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Title

Does implementation of the European guidelines based on the SCORE model double the number of Norwegian adults who need cardiovascular drugs for primary prevention? The Tromsø study 2001

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Abstract

Aims:

To study the implications of European guidelines on the use of antihypertensives and/or lipid-lowering drugs (LLDs) for primary prevention in a Norwegian population.

Methods and results:

The Tromsø study is a population-based study in the municipality Tromsø, Norway (1974–present). This analysis includes the 45- to 79-year-old participants in 2001 ($n = 6362$, attendance rate 86%).

From the age of 60 years in men and 70 years in women, almost all participants were defined as high-risk individuals according to the European guidelines, with established cardiovascular disease, diabetes, or a 10-year risk score of $\geq 5\%$.

In the primary prevention subgroup of the 45–64 year olds, recommended antihypertensive and/or LLD use would be higher in men only, 42% compared with 12% on current medication. Among the 65–79 year olds, over 90% would be eligible for antihypertensives and/or LLDs in both sexes, compared with current treatment rates of below 30%. In total, 40% of all participants aged 45–79 years would be candidates for primary prevention, compared with 15% on current medication.

Conclusion

The implementation of European guidelines could imply a doubling of the numbers of Norwegian adults on cardiovascular medication for primary prevention. Contributors to the

increase would be more frequent drug use in men and elderly people, particularly for LLD use.

Introduction

Cardiovascular disease (CVD), as the major cause of premature death in most European countries, needs an active preventive approach. Recent European guidelines on CVD prevention in clinical practice[1] recommend the use of high-risk preventive strategies based on identification of individuals at high absolute risk. Such high-risk individuals are defined as patients with established CVD or diabetes, or asymptomatic individuals with a 10-year risk of 5% or more of having a fatal CVD event.

To identify high-risk individuals, the European guidelines now recommend the recently developed SCORE (Systematic Coronary Risk Evaluation) risk model as a tool in everyday practice.[2] Accordingly, antihypertensives and/or lipid-lowering drugs (LLDs) for primary prevention are recommended in those with a 10-year risk of fatal CVD of 5% or more (SCORE ≥ 5%), together with a systolic blood pressure and/or total cholesterol above target values.[1] The guidelines do not specify an upper age limit for primary prevention.

The European guidelines claim to be a framework for the development of national guidelines. Adaptation can be made in order to reflect practical, economic and medical circumstances in the individual country. Given the profound burden of CVD on health of the adult population,[3, 4] as well as the health-care cost, it is important to estimate the national burden of CVD as well as the implications of suggested preventive strategies. A recent study showed that a large majority of Norwegian adults (76% aged 20–79) have 'unfavourable' total cholesterol and/or blood pressure according to the definitions of the European guidelines.[5] However, elevated levels of single risk factors do not necessarily imply drug intervention. Hence, an evaluation of treatment eligibility according to European guidelines presupposes a multiple risk factor evaluation.

By applying the SCORE risk model to a Norwegian population-based survey, the aim of this study was to describe the implications of European guidelines with regard to recommended and current use of antihypertensives and/or LLDs for primary prevention.

Materials and methods

The participants in this study were men and women who had participated in a population survey in Tromsø, Norway, in 2001. The Tromsø study is conducted in the municipality of Tromsø, situated at 69°N (current population 63 000), and has been repeated five times since 1974. The fifth survey was conducted by the Institute of Community Medicine, University of Tromsø, in collaboration with the Norwegian Institute of Public Health, and was primarily designed to explore risk factors, chronic diseases and drug use in individuals.

In 1994, all inhabitants aged 55–74 years and 5–10% of samples in other age groups were invited to an extensive examination ($n = 10542$, attendance rate 76%). Of these, all participants still residing in Tromsø in 2001 were invited to the fifth survey ($n = 7413$). In addition, all inhabitants aged 30, 40, 45, 60 and 75 years in 2001 were invited, making up a total of 10 421 people. We limited this analysis to the age group 45–79 years ($n = 6450$, attendance rate 86%). Individuals with missing responses to questions on health status that were needed to classify them into CVD prevention subgroups and to calculate their risk score were excluded from the analyses ($n = 88$). The current cross-sectional analysis includes 6362 participants, of whom 3590 (56.4%) were women. The mean age (SD) was 63.9 (9.2) years.

Screening consisted of self-administered questionnaires, clinical measurements and laboratory tests, similar to previous screenings.[6] The questionnaire included questions on:

- socio-demographic factors

- previous myocardial infarction (MI) (yes/no)

- prevalent angina pectoris (yes/no)

- previous stroke (yes/no)

- current diabetes (yes/no)

- deep leg pain during walking (yes/no) (indicative of intermittent claudication)

- cigarette smoking (yes/previously/no).

The questionnaire was enclosed in the letter of invitation and responses collected at the following visit, where height, weight and blood pressure were measured and blood samples collected. Blood pressure was measured three times on one occasion. The mean of measurements 2 and 3 was used in our analyses. Trained personnel recorded the blood pressure with an automatic device (Dinamap Vital Signs Monitor, Tampa, FL), using standardized procedures. Non-fasting serum cholesterol was analysed using standard enzymatic methods at the Department of Clinical Chemistry, University Hospital of North Norway.

The proprietary names of medicines used regularly during the 4 weeks preceding the study were reported on the questionnaire and registered on the fifth level of the Anatomical Therapeutic Chemical (ATC) system, version 2000.[7] In addition, the questionnaire included a predefined question with answering categories (yes/previously/no) on the use of LLD, antihypertensive and anti-diabetic drugs.[8] Participants reporting a proprietary name of an LLD (ATC group C10) and/or current LLD use were included as LLD users in the analysis.

Diabetes was defined by self-report or use of an anti-diabetic drug (ATC group A10). Similarly, angina pectoris was defined by self-report or use of nitrates (ATC group C01D).

Hypertension was defined as systolic blood pressure ≥ 140 mmHg and/or diastolic blood pressure ≥ 90 mmHg[9] or a self-report of current antihypertensive use.

The SCORE risk model

The SCORE risk model is derived from datasets from 12 European cohort studies, mainly carried out in general population settings.[2] The model estimates the 10-year risk of having a fatal CVD event for an individual, on the basis of age, gender, total cholesterol concentration, systolic blood pressure and current smoking status. Separate risk models have been developed for high- and low-risk European populations. Norway is classified as a high-risk country. A total of 129 971 participants in cohorts from eight high-risk countries were included in the high-risk model, and 48 425 (37%) of these participants were Norwegians. As age is a major determinant of coronary risk, and the age ranges of the cohorts were somewhat heterogeneous, the calculation of model fit was limited to the age group 45–64 years.[2]

Cardiovascular risk groups

The study population was stratified into subgroups according to CVD risk level:

- Secondary prevention subgroup: participants with self-reported CVD (stroke, MI, angina pectoris or intermittent claudication) or diabetes.

- Primary prevention subgroup: participants with no self-reported CVD or diabetes.

Implications of European guidelines on use of antihypertensives and/or LLDs for primary prevention

Participants in the primary prevention subgroup who reported use of antihypertensives and/or LLDs were included as current users in the analyses. The current proportions of drug users were compared with the recommended proportions eligible for primary prevention according

to European guidelines: those with a 10-year risk $\geq$ 5% of having a fatal CVD event, together with systolic blood pressure $\geq$ 140 mmHg and/or total cholesterol $\geq$ 5.0 mmol/l.[1]

We calculated a delta (Δ) percentage, which expresses the difference between recommended and observed current drug use in the Tromsø study (percentage of users according to recommended European guidelines minus percentage of current users). A positive delta percentage indicates that the recommended use exceeds the current use.

Using prevalences of CVD morbidity and drug use from our study population, we estimated the implications of European guidelines in the primary prevention subgroup of the 45–64 and the 65–79 year olds registered in Norway.[10]

Statistical analysis

Age-adjusted means of total cholesterol and systolic blood pressure (baseline characteristics) were calculated by the least-square (LS) means in the proc GLM procedure in SAS, and compared using two-sided *t*-tests for variables with a normal distribution. A *p* value of < 0.01 was considered statistically significant, to account for the inflation of the type I error as a result of multiple testing. Current and recommended antihypertensive and/or LLD use is described in terms of proportions. Confidence intervals for proportions were calculated using the continuity corrected version of the score.[11] Adjustment for age of crude current and recommended LLD and/or antihypertensive proportions in total age groups 45–64 and 65–79 years was performed according to the direct method, using the Norwegian standard population.[10] The SAS software package SAS Institute Inc., version 8, was used.

Ethics

This study complies with the Declaration of Helsinki. Approval was granted from the National Data Inspectorate and the Regional Committee for Medical Research Ethics in Northern Norway. All participants gave a written informed consent.

Results

Characteristics of the study population: CVD risk profile distribution

About 80% of all men and 90% of all women had a total cholesterol above the target of 5.0 mmol/l (Table 1). Systolic blood pressure was above the target of 140 mmHg in about 50%. Men reported more frequent use of LLDs than women: 17% and 11%, respectively. A fifth reported use of antihypertensives, with no sex difference

In the primary prevention subgroup, the proportion with a 10-year risk ≥ 5% increased with age in both sexes (Figure 1). From 60 years of age almost all men (94%) were defined as high-risk individuals according to the European guidelines, i.e. with CVD, diabetes or a risk score ≥ 5%. The risk level in women had a 10-year delay compared with men (Figure 1). From 70 years of age almost all women (98%) were defined as high-risk individuals.

Implications of European guidelines on use of antihypertensives and/or LLDs in the primary prevention subgroup

The gap between recommended and current antihypertensive use increased with increasing age in both sexes, independent of smoking status (Table 2). Among men the gap between the recommended and current antihypertensive use increased strongly from age 50 in smokers and age 55 in non-smokers (Table 2). Among women, similar patterns were seen, although with a 10-year delay compared with men. All delta percentages were positive in men; however, in non-smoking women the gap between recommended and current antihypertensive use was negative until 65 years of age. Although the proportion of current antihypertensive users in the 5-year age groups never exceeded 20% in smokers and 30% in non-smokers, the proportion eligible for treatment according to the guidelines increased to about 70% in the 75–79 year olds.

Patterns for the gap between recommended and current LLD use was similar to antihypertensive use, and the gap increased with increasing age in both sexes, independent of smoking status (Table 3). However, higher recommended and lower current LLD treatment rates caused an even larger gap, compared with the patterns for antihypertensives. Among men, the gap between the recommended and current LLD use increased strongly from age 50 in smokers and age 60 in non-smokers (Table 3). Among women, recommended LLD use

accelerated 10 years later; however, in non-smoking women aged 45–64 years the gap was very modest. Although the proportion of present LLD users in the 5-year age groups never exceeded 15% in both sexes, the recommended LLD use in those aged over 65 years reached 90% in all groups, except in non-smoking women.

If treatment rates from the Tromsø study are representative for Norway, about 12% of all men and women aged 45–64 years, who are free of CVD and diabetes, are on current antihypertensive and/or LLD treatment (Table 4). If the guidelines were to be followed, 42% of all men in this age group would be candidates for either antihypertensives and/or LLDs, whereas the proportion of women on medication would not change. Although the gap between the recommended and current use of antihypertensive and/or LLD use increased steadily with age in both men and women, a marked difference was observed between age groups 45–64 and 65–79 years and between the sexes. In women aged 45–64 years, the recommended guidelines may not lead to any increased treatment. However, in 65–79 year olds, antihypertensive and/or LLD medication may be recommended to about 90% in both sexes, compared with current treatment rates of below 30%.

In total, among those aged 45–79 years and free of CVD and diabetes, antihypertensives and/or LLDs would be recommended in 40% compared with 15% on current medication. Hence, if the European guidelines were to be followed, the proportion of antihypertensive and/or LLD users would be more than doubled in a Norwegian adult population, as a result of higher drug use particularly in men and elderly people. The main contributor would be more frequent use of LLDs.

Discussion

This study demonstrates a gap between recommended and current drug use for primary prevention of CVD. In the primary prevention subgroup, the number of antihypertensive and/or LLD users would be increased more than twofold in people aged 45–79 years if the European guidelines were to be followed. Low current drug use in men and elderly people, particularly LLDs, has made the greatest contribution to the overall gap between recommended and current preventive drug use. Strictly speaking, the target population for CVD risk prediction by the SCORE model, and thereby for evaluation of treatment eligibility, is those aged 45–64 years. In this age group the gap between recommended and current CVD preventive drug use was seen almost exclusively in men. However, the European guidelines do not discuss an upper age limit for primary prevention intervention. Furthermore, antihypertensives and LLDs are used extensively among elderly people in clinical practice. For this reason, we chose to evaluate treatment eligibility using the SCORE model in individuals aged up to 79 years. Hence, from the age of 60 years in men and 70 years in women, antihypertensive and/or LLD treatment would be recommended to almost everyone in the primary prevention subgroup, independent of smoking status, compared with current treatment rates of 30% or lower.

Smokers have a higher absolute risk of CVD at a given level of blood pressure or serum total cholesterol. Ideally, a reduction in CVD risk factors should be achieved by life-style modification. In our study population, 27% were current daily smokers. If everyone had been a non-smoker, 34% would still be eligible for antihypertensive and/or LLD treatment as a result of the high serum cholesterol and blood pressure levels in this population (data not shown). Thus, given the large gap between current risk level and cut-off for intervention

according to current European guidelines, adherence to these guidelines would most probably imply that a large proportion of the population should be on medication.

An important strength of this study is its population-based setting, with our information on the non-users of drugs in the primary preventive subgroup. Another strength is the inclusion of clinical measurements such as serum total cholesterol and blood pressure. However, with regard to the relevance of the measurements used in this study, some factors need to be considered:

The serum cholesterol and blood pressure readings were taken from a population survey setting and measured on a single occasion, thus not taking into account regression to the mean. In clinical practice, several readings over a longer time period are recommended before deciding whether to start drug therapy. Nevertheless, distributions of blood pressure values in whole populations can be validly characterized by measurements taken on a single occasion in a representative sample of individuals.[12]

An inherent limitation of the cross-sectional study design is that we have no information on total cholesterol concentration or blood pressure before the initiation of antihypertensives or LLDs. Risk factors entered in the SCORE risk model have already been lowered in some participants in our study population. This may explain why the observed treatment rates are higher than recommended in younger non-smoking women. The calculated treatment risk score, with corresponding proportions eligible for therapy using the European guidelines, may consequently be considered as a conservative estimate of treatment eligibility.

Furthermore, morbidity and drug use variables are based on self-reports. However, the formulations of questions on morbidity and drug use in this study have been used in other surveys performed by the Norwegian Institute of Health.[8] Validation of questionnaire information from these comparable surveys agrees with medical records for prevalent

diabetes (96%), myocardial infarction (81%), current drugs for hypertension (97%), insulin (95%) and oral anti-diabetics (100%).[13, 14] No validation has been performed in this study with regard to self-report of LLD use. However, 85% of those reporting current LLD use also reported a proprietary LLD in another part of the questionnaire, which consolidates the information on LLD use.

According to the European guidelines, a large number of elderly people in our study population would be candidates for primary prevention with either an antihypertensive or an LLD. Although the beneficial effects of antihypertensives among elderly people are well documented, the documentation of the beneficial effects of LLDs on total and CVD mortality is more limited.[15] More specific guidance to preventive LLD intervention in elderly people is warranted if the European guidelines are to be fully implemented in clinical practice.

Importantly, there may be factors contributing to an overestimation of CVD risk, and thereby treatment eligibility, through use of the SCORE risk model. Trends for coronary heart disease (CHD) and CVD incidence and mortality in most industrialized countries are currently declining.[16] The CVD risk-factor level is declining in Norway: this previously high-risk country has recently attained a CHD mortality comparable to that of Greece.[17] Risk prediction using the high-risk SCORE model derived from observational periods, started 20 years or more ago, is implicitly prone to overestimation in this situation. However, it is not yet known whether the low-risk SCORE model would fit the current Norwegian mortality situation better.

In the current unsettled situation, it may be unreasonable to use a risk model developed from risk estimates of the 1970s and 1980s as a guiding tool for starting life-long preventive drug

therapy in young adults today. For this reason we decided not to project risk in younger people to what they would attain when aged 60 years, an actual recommendation of the European guidelines.

Conclusion

Adherence to the European guidelines based on the SCORE risk model could double the proportion of users of CVD drugs for primary prevention in the Norwegian adult population. However, in the age group 45–64 years, treatment rates would be increased in men only. Among elderly people (65–79 years of age), the higher proportions of users eligible for primary prevention were seen in both sexes. The LLDs would be a major contributor to the increased drug use. There is a need for discussion on how to implement the guidelines in the elderly population (65+ years).

Acknowledgements

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Tables and figures

Figure 1. The cardiovascular risk profile distribution according to the SCORE risk model (percentage 10-year risk of having a fatal cardiovascular disease [CVD] event) in men and women: the Tromsø study 2001.
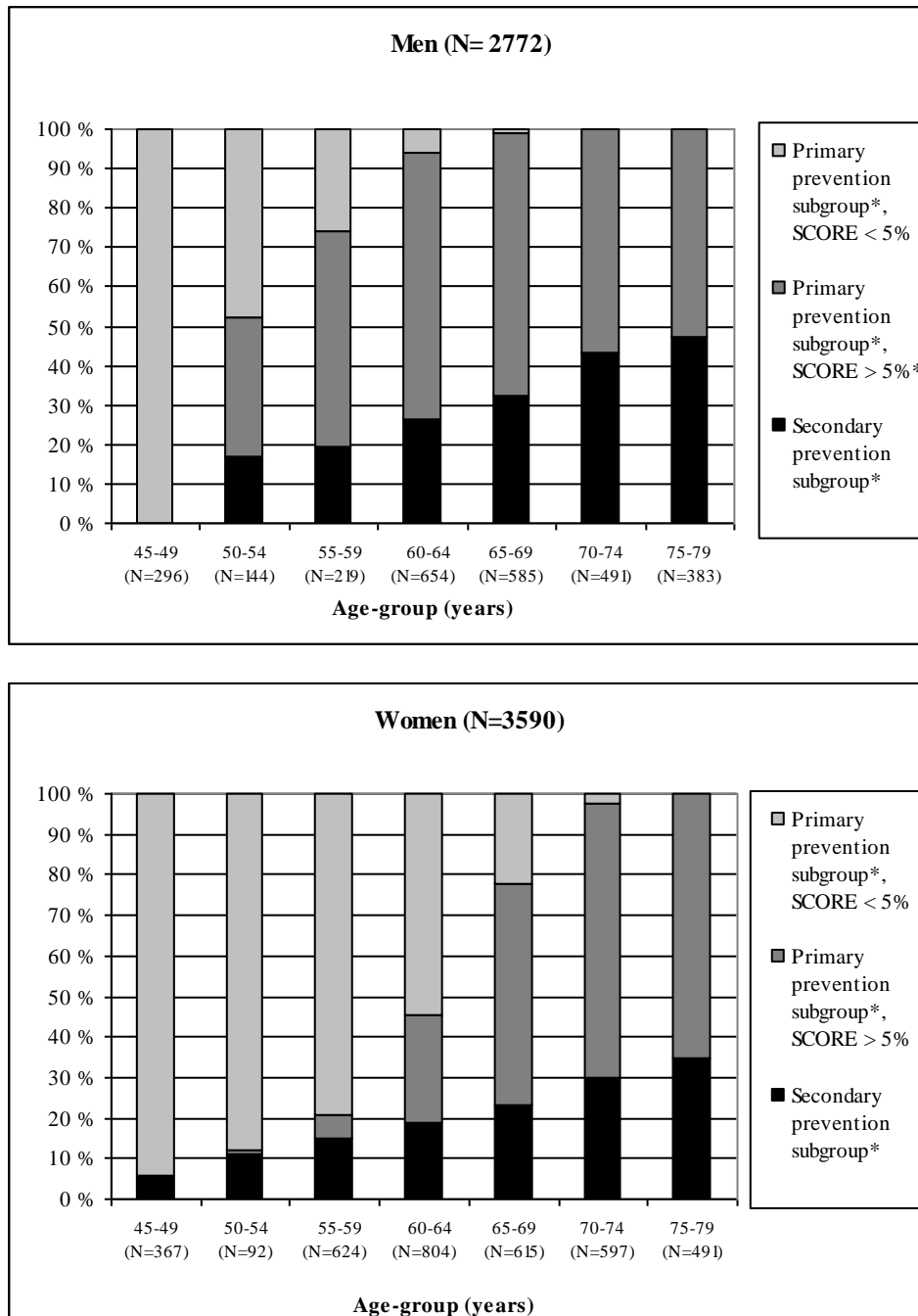
*Secondary prevention subgroup: participants with self-reported CVD (myocardial infarction, angina pectoris, stroke or intermittent claudication) or diabetes. Primary prevention subgroup: participants reporting no established CVD or diabetes. Participants at high cardiovascular risk according to European guidelines: secondary prevention subgroup or primary prevention subgroup with SCORE > 5%.

Table 1. Characteristics of participants aged 45–79 years ($n = 6362$): the Tromsø study 2001

	Men ($n = 2772$)		Women ($n = 3590$)		
	No.	(%)	No.	(%)	p-value
Age (years)					
45-49	296	(10.7)	367	(10.2)	
50-54	144	(5.2)	92	(2.6)	
55-59	219	(7.9)	624	(17.4)	
60-64	654	(23.6)	804	(22.4)	
65-69	585	(21.1)	615	(17.1)	
70-74	491	(17.7)	597	(16.6)	
75-79	383	(13.8)	491	(13.7)	
Total cholesterol (mmol/L)					
Age adjusted mean (SD)		6.1(1.1)		6.5 (1.2)	<0.0001
≤ 5 .0	476	(17.2)	367	(10.2)	
5.1-5.9	862	(31.1)	878	(24.5)	
6.0-6.9	870	(31.4)	1208	(33.7)	
7.0-7.9	419	(15.1)	784	(21.8)	
≥ 8.0	145	(5.2)	353	(9.8)	
Systolic blood pressure (mmHg)[a]					
Age adjusted mean (SD)		142 (20)		142 (23)	0.31
<140 (normal)	1334	(48.1)	1788	(49.8)	
140-159 (Grade 1)	892	(32.2)	1027	(28.6)	
160-179 (Grade 2)	426	(15.4)	569	(15.9)	
≥180 (Grade 3)	120	(4.3)	206	(5.7)	
Current smoking	764	(27.6)	958	(26.7)	
Obesity (BMI>30 kg/m^2)	514	(18.5)	799	(22.3)	
Lipid lowering drugs (LLD)	477	(17.2)	415	(11.6)	
Antihypertensive therapy (AHT)	644	(23.2)	793	(22.1)	
Cardiovascular disease[b]	790	(28.5)	680	(18.9)	
Angina Pectoris [c]	367	(13.2)	260	(7.2)	
Myocardial infarction	322	(11.6)	120	(3.3)	
Stroke	134	(4.8)	111	(3.1)	
Claudicatio intermittens[d]	306	(11.0)	382	(10.6)	
Diabetes [e]	149	(5.4)	151	(4.2)	

Hypertension [f]	1706	(61.5)	2073	(57.7)

[a]From Whitworth.[18]

[b]Cardiovascular disease: self-report of stroke, myocardial infarction, angina pectoris or use of nitrates (ATC-group C01D), or intermittent claudication.

[c]Angina pectoris: self-reported angina pectoris or self-reported use of nitrate (ATC group C01D).

[d]Claudicatio intermittens: self-reported deep leg pain during walking.

[e]Diabetes: self-reported diabetes and/or self-reported use of an anti-diabetic drug (ATC group A10).

[f]Hypertension: systolic blood pressure $\geq$ 140 mmHg and/or diastolic blood pressure $\geq$ 90 mmHg, or reporting to be on antihypertensives.

Table 2. Proportion of the primary prevention subgroup[a] on antihypertensives currently[b] and as recommended in men and women according to European guidelines (EG)[c:] the Tromsø study 2001

Smokers

	Men (n = 544)						Women (n = 748)					
	Current			EG			Current			EG		
Age (years)	No.	%	(95% CI)	%	(95% CI)	Δ %	No.	%	(95% CI)	%	(95% CI)	Δ %
45-49	96	1.0	(0.1;6.5)	2.1	(0.4;8.1)	1.1	124	0.8	(0.0;5.1)	0	(0.0;2.9)	-0.8
50-54	45	2.2	(0.1;13.2)	40.0	(26.1;55.6)	37.8	29	6.9	(1.2;24.2)	3.5	(0.1;19.6)	-3.4
55-59	65	7.7	(2.9;17.8)	35.4	(24.2;48.3)	27.7	161	11.8	(7.4;18.1)	21.1	(15.3;28.4)	9.3
60-64	133	10.5	(6.1;17.3)	43.6	(35.1;52.5)	33.1	196	11.2	(7.3;16.7)	47.5	(40.3;54.7)	36.3
65-69	103	15.5	(9.4;24.3)	58.3	(48.1;67.8)	42.8	109	15.6	(9.6;24.1)	47.7	(38.1;57.5)	32.1
70-74	66	13.6	(6.8;24.8)	63.6	(50.8;74.4)	50.0	85	20.0	(12.4;30.4)	57.7	(46.5;68.1)	37.7
75-79	36	8.3	(2.2;23.6)	63.9	(46.2;78.9)	55.6	44	13.6	(5.7;28.1)	65.9	(50.0;79.1)	52.3

Non-smokers

	Men (n = 1383)						Women (n = 2073)					
	Current			EG			Current			EG		
Age (years)	No.	%	(95% CI)	%	(95% CI)	Δ %	No.	%	(95% CI)	%	(95% CI)	Δ %
45-49	177	1.7	(0.4;5.2)	0	(0.0;2.1)	-1.7	221	5.0	(2.6;9.0)	0	(0.0;1.7)	-5.0
50-54	75	6.7	(2.5;15.5)	20.0	(12.0;31.2)	13.3	53	7.6	(2.5;19.1)	0	(0.0;6.7)	-7.6
55-59	111	12.6	(7.3;20.6)	39.6	(30.6;49.4)	27.0	369	13.8	(10.6;17.9)	0.5	(0.1;2.2)	-13.3
60-64	349	17.2	(13.5;21.7)	54.4	(49.1;59.7)	37.2	458	19.0	(15.6;23.0)	18.4	(15.0;22.3)	-0.6
65-69	292	20.2	(15.9;25.4)	58.6	(52.7;64.2)	38.4	362	20.7	(16.7;25.3)	52.8	(47.5;58.0)	32.1
70-74	213	25.4	(19.8;31.8)	69.0	(62.8;75.2)	43.6	333	25.8	(21.3;30.9)	70.6	(65.3;74.4)	44.8
75-79	166	27.1	(20.7;34.7)	73.5	(66.0;79.9)	46.4	277	30.3	(25.0;36.2)	74.4	(68.7;79.3)	44.1

[a]Primary prevention subgroup: participants reporting no established cardiovascular disease or diabetes.
[b]Self-reported use of antihypertensive therapy.
[c]SCORE $\geq$ 5% and systolic blood pressure $\geq$ 140 mmHg.
95%CI, 95% confidence interval.

Table 3. Proportion of the primary prevention subgroup[a] on lipid-lowering drugs currently[b] and as recommended in men and women according to European guidelines (EG)[c]: the Tromsø study 2001.

Smokers

Age (years)	Men (n = 544)						Women (n = 748)					
		Current		EG				Current		EG		
	N	%	(95% CI)	%	(95% CI)	Δ %	N	%	(95% CI)	%	(95% CI)	Δ %
45-49	96	1.0	(0.1;6.5)	2.1	(0.4;8.1)	1.1	124	0	(0.0;2.9)	0	(0.0;2.9)	0
50-54	45	8.9	(2.9;22.1)	71.7	(55.5;83.2	62.2	29	3.5	(0.2;19.6)	3.5	(0.2;19.6)	0
55-59	65	10.8	(4.8;21.5)	92.3	(82.3;97.1)	81.5	161	6.2	(3.2;11.4)	21.7	(15.8;29.1)	15.5
60-64	133	6.0	(2.8;11.9)	88.0	(80.9;92.8)	82.0	196	5.6	(3.0;10.1)	66.3	(59.2;72.8)	60.7
65-69	103	3.4	(1.3;10.2)	90.3	(82.5;95.0)	86.9	109	9.2	(4.7;16.6)	91.7	(84.5;95.9)	82.5
70-74	66	1.5	(0.1;9.3)	90.9	(80.6;96.3)	89.4	85	8.2	(3.7;16.8)	97.7	(91.0;99.6)	89.5
75-79	36	2.8	(0.2;16.2)	80.6	(63.4;91.2)	77.8	44	0	(0.0;8.0)	93.2	(80.3;98.2)	93.2

Non-smokers

Age (years)	Men (n = 1383)						Women (n = 2073)					
		Current		EG				Current		EG		
	N	%	(95% CI)	%	(95% CI)	Δ %	N	%	(95% CI)	%	(95% CI)	Δ %
45-49	177	2.8	(1.0;6.8)	0	(0.0;2.1)	-2.8	221	0.9	(0.2;3.6)	0	(0.0;1.7)	-0.9
50-54	75	10.7	(5.1;20.5)	24.0	(15.2;35.5)	13.3	53	1.9	(0.1;11.4)	0	(0.0;6.7)	-1.9
55-59	111	15.3	(9.4;23.7)	49.6	(40.0;59.1)	34.3	369	5.4	(3.4;8.4)	0.5	(0.1;2.2)	-4.9
60-64	349	6.0	(3.9;9.2)	82.8	(78.3;86.5)	76.8	458	7.0	(4.9;9.8)	17.7	(14.4;21.6)	10.7
65-69	292	6.2	(3.8;9.7)	89.0	(84.8;92.3)	82.8	362	12.4	(9.3;16.4)	61.3	(56.1;66.3)	48.9
70-74	213	6.1	(3.4;10.5)	91.1	(86.2;94.4)	85.0	333	6.9	(4.5;10.3)	91.3	(87.6;94.0)	84.4
75-79	166	6.0	(3.1;11.1)	83.7	(77.0;88.8)	77.7	277	5.8	(3.5;9.4)	91.5	(89.8;96.0)	85.7

[a]Primary prevention subgroup: participants reporting no established cardiovascular disease or diabetes.
[b]Self-reported use of lipid-lowering drugs.

cSCORE ≥ 5% and total cholesterol ≥ 5.0 mmol/l.
95%CI, 95% confidence interval.

Table 4. Proportions of the primary prevention subgroup[a] (aged 45–79 year) on antihypertensives and/or lipid-lowering drugs (LLDs) currently[b] and as recommended in men and women according to European guidelines (EG)[c]: the Tromsø study 2001

| | Men (n= 1927) | | | | | Women (n= 2821) | | | | |
| | Current | | EG | | | Current | | EG | | |
Age in years	No.	% (95% CI)	%	(95% CI)	Δ %	No.	% (95% CI)	%	(95% CI)	Δ %
Antihypertensives										
45-49	273	1.5 (0.5;4.0)	0.7	(0.1;2.9)	-0.8	345	3.5 (1.9;6.2)	0	(0.0;1.1)	-3.5
50-54	120	5.0 (2.1;11.0)	27.5	(19.9;36.5)	22.5	82	7.3 (3.0;15.8)	1.2	(0.1;7.6)	-6.1
55-59	176	10.8 (6.8;16.6)	38.1	(31.0;45.7)	27.3	530	13.2 (10.5;16.5)	6.8	(4.9;9.4)	-6.4
60-64	482	15.4 (12.3;19.0)	51.5	(46.9;45.7)	36.1	654	16.7 (14.1;20.1)	27.1	(23.7;30.7)	10.4
65-69	395	19.0 (15.3;23.3)	58.5	(53.4;63.4)	39.5	471	19.5 (16.1;23.5)	51.6	(47.7;56.2)	32.1
70-74	279	22.6 (17.9;28.0)	67.7	(61.9;73.1)	45.1	418	24.6 (20.6;29.1)	67.9	(63.2;72.4)	43.3
75-79	202	23.8 (18.2;30.4)	71.8	(65.0;77.8)	48.0	321	28.0 (23.3;33.4)	73.2	(68.0;77.9)	45.2
*Total 45-64 years		**6.8**	**24.9**		**18.1**		**9.1**	**6.5**		**-2.6**
*Total 65-79 years		**21.4**	**65.0**		**43.6**		**23.9**	**63.8**		**39.9**
LLDs										
45-49	273	2.2 (0.1;2.9)	0.7	(0.1;2.9)	-1.5	345	0.6 (0.1;2.3)	0	(0.0;1.1)	-0.6
50-54	120	10.0 (5.5;17.2)	41.7	(32.9;51.0)	31.7	82	2.4 (0.4;9.4)	1.2	(0.1;7.8)	-1.2
55-59	176	13.6 (9.1;19.8)	65.3	(57.8;72.2)	51.7	530	5.7 (3.9;8.1)	7.0	(5.0;9.6)	1.3
60-64	482	6.0 (4.1;8.6)	84.2	(80.6;87.3)	78.2	654	6.6 (4.9;8.8)	32.3	(28.7;36.0)	25.7
65-69	395	5.6 (3.6;8.4)	89.4	(85.6;92.2)	83.8	471	11.7 (9.0;15.0)	68.4	(63.9;72.5)	56.7
70-74	279	5.0 (2.9;8.5)	91.0	(86.9;94.0)	86.0	418	7.2 (5.0;10.2)	92.6	(89.5;94.8)	85.4
75-79	202	5.5 (2.9;9.8)	83.2	(77.1;87.9)	77.7	321	5.0 (3.0;8.1)	93.5	(90.0;95.8)	88.5
*Total 45-64 years		**7.7**	**40.3**		**32.6**		**3.3**	**7.4**		**4.0**
*Total 65-79 years		**5.4**	**88.3**		**82.9**		**8.1**	**84.3**		**76.2**

Antihypertensives and/or LLDs

Age	N	%	(95%CI)	%	(95%CI)	Diff	N	%	(95%CI)	%	(95%CI)	Diff
45-49	273	3.3	(1.6;6.4)	0.7	(0.1;2.9)	-2.6	345	3.5	(1.9;6.2)	0	(0.0;1.1)	-3.5
50-54	120	12.5	(7.4;20.1)	42.5	(33.6;51.9)	30.0	82	8.5	(3.8;17.3)	1.2	(0.1;7.8)	-7.3
55-59	176	19.9	(14.4;26.7)	67.1	(59.5;73.8)	47.2	530	17.2	(14.1;20.7)	7.0	(5.0;9.6)	-10.2
60-64	482	18.3	(15.0;22.1)	89.4	(86.2;92.0)	71.1	654	21.0	(17.9;24.3)	33.0	(29.5;36.8)	12.0
65-69	395	21.5	(17.6;26.0)	93.2	(90.1;95.4)	71.7	471	25.5	(21.7;29.7)	80.7	(66.3;74.7)	55.2
70-74	279	25.8	(20.9;31.4)	97.5	(94.7;98.9)	71.7	418	28.2	(24.0;32.9)	95.7	(93.2;97.4)	67.5
75-79	202	25.7	(20.0;32.5)	95.1	(90.8;97.5)	69.4	321	29.9	(25.0;35.3)	96.6	(93.8;98.2)	66.7
*Total 45-64 years		12.1		41.8		29.7		11.1		7.6		-3.5
*Total 65-79 years		24.0		95.1		71.1		27.8		90.7		62.9

*Adjustment for age of crude current and recommended LLD and/or antihypertensive proportions, in total age groups 45–64 and 65–79 years, was performed according to the direct method, using the Norwegian standard population.[10]
aPrimary prevention subgroup: participants reporting no established cardiovascular disease or diabetes.
bSelf-reported use of antihypertensives and/or LLDs.
cSCORE $\geq$ 5%; and systolic blood pressure $\geq$ 140 mmHg (antihypertensive), total cholesterol $\geq$ 5.0 mmol/l (LLD), systolic blood pressure $\geq$ 140 mmHg and/or total cholesterol $\geq$ 5.0 mmol/l (antihypertensives and/or LLDs).
95%CI, 95% confidence interval.