal, depending on body weight and physical activity). Apart from specific cases, 50–55% of the energy content was supplied by carbohydrates (mainly starch), 30% by lipids (mainly mono- and polyunsaturated, with less than 300 mg/day cholesterol) and the remaining calorie amount by proteins. The appropriate changes in lifestyle were recommended, with particular attention to smoking cessation. Drugs were prescribed when indicated, according to the current international guidelines for the treatment of hypertension, dyslipidaemia and diabetes.[12–14]

Follow-up visits were performed upon the GP's request. Patients were interviewed at each visit on their compliance to treatment and possible side effects of drugs. In particular, they were specifically asked about the number of cigarettes smoked per day, alcohol consumption and physical activity. The recommendations of JNC7 about empathetic reinforcement were applied. In particular, an aptitude of interest for the patient's needs and concerns was adopted and a positive feedback for successful lifestyle changes, improvements in body weight and other cardiovascular RFs was provided. If blood pressure and other parameters were not well controlled, patients were asked about their relevant behaviours and more frequent appointments were scheduled. Each patient's understanding of the

diagnosis and therapy was assessed: misunderstandings and fears were discussed, lifestyle, diet and drug advices were reinforced at each visit and solutions to cope difficulties were proposed.[10]

All visits were performed by the same physician (TM).

Statistics

SPSS package[16] was used for calculations. Student *t* test, analysis of variance (ANOVA), multivariate logistic regression and χ^2 analysis were performed when appropriate. Data are expressed as means $\pm$ s.d. School education was categorized in different levels, from 1 (illiterate) to 7 (academic degree). A score was also assigned to current or previous (for those who had retired) work activities, from 1 (housewives) to 11 (professionals).

Owing to the uneven distribution of patients across the educational and occupational levels, with most of them in the lowest categories and very few in the highest, three groups were formed for both parameters, with top levels pooled together. In particular, education groups were: I (no school degree); II (elementary school, i.e. 5-years education, considered mandatory until the fifties); III (primary school, i.e. 8-years education, or higher degree). Work activity groups were: I (corresponding to occupational categories 1 and 2: housewives and the four unemployed persons); II (cleaning personnel, blue-collar workers); and III (craftsmen, white collars and other more qualified personnel).

The effect of therapy was evaluated by measuring changes in clinic and laboratory parameters and assessing the control rate of obesity, arterial hypertension, diabetes and dyslipidaemia (percent of patients whose relevant parameters were reduced below the cutoffs indicated above). The visit at which the initial treatment was prescribed (in most instances, the second one) was taken as baseline and the last visit performed within 31 October 2005 was considered as final. Treatment was categorized into five levels: no cardiovascular drug (1), drugs for one cardiovascular RF (2), drugs for two or more cardiovascular RFs (3), antiplatelet drugs (4) and drugs for cardiovascular complications: nitroglycerine derivatives, anticoagulants, antiarrhytmics, digitalis and so on (5).

Results

Five hundred and three patients were included in the analysis (365 female, 138 male, mean age at the first visit $= 68 \pm 6$ years); 56% of them attended the outpatient clinic of the historical centre and 44% that of the suburban district of Scampia (Figure 1).

Educational level of this population was low. The distribution of patients in the three groups described in Patients and methods was: 24.9% in group I (7.1% of all patients were illiterate); 41.8% in group II; only 33.3% had attended primary school (group III). At the first visit, people who were currently employed were mainly blue-collar workers, whereas 205 (40.8%) had retired. Current or previous activities were distributed as follows: group I (mainly housewives), 48.8% of patients; group II, 25.3% and group III, 25.9%.

Smoking and alcohol consumption were not common among our patients. Current smokers at the first visit were 14.8%, and only 2.2% smoked more than 20 cigarettes per day; 58.4% did not drink alcohol at all, and no alcoholics with physical dependence were found. However, most patients (63.0%) were sedentary and only a few (1.1%) performed regular physical activity during leisure time or was involved in heavy work as part of their employment.

A high prevalence of overweight and obesity characterized the study population, as shown in Table 1. Most patients had arterial hypertension and dyslipidaemia, whereas over a fourth of them had impaired glucose metabolism.

Only 323 (92.0%) of the 351 hypertensive patients were aware of their diseases. A lower level of awareness was found for diabetes (83.9%) and dyslipidaemias (75.3%). Discrepancies between diagnosis and history of these conditions were all significant ($P<0.001$) at the χ^2 test. As many as 462 previously ignored morbid conditions were diagnosed: 156 of them were cardiovascular RFs and 127 were signs of target organ damage (echocardiographic evidence of left ventricular hypertrophy, electrocardiographic and clinical signs of myocardial ischaemia, atherosclerotic plaques at the carotid

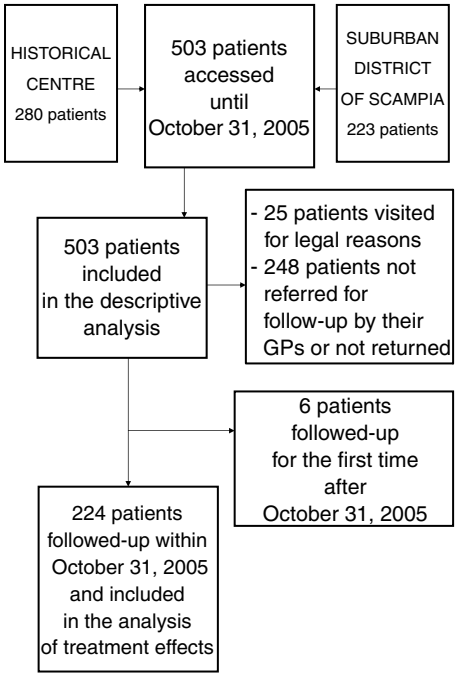

Figure 1 Flow chart of patient access and follow-up. GPs = general practitioners.

or peripheral arteries, microalbuminuria or other signs of nephropathy, retinopathy). Other new diagnoses were related to valvulopathies, cardiac arrhythmias, steatohepatitis and other, mainly non-cardiovascular diseases.

A link between educational level and adiposity was found. A lower BMI was observed in patients of the highest education group ($29.5 \pm 6\,kg/m^2$), as compared with the others ($32.8 \pm 6\,kg/m^2$ in education group II and $34.5 \pm 6\,kg/m^2$ in group I, F significance at ANOVA <0.001; all differences were significant at the *post hoc* Tukey's test). Conversely, HDL cholesterol levels were significantly higher in the highest education group (1.47 ± 0.4 mmol/l) compared to groups II and I (1.36 ± 0.3 and 1.32 ± 0.3 mmol/l, respectively, F significance at ANOVA $= 0.007$). Patients in the highest education group required a less intense therapy than the others: average score of treatment was 3.28, 2.88 and 2.53 in groups I to III, respectively ($P<0.04$ at the χ^2 test).

When work activities were clustered into three groups of increasing professional level, significant differences were found between them in BMI, systolic blood pressure, total and LDL cholesterol. All comparisons favoured the most qualified workers. BMI was $33.9 \pm 6\,kg/m^2$ in the lowest group of work activity, $31.4 \pm 6\,kg/m^2$ in the intermediate and $29.4 \pm 6\,kg/m^2$ in the highest (F significance <0.001). Systolic blood pressure was 158 ± 24 mm Hg in group I, 151 ± 22 mm Hg in group II and 154 ± 23 mm Hg in group III (F significance $= 0.023$). Total cholesterol concentration was 5.87 ± 1.2, 5.56 ± 1.2, and 5.48 ± 1.1 mmol/l in the three groups, respectively (F significance $= 0.007$). LDL cholesterol levels were 3.83 ± 1.1, 3.54 ± 0.9 and 3.52 ± 0.9 mmol/l, respectively (F significance $= 0.016$). *Post hoc* comparisons according to Tukey indicated the following significant differences: for BMI, between all groups; for systolic blood pressure, between the lowest and the intermediate groups; for total and LDL cholesterol, between the lowest and the highest groups.

At baseline, sufficient data for the diagnosis of MS were available for 309 patients (61% of the total). Their age range and clinical and biochemical characteristics were closely similar to those of the whole population, apart from BMI, which was slightly higher ($33.2 \pm 6.4\,kg/m^2$ vs 32.0 ± 6.5, $P<0.02$). According to ATPIII criteria, MS was present in 168 patients (54%). School education (Figure 2) and work activity (Figure 3) significantly affected MS prevalence. Odds ratio of MS in the highest education group, with the lowest one as

Table 1 Prevalence of some cardiovascular risk factors

	n	%
Overweight/obesity		
No	77	15.3
Overweight	130	25.8
Obesity	296	58.8
Arterial hypertension		
No	152	30.2
Yes	351	69.8
Glucose intolerance		
No	364	72.4
Impaired fasting glucose or impaired glucose tolerance	52	10.3
Diabetes mellitus	87	17.3
Dyslipidaemia		
No	218	43.4
Hypertriglyceridaemia	15	3.0
Hypercholesterolaemia or combined dyslipidaemia	269	53.6

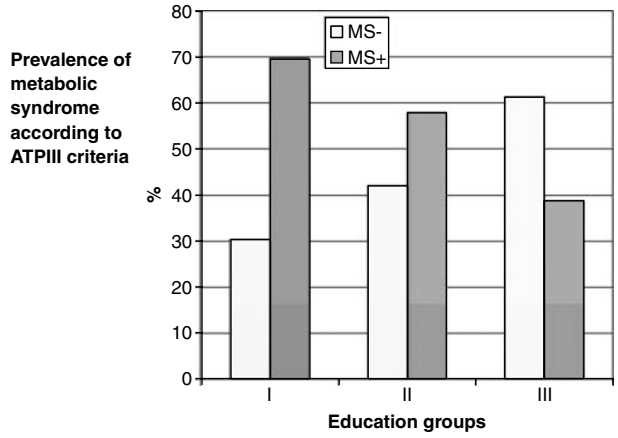

Figure 2 Prevalence of MS according to education level. Education group I = no school degree (24.9% of population); group II = elementary degree (41.8%); group III = primary degree or higher (33.3%). MS = metabolic syndrome. Significance <0.001 at the Kruskal–Wallis χ^2 test.

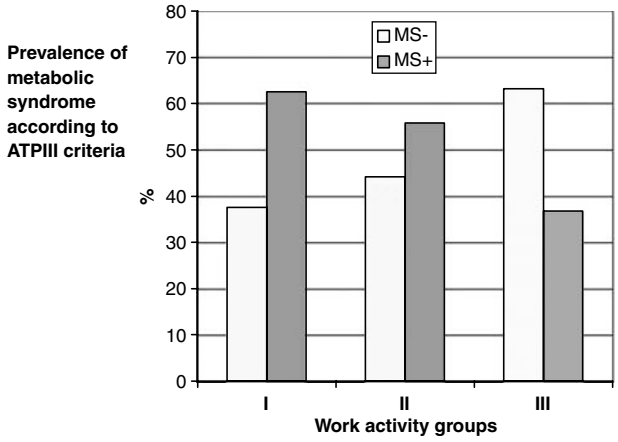

Figure 3 Prevalence of MS according to level of current or previous work activity. Work activity group I = housewives and unemployed (48.8% of population); group II = cleaning service and other blue-collar work (25.3%); group III = more qualified works (25.9%). MS = metabolic syndrome. Significance = 0.001 at the Kruskal–Wallis χ^2 test.

reference, was 0.28 (95% confidence interval (CI) = 0.15–0.52). Odds ratio of MS in the highest work activity group, as compared to the lowest one, was 0.35 (95% CI = 0.20–0.62). When the presence of MS was assessed according to the new IDF criteria, its prevalence was 65%. The distribution of patients meeting IDF criteria for MS in the three education and work activity groups showed a pattern similar to ATPIII-based diagnosis. A stepwise multivariate logistic regression with ATPIII-diagnosed MS as dependent variable and age, gender and, alternatively, school education or work activity as covariates showed a significant association of MS with education (Cox $R^2 = 0.057$, significance <0.001) or work activity (Cox $R^2 = 0.044$, significance <0.001), but not with age or gender.

Patients of the suburban district of Scampia, who were 1.7 years younger than their counterparts in the historical centre ($P<0.001$) but had a lower educational level (primary school degree obtained by 23.3% of them vs 41.4% in the historical centre, $P<0.001$), showed a higher prevalence of MS: 66% (102/154) vs 43% (66/155), $P<0.001$, according to ATPIII criteria. Obesity (74.9 vs 46.1%, $P<0.001$) was also more frequently observed in Scampia.

Effects of treatment

Follow-up visits were performed by 31 October 2005 in 224 patients (45% of the study population, Figure 1). Their mean observation period was 62 weeks, with a high variability (up to 445 weeks, median = 18). The average number of visits was 6.6 ± 7.7 (up to 57, median = 4). The characteristics of these patients were similar to those of the whole study population, except for marginally significant differences in BMI ($32.7 \pm 6.7\,kg/m^2$ in patients returned to follow-up and 31.5 ± 6.2 in the others, $P = 0.049$), and serum glucose level (5.83 ± 1.7 and 6.19 ± 2.0 mmol/l, respectively, $P = 0.051$).

The effect of advice aimed to promote a healthy lifestyle among patients, was a reduction in BMI (−3.3%, $P<0.001$), waist circumference (−4.1%, $P<0.001$), waist/hip ratio (−1.3%, $P<0.05$), blood pressure (systolic −7.1%, $P<0.001$; diastolic −6.8%, $P<0.001$), fasting blood glucose (−3.9%, $P<0.001$), total cholesterol (−6.2%, $P<0.001$), LDL cholesterol (−6.2%, $P<0.001$) and serum triglyceride (−6.2%, $P<0.01$) in the whole sample. Smoking habit was also significantly reduced (mean score changed from 1.33 to 1.24, $P = 0.002$ at the Wilcoxon χ^2 test). Table 2 shows the effects of intervention in the patients with cardiovascular RFs out of normal range: all RFs were significantly affected by therapy. Percent reductions in body weight, blood pressure, total, LDL and HDL cholesterol and total triglyceride were not correlated with the duration of follow-up, as tested by the Pearson's analysis.

Control rate of most cardiovascular RFs improved during follow-up, as shown in Table 3. Simultaneous control of systolic and diastolic blood pressure was different in the two sexes (44.4% in men and 34.2% in women). Changes in clinical and biochemical parameters were similar in the three groups of school education and work activity. MS prevalence, assessed according to the ATPIII criteria, decreased from 47% at baseline to 34% at the end of follow-up ($P<0.05$ at the χ^2 test).

Discussion

The population sample of the present study was overall characterized by low socio-economic conditions, as shown by the educational and occupational levels. In these non-institutionalized, aged patients (for three-quarters women), attending the local facilities of the SSN, we observed a high prevalence of the main cardiovascular RFs. Two important exceptions were the quite low diffusion of the smoking habit and the very small number of heavy alcohol consumers. Whereas alcohol addiction is uncommon in Southern Italy,[17] the low prevalence of smoking habit is in contrast with the data reported for the general Neapolitan population[18,19] and could be owing to the presence of many elderly women in our sample. A similar finding has been reported in Southern Spain.[20] However, the high

Table 2 Changes in some clinical and biochemical parameters during treatment (only cases with impaired values at baseline or in pharmacological treatment for that cardiovascular risk factor are presented)

	Cases included if	*Baseline*	*Final*	*Δ%*
BMI (kg/m^2)	⩾25.0	34.3 ± 6	33.1 ± 6*	−3.5
SBP (mm Hg)	SBP⩾140 or DBP⩾90	160 ± 22	146 ± 24*	−8.3
DBP (mm Hg)	SBP⩾140 or DBP⩾90	89 ± 11	81 ± 11*	−8.0
FBG (mmol/l)	⩾6.11	7.39 ± 2.1	6.72 ± 2.1*	−9.1
Total cholesterol (mmol/l)	⩾5.17	6.31 ± 1.1	5.59 ± 0.9*	−11.4
LDL cholesterol (mmol/l)	⩾3.36	4.03 ± 1.0	3.44 ± 0.8*	−14.6
Triglyceride (mmol/l)	⩾1.69	1.74 ± 0.9	1.50 ± 0.7*	−13.8

Abbreviations: BMI, body mass index; DBP, diastolic blood pressure; FBG, fasting blood glucose; LDL, low-density lipoprotein; SBP, systolic blood pressure.
Data are means ± s.d.
Δ% = percent difference.
*$P<0.001$.

Table 3 Changes in the control rate of some cardiovascular risk factors during treatment (only cases with diagnosis performed as described in Patients and methods are presented)

	Cases included when the following diagnosis was made:	*Baseline (%)*	*Final (%)*
BMI $<30\,kg/m^2$	Overweight	26.6	32.4[a]
SBP <140 mm Hg	Hypertension	14.7	37.8[b]
DBP <90 mm Hg	Hypertension	53.2	76.3[b]
BP $<140/90$ mm Hg	Hypertension	12.8	36.5[b]
FBG <7.00 mmol/l	Glucose intolerance	48.6	62.9
Total cholesterol <5.17 mmol/l	Hypercholesterolaemia or combined dyslipidaemia	10.5	26.4[c]
LDL cholesterol below the ATPIII cut-off level	Hypercholesterolaemia or combined dyslipidaemia	15.6	48.6[b]
Total triglyceride <1.69 mmol/l	Any dyslipidaemia	57.0	69.0[d]

Abbreviations: BP, blood pressure; BMI, body mass index; DBP, diastolic blood pressure; FBG, fasting blood glucose; LDL, low-density lipoprotein; SBP, systolic blood pressure.
Data are means $\pm$ s.d.
ATPIII = Adult Treatment Panel III.
[a]$P<0.01$ at the McNemar χ^2 test.
[b]$P<0.001$ at the McNemar χ^2 test.
[c]$P<0.005$ at the McNemar χ^2 test.
[d]$P=0.064$ at the McNemar χ^2 test.

prevalence of obesity – which reflects a characteristic of Southern Italy[21] – and of sedentarity indicates that diet and lifestyle changes should be pursued to improve cardiovascular risk profile among the elderly people of this area.[22]

As expected, these patients, who were referred to a specialist by their family doctors, showed a greater awareness of hypertension than the general population usually does. However, we still found an 8.0% difference between history and diagnosis of hypertension and a 16.1% discrepancy between history and diagnosis of diabetes; lack of awareness was close to 25% as far as serum lipid abnormalities are concerned. When all cardiovascular RFs were considered together, about one every three patients got a new diagnosis. This figure is probably underestimated, owing to the missed diagnoses of patients not followed-up, or who did not repeat baseline biochemical measurements as prescribed. Moreover, many previously undiagnosed target organ damages were discovered (about one every four patients). Taken together, these data suggest that, in the setting of family medicine of the districts of Naples where our study was undertaken, the assessment of composite cardiovascular risk needs to be improved. The lower patient awareness of biochemical abnormalities, as compared to high blood pressure, could reflect the doctors' delayed compliance with the new diagnostic criteria of cardiovascular RFs, or might indicate that insufficient information is given to patients regarding their health status. This finding parallels a recent observation made in the region of Rotterdam: women at risk of stroke living in the neglected neighbourhoods of that city had a reduced opportunity to receive an appropriate evaluation of their cardiovascular risk profile, as compared to patients of more favourite districts.[23] On the other hand, Italian data indicate that this problem could not be limited to family medicine or to particular areas: in a sample of hypertensive patients referred to medical specialists operating in many Italian regions, an insufficient detection of cardiovascular RFs was frequently observed.[24]

Our data indicating a higher prevalence of several cardiovascular RFs at lower educational and occupational levels confirm similar results obtained previously in patients with suspected[7] or established[6] coronary heart disease, working people[25] and general population.[20–21,26–28] However, the data analysed in these studies were obtained across wide age ranges, or even excluding elderly persons. Moreover, population studies were designed to explore differences among very different educational and occupational categories. At variance, we have limited our observation to patients over 60 years and in a specific social context. Therefore, our results add to previous evidence the finding that differences in blood pressure, BMI and serum lipid concentration can be detected between education and current/previous work categories, even in elderly people of very low social classes. We also observed that the most educated patients require a less intensive treatment, in line with a better cardiovascular risk profile in this subgroup. The higher diffusion of MS in the suburban district of Scampia, where patients were younger than in the other clinic, but their educational level was lower, confirms the importance of social status as a determinant of cardiovascular risk profile.

MS, defined according to both the ATPIII and IDF criteria, was present in more than half of the 309 patients for whom data were available. This figure is higher than reported previously in an Italian series of patients attending medical facilities for cardiovascular problems. In two outpatient hypertension clinics, located in Milan, Northern Italy[29] and in Palermo, Sicily,[30] the prevalence of MS, evaluated with the ATPIII criteria, was 30 and 37%, respectively. Both studies were performed in young and middle-aged patients: this could partly explain the

lower frequency of the syndrome, whose onset parallels ageing.[31,32]

We have found a decreasing frequency of MS with increasing education level, as well as with increasing occupational category level; this finding has been confirmed by multivariate logistic regression. The link of education and work qualification with the occurrence of MS has been documented in various countries.[32–37] However, as for the single cardiovascular RFs, these studies have been usually performed either in young and middle-aged populations, or among active workers. We observed that the level of education and current or previous employment was associated with the prevalence of MS also among elderly persons, mostly retired or who had never worked, in a general context of a low social status.

The level of all main cardiovascular RFs improved during treatment, both in patients with abnormal baseline values and in the whole sample. This last finding is relevant because it includes patients with suboptimal levels of blood pressure and serum lipids, which are responsible for a substantial burden of cardiovascular events.[14,38] Diastolic blood pressure was better controlled than systolic, in keeping with previous observations.[1,2,39]

Blood pressure control is difficult in the elderly,[1–3,40] partly owing to poor compliance to treatment.[3,39] Low socio-economic status is another determinant of insufficient control of cardiovascular RFs.[5–7] In our elderly hypertensive patients of low social level, blood pressure was within normal range in 44% of men and 34% of women at the final visit. Of course, the asymmetrical gender distribution of our series influenced the overall figure of 36.5%. A more difficult control of hypertension in elderly women was also seen in the Framingham cohort, where blood pressure was below 140/90 mm Hg in 36% of men and 28% of women between 60 and 79 years.[40] Two recent studies investigated blood pressure control rate in Italian patients attending medical facilities. Blood pressure was within normal limits in only 18.4% of treated hypertensives recruited by GPs participating to the ForLife study.[41] At variance, in the SILVIA study, involving several hypertension centres, an overall control rate close to that of the present investigation (37.5%) was found, although patients were 7 years younger: in that series, the beneficial effects of treatment were impaired in older patients and in those with lower educational level.[42]

Data about control of biochemical parameters in our series deserve caution, because the number of patients with impaired baseline values was smaller than for those with blood pressure. However, significant changes in the main glucose and lipid parameters were obtained and the number of patients with the features of the MS decreased during treatment. In particular, in hyperlipidaemic patients control rate of total cholesterol level was twofold and that of LDL cholesterol was threefold during treatment, using the cutoff value recommended by ATPIII.[14] This finding is particularly remarkable considering the usually low compliance of older patients: in a population of central Italy, for example, it has been recently observed that the intake of statins is discontinuous after the age of 45 years.[43] Moreover, since 2004 most patients are charged for statins and fibrates, because the Italian drug authority (Agenzia Italiana del Farmaco) has greatly restricted their free delivery.

Our work presents two main weak points. First of all, the analysis of treatment effects was limited to 45% of the whole population, and follow-up duration showed a high variability between patients. This was determined by different reasons: visits performed for legal issues, consultations just requested by GPs for help to solve a diagnostic problem and not referred for follow-up, patients who decided by themselves not to return, patients referred to us by other specialists for specific needs, patients first seen in the weeks immediately before the end of the study period. The wide range of visit number and follow-up periods was also owing to GPs' and patients' decision and to the time distance of the first visit from the end of the study period. However, characteristics of treated patients were not different from those of the whole population. Moreover, changes in blood pressure and other parameters explored were not correlated to the individual follow-up periods. Italian National Health Service entrusts citizens' health primarily to GPs. These may seek, when necessary, the advice of a specialist: however, not always do they entrust to the specialists also the patient's follow-up, and not always for the same time period. Of course (this is the second weak point of our study) we cannot exclude that the changes observed in clinical and biochemical parameters are partly owing to the regression-to-the-mean phenomenon, as we cannot compare our data with a control group as, for example, in prospectively designed trials of an intensive care vs a referred care group. Other works that present the experience of single[44–46] or pooled[42] outpatient clinics, as ours does, reported blood pressure changes and control rates, without comparison with control groups. On the other hand, the fact that our patients were simply treated and not enrolled in a trial should reduce the 'Hawthorne effect', that is, the enhancement of response just owing to the awareness of being observed.[47] In our study, where we found blood pressure control rates close to or better than those observed in similar settings,[41,42,44] we aimed at reducing bias by discarding clinical measurements of the first visit and taking as baseline those of the second one, when treatment was prescribed. This way, we tried to reduce both the regression-to-the-mean effect and the patient's alerting reaction. Baseline laboratory findings were also repeated twice, when they were impaired. Moreover, we have taken as final point the last visit available at a defined date, whatever the

duration of the previous follow-up or the number of visits: therefore, we have determined patients' conditions in a 'random' occasion, irrespective of the best result obtained. If these measures could not completely eliminate the risk of bias, they hopefully reduced it.

As the EISBERG project on the global status of hypertension treatment has recently outlined, a better patient–physician relationship is needed to improve blood pressure control.[39] In keeping with the recommendations of many authorities in the treatment of cardiovascular RFs,[10,14,48] we have addressed the issue of the interaction with patients in order to attain an efficient partnership with them, which can improve therapeutic results, including satisfaction and general health status.[10,49] To reach our aim, we have followed the method suggested by JNC7 to improve patients' trust and motivation.[10] A systematic review has shown that a doctor's attitude towards patients has concrete clinical effects.[50] The significant reduction in smoking habit in our patients could be regarded as an example of this. We suggest that the general improvement in cardiovascular risk profile we observed, despite the unfavourable context of age and socio-economic conditions, is partly owing to this approach. Beside evidence-based prescriptions, motivating patients to actively participate in managing their own health is nowadays considered an essential part of medical professionalism.[51,52] Building a trustful patient–physician relationship is a step in this direction. We should avoid leaving this task to alternative practices, whose scientific basis is hard to demonstrate.[53]

What is known about topic

- Epidemiological studies indicate that older age is associated with high prevalence, low awareness and poor control of cardiovascular risk factors.
- Similar findings have been obtained in people of low socio-economic level (whose usual markers are education and work qualification), although these studies are mainly focused on middle-aged populations.
- Motivation of patients, through a positive patient–physician relationship, is recommended by current guidelines as an important tool in improving compliance to treatment of cardiovascular risk factors. This issue is considered particularly important in older patients, whose response rate is lower.

What this study adds

- In the wide series of elderly Neapolitan outpatients presented here, characterized by low social status as a whole, the lower were the educational level and work qualification, the higher was the prevalence of the main cardiovascular risk factors and of metabolic syndrome.
- Patients' awareness of their cardiovascular risk factors was defective, although they were referred by general practitioners mostly for metabolic or cardiovascular problems.
- Clinical intervention, compliant with current guidelines and addressed to improve patient–physician relationship, can obtain a significant improvement in control of cardiovascular risk profile, notwithstanding the obstacle of age and social level combined.

In conclusion, this population of elderly Neapolitan patients referred to specialized clinics by their family doctors presented a high prevalence of cardiovascular RFs. Their degree of awareness and the number of new diagnoses indicates that patients were not satisfactorily informed about their cardiovascular risk profile. The distribution of cardiovascular RFs and that of MS were influenced by educational and occupational level, even in the context of a low general socio-economic status. Notwithstanding the hindrances related to age and social status, a therapeutic intervention specifically addressing patient–physician relationship can effectively improve the cardiovascular risk profile of such patients.

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