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Impact of physicians' age on the clinical management of global cardiovascular risk: analysis of the results of the Evaluation of Final Feasible Effect of Control Training and Ultra Sensitisation Educational Programme

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SUMMARY

Aim: To evaluate the potential impact of physicians' age on global cardiovascular (CV) risk management in the population of the Evaluation of Final Feasible Effect of Ultra Control Training and Sensitisation (EFFECTUS) study. **Methods:** Involved physicians were stratified into three age groups (≤ 45, 46–55 and > 55 years), and asked to provide clinical data covering the first 10 adult outpatients, consecutively seen in May 2006. **Results:** Overall 1078 physicians, among whom 219 (20%) were aged ≤ 45, 658 (61%) between 46 and 55, and 201 (19%) > 55 years, collected data of 9904 outpatients (46.5% female patients, aged 67 ± 9 years), who were distributed into three corresponding groups: 2010 (20%), 6111 (62%) and 1783 (18%), respectively. A higher prevalence of myocardial infarction and stroke was recorded by younger physicians rather than those aged > 46 years. Older physicians frequently recommended life-style changes, whereas a higher number of antihypertensive, antiplatelet, glucose and lipid-lowering prescriptions was prescribed by physicians aged ≤ 45 years. **Conclusions:** This analysis of the EFFECTUS study indicates a higher prevalence of vascular diseases among outpatients who were followed by younger physicians, who prescribed a higher number of CV drugs than older physicians. These older physicians have more attitude for prescribing favourable life-style changes than younger physicians.

What's known

- Ageing represents a well-known risk factor for cardiovascular diseases and metabolic disorders in both western and developing countries. Older individuals have, in fact, higher susceptibility to experience major cardiovascular events and non-cardiovascular mortality.
- Age has been included in some, but not in all algorithms and risk calculators for individual cardiovascular risk assessment.
- While physicians recognise the importance of patients' age as a major driven for cardiovascular risk, yet few evidence are available regarding the potential impact of physicians' age on clinical attitudes and preferences for the clinical management of patients at cardiovascular risk.

What's new

- We evaluate the potential impact of physicians' age on global cardiovascular risk management in the population of the Evaluation of Final Feasible Effect of Ultra Control Training and Sensitisation study, a multicentre, observational survey performed in Italy, by stratifying involved physicians into three age groups (≤ 45, 46–55 and > 55 years).
- We observe a significantly higher prevalence of cardiovascular risk factors and clinical conditions among younger specialised physicians rather than in older physicians, the majority of which were general practitioners.
- This distribution was paralled by a significantly larger use of cardiovascular drugs (antiplatelet, glucose and lipid-lowering agents), in younger than in older physicians, in which a lower rate of control of major cardiovascular risk factors (e.g. hypertension, dyslipidemia, diabetes) was achieved.

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Introduction

Ageing of general population has been advocated as one of the leading causes of the progressive increased prevalence of cardiovascular (CV) morbidity and mortality, mostly in western countries. Older individuals have, in fact, higher and longer interactions with major CV risk factors, including smoking, hypertension, obesity, dyslipidemia and diabetes mellitus, and more frequently have associated non-CV clinical conditions, thus leading to a substantially higher burden of CV disease than younger subjects. On the basis of these assumptions, current international guidelines for the clinical management of CV diseases highlighted the importance of age for a proper global CV risk stratification and, mostly, for individual risk projection over the years in any apparently asymptomatic (healthy) subjects. As a matter of fact, however, while patients' age represents a well-recognised CV risk factor, few evidence are available regarding the potential impact of physicians' age on clinical attitudes and preferences for the clinical management of global CV risk in a setting of 'real practice'.

The Evaluation of Final Feasible Effect of Ultra Control Training and Sensitisation (EFFECTUS) programme is a multicentre, observational study, designed to raise awareness on global CV risk management and control among physicians operating in the daily clinical practice in Italy (1). In this population, we have recently demonstrated a relatively high prevalence of major CV risk factors, irrespective of the clinical settings (cardiologists, diabetologists and general practitioners) (1) and national areas in which patients were followed. In further analyses, we were also able to demonstrate that a more intensive clinical data recording was paralled with a better adherence to guidelines (2), and that the use of electronic rather than conventional support may translate into better management of outpatients at CV risk by Italian physicians in their daily clinical practice (3). Overall these data, which were collected in a relatively elderly outpatient population (average age 67 ± 9 years) by a relatively middle-aged cohort of physicians (average age 50 ± 7 years), have provided a closer and updated glimpse on the current attitudes and preferences for the clinical management of individual global CV risk and may suggest a potential way to improve control of major CV risk factors in the daily clinical practice in Italy.

In the present analysis, we aimed to examine the potential influence of physicians' age on strategies for the clinical management of global CV risk by evaluating the potential differences and discrepancies among physicians involved in the EFFECTUS programme and stratified according to their age into three groups (≤ 45 years, 46–55 years and > 55 years).

Methods

Methodology of the study

The methodology of the study has been previously described (1). Briefly, EFFECTUS is an educational programme, which was planned in two separate phases, being the first one designed to evaluate prevalence of major CV risk factors and the second one to establish the potential influence of an educational intervention on global CV risk management among physicians operating in the clinical practice in Italy.

The study conformed to the Declaration of Helsinki and its subsequent modifications, and was authorised by the reference Ethical Committee. The confidentiality of the data was strictly protected. Written consent to participate to the educational programme was obtained by all involved physicians and confidentiality on demographic and clinical data of all patients was carefully preserved.

Physicians' recruitment

Physicians' recruitment was accomplished in May 2006. Participants involved in the programme were randomly selected, to have a representative sample of the physicians in Italy, from a community of medical doctors, who shared some specific features: (i) experience in data collection and clinical case report compilation; (ii) a routine practice of at least 60 patients per week, on average; (iii) free on-line access to remote central database. Physicians were invited to participate to an educational training programme, aimed at evaluating the efficacy of a clinical problem-oriented learning approach for improving individual global CV risk management in their routine clinical practice. Thus, involved physicians were blind to the final purposes of the survey. Acceptance of this initial invitation placed physicians under no obligation, and physicians were entitled to drop out of the survey at any stage.

Written invitations were forwarded in a sizable number to ensure the study population sample was a sufficient representative and to achieve this target within a period of approximately 3–4 weeks. For this purpose, each of the 20–24 regional referral centres invited 60 physicians per region (35 general practitioners, 10 diabetologists and 15 cardiologists) to participate in this survey, for a total of 1400 individual physicians, selected on the basis of the above-mentioned clinical habits and personal characteristics. Then, approximately 1250 invitations were issued and physicians were asked to fill questionnaires featuring their characteristics and practice

(age, gender, geographic location, professional expertise or speciality, use of electronic or conventional clinical database) and to reply anonymously to the administrative site of their regional referral centres.

The planned sample size of the survey participants included about 1200 physicians, to achieve an adequate representation of all Italian regions, as well as to limit excessive heterogeneity in age, gender, geographic location, professional expertise and practice size. The predefined minimum percentage of responses to achieve to declare the representative sample size was arbitrarily fixed to 80% of the total sample. Overall, the survey generated a population sample of 1078 physicians (89.8% of the planned sample size) and reflected approximately an outpatient practice of about 11,000 patients per week. Physicians who completed the programme did not receive any compensation for their participation.

Following their acceptance, involved physicians were asked to provide clinical data extracted from their clinical records from the first 10 consecutive adult Caucasian outpatients aged more than 50 years, whatever the reason they referred to their own attending physicians. At each study site, data collection was accomplished during 1 week during May 2006. The entire data collection was completed by participants on-site and then delivered to the data collection centre by on-line access to remote database or by National mail delivery service.

Physicians involved in this programme were stratified in three groups, according to the purpose of the present analysis, including physicians aged ≤ 45 years, between 46–55 years and > 55 years.

Data collection

Medical history and lifestyle habits were assessed by means of a standardised questionnaire. Body mass index (BMI) was expressed as weight in kilograms divided by surface in squared metres. Obesity was defined in the presence of a BMI ≥ 30 kg/m^2 (4). Normal values of clinic and metabolic parameters were carefully assessed. In particular, systolic and diastolic BP control was defined as BP ≤ 140/90 mmHg) (5), total cholesterol ≤ 190 mg/dl (6), high-density lipoprotein (HDL) cholesterol ≥ 40 mg/dl in men and 50 ≥ mg/dl in women (7), triglycerides ≤ 150 mg/dl (7) and fasting glucose levels ≤ 126 mg/dl (8).

Diagnostic criteria proposed by international guidelines were applied in those patients having hypertension (5), hypercholesterolemia (6), low levels of HDL cholesterol levels (7), diabetes (8) and in those having previous history of coronary artery disease (9) or cerebrovascular disease (10).

Statistical analysis

Continuous variables were expressed as mean ± standard deviation and discrete variables as number and percentages. Physician's data were compared by using analysis of variance (continuous variables) or Pearson's chi-square test (categorical variables). Patient's data were analysed using a mixed model with age-group as fixed effect (≤ 45 years as reference category) and physicians fitted as random, so that possible differences in data across physicians could be considered. Data were entered into a database (Microsoft Access for Windows; Microsoft Corp, Redmond, WA) and statistical analyses were performed with R (R Development Core Team; R Foundation for Statistical Computing, Vienna, Austria). Because of the large sample size, the comparisons were considered relevant for p-value < 0.001.

Results

The EFFECTUS programme involved 1078 physicians, among whom 219 (20%) were aged ≤ 45 years, 658 (61%) between 46 and 55 years, and 201 (19%) > 55 years. They collected data of 9904 outpatients (46.5% female patients, aged 67 ± 9 years), who were distributed into three corresponding groups: 2010 (20%), 6111 (62%) and 1783 (18%), respectively. General characteristics of physicians and patients involved in the EFFECTUS programme are reported in Table 1.

A significant proportion of physicians aged more than 46 years were men, whereas a quite balanced gender distribution was reported in the younger group of physicians (p < 0.001 for trend). In addition, a significantly higher proportion of older physicians were general practitioners than young physicians, who were more frequently cardiologists and diabetologists (p < 0.001 for trend). Overall, different age groups of involved physicians were equally distributed throughout different geographical areas of our country (p = 0.026), and this balanced distribution allows us to reduce the potential impact of local influences on clinical practice, an issue that has been recently addressed in other analysis of this database (11).

Patients' age distributions were substantially uniform among different physicians' age groups, whereas a significantly higher proportion of male subjects were followed by physicians aged more than 55 years as compared with other groups of physicians (p = 0.001). In addition, patients followed by older physicians tended to have more frequently obesity (p = 0.038) and smoking habit (p = 0.006) than those followed by physicians aged < 55 years,

Table 1 General characteristics of involved physicians, and prevalence and absolute levels of major cardiovascular risk factors and associated clinical conditions in the overall population and in subgroups of patients stratified according to physicians' age

		Physicians' age (years)			
	Overall	**≤ 45**	**46–55**	**> 55**	**p-Value**
Physicians' characteristics					
Physicians, *n* (%)	1078 (100)	219 (20)	658 (61)	201 (19)	
Male, *n* (%)	788 (73)	123 (56)	481 (73)*	184 (92)*	< 0.001
Age (years)	50 ± 7	41 ± 4	51 ± 3	59 ± 3	–
Physicians					
General practitioners, *n* (%)	841 (78)	117 (53)	563 (86)*	161 (80)*	< 0.001
Cardiologists, *n* (%)	140 (13)	67 (31)	48 (7)*	25 (12)*	
Diabetologists, *n* (%)	97 (9)	35 (16)	47 (7)*	15 (7)	
Macro-areas					
Northern physicians, *n* (%)	340 (31)	85 (39)	200 (30)	55 (27)	0.026
Centre physicians, *n* (%)	385 (36)	66 (30)	251 (38)	68 (34)	
Southern physicians, *n* (%)	353 (33)	68 (31)	207 (31)	78 (39)	
Patients' characteristics					
Patients, *n* (%)	9904 (100)	2010 (20)	6111 (62)	1783 (18)	
Male, *n* (%)	5300 (54)	1082 (54)	3198 (52)	1020 (57)	0.001
Age (years)	67 ± 9	67 ± 9	67 ± 9	66 ± 9	0.011
BMI (kg/m^2)	28 ± 5	28 ± 5	28 ± 5	28 ± 5	0.81
Waist circumference (cm)	99 ± 16	97 ± 16	99 ± 16	99 ± 14	0.56
Obesity, *n* (%)	2504 (25)	538 (27)	1464 (24)	502 (28)	0.038
Physical activity, *n* (%)	2922 (30)	549 (27)	1824 (30)	549 (31)	0.38
Family history of CV disease, *n* (%)	2884 (29)	583 (29)	1724 (28)	577 (32)	0.22
Smoking, *n* (%)	3324 (34)	716 (36)	1948 (32)	660 (37)	0.006
Hypertension, *n* (%)	7436 (75)	1558 (78)	4528 (74)	1350 (76)	0.07
Systolic BP levels (mmHg)	138 ± 15	138 ± 16	138 ± 14	139 ± 16	0.06
Diastolic BP levels (mmHg)	82 ± 8	81 ± 9	81 ± 8	83 ± 9	0.002
Dyslipidemia, *n* (%)	5873 (59)	1234 (61)	3561 (58)	1078 (60)	0.20
Total cholesterol (mg/dl)	212 ± 40	208 ± 42	212 ± 39	216 ± 40	0.001
HDL cholesterol (mg/dl)	52 ± 14	52 ± 14	53 ± 14	51 ± 13	0.017
LDL cholesterol (mg/dl)	131 ± 37	128 ± 36	130 ± 36	136 ± 39	0.020
Triglycerides (mg/dl)	155 ± 74	153 ± 76	154 ± 74	160 ± 73	0.25
Diabetes mellitus, *n* (%)	3681 (37)	818 (41)	2224 (36)	639 (36)	0.12
Fasting glucose (mg/dl)	121 ± 41	127 ± 46	120 ± 40	119 ± 38	0.003
HbA1c, *n* (%)	7.07 ± 1.44	7.23 ± 1.47	7.06 ± 1.39	6.93 ± 1.54	0.06
Ischaemic heart disease, *n* (%)	2633 (27)	583 (29)	1539 (25)	511 (29)	0.050
Previous MI, *n* (%)	1218 (12)	307 (15)	700 (11)	211 (12)	0.003
Angina, *n* (%)	767 (8)	175 (9)	449 (7)	143 (8)	0.39
Coronary revascularisation, *n* (%)	882 (9)	195 (10)	513 (8)	174 (10)	0.27
Ischaemic cerebral disease, *n* (%)	1102 (11)	270 (13)	635 (10)	197 (11)	0.013
Stroke, *n* (%)	262 (3)	76 (4)	132 (2)	54 (3)	0.008
TIA, *n* (%)	444 (4)	113 (6)	262 (4)	69 (4)	0.031
Carotid artery disease, *n* (%)	420 (4)	93 (5)	242 (4)	85 (5)	0.38
Peripheral artery disease, *n* (%)	1247 (13)	267 (13)	768 (13)	212 (12)	0.52
Serum creatinine (mg/dl)	1.05 ± 0.35	1.06 ± 0.37	1.04 ± 0.32	1.06 ± 0.4	0.28

Data are expressed as mean ± SD, if needed. *p < 0.001 as compared with physicians aged ≤ 45 years. BMI, body mass index; BP, blood pressure; CV, cardiovascular; HbA1c, glycated haemoglobin; HDL, high-density lipoprotein; LDL, low density lipoprotein; TIA, transient ischaemic attack.

without any significant difference regarding BMI or waist circumference among different subgroups. On the contrary, a progressively, although not significant, increase in the practice of physical activity was reported in patients followed by younger towards those followed by older physicians.

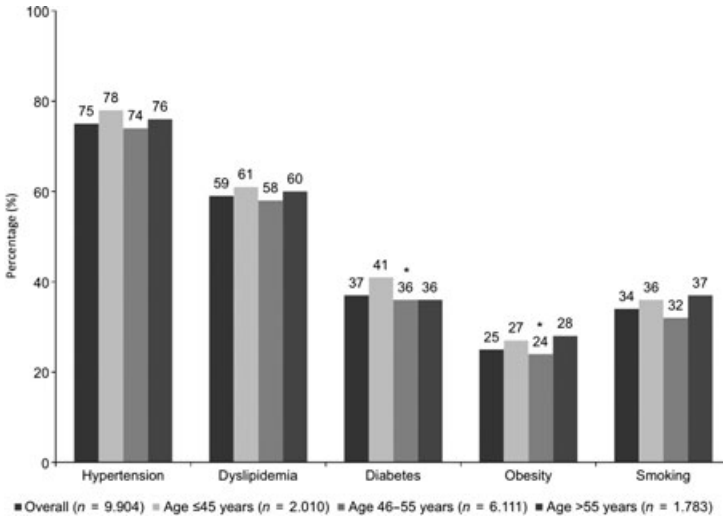

Figure 1 Prevalence of major cardiovascular risk factors in the overall population and in subgroups of patients stratified according to physicians' age. *$p < 0.05$ for trend

In the overall population sample, arterial hypertension represented the most common CV risk factor, followed by dyslipidemia and diabetes mellitus, and this distribution was not affected by physicians' age stratification (Figure 1). Prevalence of different major CV risk factors was not statistically different among three age groups, although hypertension tended to be more prevalent in those subjects followed by younger physicians than in those followed by physicians aged more than 46 years ($p = 0.07$). At the same time, ischaemic heart disease, mostly myocardial infarction ($p = 0.003$), and cerebrovascular disease, mostly stroke ($p = 0.008$) and transient ischaemic attack (TIA) ($p = 0.031$), were more prevalent in outpatients followed by younger physicians than in those followed by physicians aged more than 46 years.

Both systolic and diastolic blood pressure levels were higher in outpatients followed by older physicians as compared with those recorded by physicians aged < 60 years ($p = 0.06$ and $p = 0.002$, respectively). It should be also noted that systolic blood pressure levels were on average in the high-normal range, while diastolic blood pressure levels were always below the normal values, irrespective of physicians' age. On the contrary, both fasting glucose and HbA1c levels were higher in those patients followed by younger physicians than in those followed by physicians aged > 46 years ($p = 0.003$ and $p = 0.06$, respectively). A progressive increase in total cholesterol levels [paralled by a trend towards increase in low density lipoprotein (LDL) cholesterol levels] was observed in patients followed by younger towards those followed by older physicians ($p = 0.001$ for trend), whereas no significant difference was found among three age groups with regard to HDL cholesterol and triglyceride levels. Of note, with the exception of LDL cholesterol levels, all these metabolic parameters were in the normal or in the upper normal thresholds. Also, no significant differences were found with regard to serum creatinine levels, which were, indeed, in the high-normal thresholds.

Figure 2 illustrates prevalence of patients showing normal values of major CV risk factors, including blood pressure, and total HDL cholesterol, triglycerides and fasting glucose levels. Blood pressure control was substantially higher among patients followed by younger physicians as compared with that reported by physicians aged more than 46 years, irrespective of the relatively higher prevalence of hypertension in the former than in the latter group. At the same time, control rate of total and LDL cholesterol was significantly higher in outpatients followed by younger physicians as compared with that achieved by older physicians, whereas no significant differences were found regarding control of HDL cholesterol and triglycerides among the three age groups. On the contrary, glucose control was significantly higher in those patients followed by older physicians as compared with that obtained in those outpatients followed by physicians aged < 55 years.

Among markers of organ damage detection and evaluation (Table S1), carotid ultrasonography and dosage of microalbuminuria were more prescribed by physicians aged < 55 years than by those aged > 55 years ($p = 0.019$ and $p = 0.005$, respectively), who prescribed for global CV risk stratification exercise stress testing and abdominal ultrasonography ($p < 0.001$) in a higher proportion of their patients than younger physicians. With regard to electrocardiogram

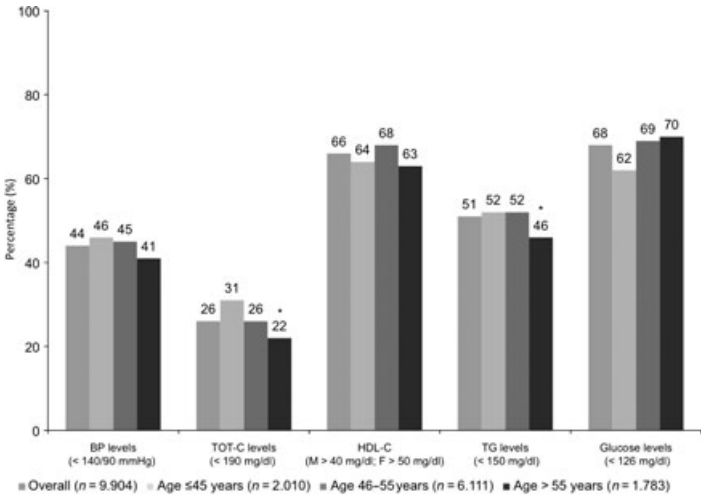

Figure 2 Percentage of patients achieving recommended targets of major cardiovascular risk factors, including blood pressure (< 140/90 mmHg), total cholesterol (< 190 mg/dl), HDL cholesterol (more than 40 mg/dl in male patients and more than 50 mg/dl in women patients), triglyceride (< 150 mg/dl) and glucose (fasting glucose < 126 mg/dl) levels in the overall population and in subgroups of patients stratified according to physicians' age. A value of *$p < 0.001$ as compared with physicians aged ≤ 45 years. BP, blood pressure; TOT-C, total cholesterol; HDL-C, high-density lipoprotein cholesterol; TG, triglycerides

(EKG), echocardiogram and *fundus oculi*, no significant differences were found among different age groups of physicians.

As shown in Table 2, favourable life-style changes, including smoking cessation, diet and physical activity, were more frequently prescribed by physicians aged > 46 years than those aged ≤ 45 years, most likely as a consequence of the higher prevalence of obesity and smoking habits in outpatients followed by the former than in those followed by the latter group of physicians. A higher number of prescriptions of CV drugs, mostly including angiotensin-converting enzyme (ACE) inhibitors ($p = 0.006$) and beta-blockers ($p = 0.016$), were reported by younger physicians than by those aged > 46 years, probably owing to the higher prevalence of hypertension and associated clinical conditions (previous myocardial infarction and stroke or TIA) among outpatients followed by younger physicians as compared with those followed by older physicians. No significant differences were found regarding the other classes of antihypertensive drugs among three age groups. Antidiabetic drugs, mostly including insulin ($p = 0.005$), were more prescribed by physicians aged ≤ 45 years than by those aged > 46 years. At the same time, lipid-lowering agents, mostly statins ($p = 0.09$), and antiplatelet agents, mostly aspirin ($p = 0.006$), were more prescribed by physicians aged ≤ 45 years than by those aged > 46 years, most likely because of the higher prevalence of associated clinical conditions (mostly previous myocardial infarction and stroke or TIA) reported in those patients followed by younger than in those followed by older physicians. Prescriptions of anticoagulant, antiarrhythmic and other lipid-lowering agents did not significantly differ among age groups.

Finally, physicians aged > 45 years paid more attention on recording clinical data on major CV risk factors, including blood pressure, fasting glucose, cholesterol and triglycerides levels than physicians aged ≤ 45 years. In addition, information on these CV risk factors were significantly more frequently recorded by older physicians than by younger physicians, who provided more updated information on organ damage detection than the other groups of physicians.

Discussion

The EFFECTUS programme was aimed at providing information on prevalence of major CV risk factors and physicians' attitudes on global CV risk management in a large population sample of daily clinical practice of general practitioners, cardiologists and diabetologists in Italy. The present study reports data collected in the cross-sectional phase of this programme, based on clinical information derived from the overall population sample of 9904 subjects observed by 1078 physicians, a large and age- and gender-representative sample of the Italian outpatient population.

In this analysis, we highlighted some important differences not only in the distribution and detection of major CV risk factors, but mostly in the clinical

Table 2 Life-style recommendations and use of different drugs in the overall population and in subgroups of patients stratified according to physicians' age

		Physicians' age (years)			
	Overall (*N* = 9.904)	≤ 45 (*n* = 2010)	46–55 (*n* = 6111)	> 55 (*n* = 1783)	p-Value
Life-style recommendations					
Smoking cessation, *n* (%)	3962 (40)	741 (37)	2434 (40)	787 (44)	0.15
Diet, *n* (%)	7091 (72)	1412 (70)	4427 (72)	1252 (70)	0.46
Physical activity, *n* (%)	6528 (66)	1271 (63)	4115 (67)	1142 (64)	0.19
Antihypertensive drugs, *n* (%)	7864 (79)	1664 (83)	4781 (78)	1419 (80)	0.005
ACE inhibitors, *n* (%)	4825 (49)	1061 (53)	2883 (47)	881 (49)	0.006
Beta-blockers, *n* (%)	2138 (22)	493 (25)	1298 (21)	347 (19)	0.016
ARBs, *n* (%)	2186 (22)	437 (22)	1318 (22)	431 (24)	0.18
Calcium-antagonists, *n* (%)	2335 (24)	490 (24)	1419 (23)	426 (24)	0.72
Diuretics, *n* (%)	3192 (32)	677 (34)	1931 (32)	584 (33)	0.46
Digoxin, *n* (%)	378 (4)	97 (5)	216 (4)	65 (4)	0.09
Nitrates, *n* (%)	1195 (12)	279 (14)	724 (12)	192 (11)	0.12
Antidiabetic drugs, *n* (%)	3021 (31)	697 (35)	1822 (30)	502 (28)	0.024
Glitazones, *n* (%)	238 (2)	60 (3)	141 (2)	37 (2)	0.48
Insulin, *n* (%)	799 (8)	212 (11)	448 (7)	139 (8)	0.005
Metformin, *n* (%)	1928 (19)	418 (21)	1182 (19)	328 (18)	0.38
Secretagoghes, *n* (%)	551 (6)	148 (7)	337 (6)	66 (4)	0.17
Others, *n* (%)	323 (3)	58 (3)	214 (4)	51 (3)	0.30
Lipid-lowering agents, *n* (%)	4312 (44)	934 (46)	2586 (42)	792 (44)	0.09
Fibrates, *n* (%)	166 (2)	37 (2)	106 (2)	23 (1)	0.62
Cholesterol absorption inhibitors, *n* (%)	64 (1)	15 (1)	31 (1)	18 (1)	0.62
Omega 3, *n* (%)	847 (9)	185 (9)	475 (8)	187 (10)	0.013
Statins, *n* (%)	3892 (39)	849 (42)	2330 (38)	713 (40)	0.09
Antiarrhythmic drugs, *n* (%)	443 (4)	94 (5)	264 (4)	85 (5)	0.86
Anticoagulant agents, *n* (%)	446 (5)	105 (5)	258 (4)	83 (5)	0.45
Antiplatelet agents, *n* (%)	4333 (44)	973 (48)	2591 (42)	769 (43)	0.013
Aspirin, *n* (%)	3461 (35)	797 (40)	2071 (34)	593 (33)	0.006
Clopidogrel, *n* (%)	260 (3)	69 (3)	137 (2)	54 (3)	0.16
Ticlopidine, *n* (%)	733 (7)	165 (8)	435 (7)	133 (7)	0.38
Other drugs, *n* (%)	1728 (17)	377 (19)	1119 (18)	232 (13)	0.005

ACE, angiotensin-converting enzyme; ARBs, angiotensin II receptor blockers.

management and therapeutic approaches adopted by younger (aged ≤ 45 years) as compared with that by older (aged > 46 years) physicians. Among the large number of data made available by this analysis, some specific aspects deserve discussion.

First of all, in our population sample a significantly higher proportion of general practitioners were aged > 46 years, while specialised physicians, such as cardiologists and diabetologists, were aged ≤ 45 years. This distribution may at least, in part, account for the higher prevalence of major CV risk factors and associated clinical conditions observed among those outpatients followed by younger specialised physicians (i.e. patients at higher CV risk profile as a result of the presence of hypertension, myocardial infarction, stroke, TIA and other comorbidities) as compared with patients followed by older general practitioners.

Secondly, our findings confirmed that arterial hypertension was the most frequent CV risk factor in the clinical practice of Italian physicians, thus highlighting the importance of early detecting and effectively treating high blood pressure levels, irrespective of age, medical degree (1), national area and attitude for electronic support by physicians in our country (3). Of note, while hypertension represents the most frequent CV risk factor, it was also under diagnosed and under treated, and this seems to be largely independent by the age of referring physicians. As a consequence, about 55% of the outpatients showed

above normal blood pressure levels, which leads to a further increase in the risk of developing major CV events, mostly in elderly hypertensive patients.

Also, the relatively low control rate of major CV risk factors, mostly hypertension, observed in patients followed by different groups of physicians seems to be at least, in part, independent by the use of diagnostic examinations or detection of markers of organ damage. In our analysis, in fact, no significant difference was found with regard to the use of advanced diagnostic examinations, mostly echocardiogram, exercise stress testing and Doppler ultrasonography, among the three age groups. Of note, although not significant, a higher number of grade I diagnostic examinations (EKG and dosage of microalbuminuria) was prescribed by younger than by older physicians. In this latter regard, this trend may be of relevance for future guidelines for the clinical management of CV diseases, mostly hypertension, diabetes mellitus and CV disease prevention, since the latest sets of these guidelines strongly recommended the use of simple, largely available and less expensive tools for global CV risk stratification in individuals at CV risk.

The differences observed in CV drug prescriptions among the three groups, mostly ACE inhibitors, beta-blockers, glucose and lipid-lowering agents (i.e. statins), may be related to the higher prevalence of associated clinical conditions (history of myocardial infarction, stroke and TIA) among patients followed by younger specialised physicians rather than in those followed by older physicians, who were more frequently general practitioners, as above mentioned. It should be highlighted, however, that even in this case the larger use of CV drugs by younger physicians was not paralled by a significantly better control of major CV risk factors, mostly high blood pressure and glucose levels, as compared with that obtained by older physicians, with the exception of total cholesterol and triglycerides levels, thus suggesting that other aspects should be taken into account in the clinical management of CV disease, beyond the number of prescriptions and dosages of drug molecules.

Finally, ageing has demonstrated to provide a favourable impact in increasing physicians' accuracy in recording patients' clinical data. In the present analysis, older physicians tended to provide a significantly higher proportion of clinical data availability and a significantly higher rate of data registration of above all major CV risk factors, markers of organ damage and associated clinical conditions as compared with that reported by younger physicians (data not shown). Even in this case, this aspect may have potential impact on future recommendations for CV disease prevention, since previous analysis of this database has shown a close relationship between high level of accuracy for clinical data collection and better CV outcomes (2).

Potential limitations

The present study is based on a cross-sectional, descriptive survey and, as such, it can only identify associations, but it cannot provide insights on causation. In view of the relatively large sample size of our study, even the possibility of sampling bias has to be considered, although proven methods were applied to avoid this. The large sample size and different distribution of involved physicians may also mean that the views expressed by respondents may not be fully representative of opinions of the wider physician community in our country. In most cases, dependence on physician self-reporting throughout standardised questionnaires, rather than more objective measures such as BP measurements or lipid or glucose quantifications, may also create potential biases. Our analysis cannot provide information about whether physicians' practices were located in rural or urban areas. Since access to medical health care in rural areas may be more difficult than in urban areas, this aspect should be acknowledged when considering the higher prevalence of major CV risk factors and associated clinical conditions in Southern than in Northern areas of our country. At the same time, we cannot provide data on the socioeconomic position of individual patients. Finally, prevalence and characteristics of metabolic syndrome and other glucose or lipid abnormalities have not been addressed in the present report, owing to the decision of making further analyses on these clinical conditions.

Conclusion

In this predefined analysis of the EFFECTUS study, we were able to demonstrate a significantly higher prevalence of major CV risk factors and associated clinical conditions among younger specialised physicians rather than in older physicians, the majority of which were general practitioners. This distribution of CV risk factors and diseases was paralled by a significantly larger use of CV drugs, mostly antiplatelet, glucose and lipid-lowering agents, in younger than in older physicians, in which a lower rate of control of major CV risk factors was achieved as compared with that reported in outpatients followed by physicians aged ≤ 45 years.

Despite arterial hypertension represents the most frequent CV risk factor and the relatively high global CV risk profile observed in this population sample,

only 45% of the patients showed normal blood pressure values and no more than 50% of them received antihypertensive drug classes, irrespective of the age of referring physicians, thus confirming the under treatment of hypertension as a key element for the global burden of CV diseases in western countries, including Italy.

A potential explanation of this discrepancy may be the relatively low rate of data collection and registration observed in younger than in older physicians, thus suggesting a potential way to improve global CV risk management in the daily clinical practice. On the basis of these considerations, specific training and educational programmes for specialised physicians should be carefully considered, to improve quality of care, reduce doctor's inertia and ameliorate the clinical management of CV diseases in Italy.

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Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Availability of diagnostic tests in the overall population and in subgroups of patients stratified according to physicians' age.

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