

Barriers to Swiss guideline-recommended cholesterol management in general practice

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Summary

Background: Standard guidelines for the management of dyslipidaemia are often not followed in general practice. The reasons for guideline non-adherence are not known.

Methods: Charts of 1000 consecutive unselected patients of 20 general practitioners in northwestern Switzerland were reviewed. An independent committee of experienced study physicians checked the data and assessed the reasons for not measuring plasma cholesterol and for not treating dyslipidaemia as recommended by guidelines.

Results: Complete data of 866 patients were studied. 29% of all patients qualified for secondary prevention. 6% had no additional cardiovascular risk factors (apart from cholesterol values), 24% had one and 41% had 2 or more additional cardiovascular risk factors. Guidelines were followed in 44% of all cases and were not followed in 56%. In 37.5% of all cases we found diagnostic guideline

non-adherence, and in 10% only treatment guideline non-adherence. 8.5% of all patients had both diagnostic and treatment non-adherence. The main reasons for diagnostic non-adherence were relevant comorbidity (45%) and GPs' belief that the risk did not require screening (42%). The main reasons for treatment non-adherence were GPs' belief that the risk did not require treatment (42%) and relevant comorbidity (38%).

Conclusion: More than half of all patients aged 35–80 years are not screened or treated according to current guidelines. The reasons are to an equal extent patient-related (relevant comorbidity) and physician-related (acceptance and knowledge of guidelines). These reasons should be considered when programmes to improve the quality of GPs' adherence to guidelines are implemented.

Key words: primary care; dyslipidaemia; management; guidelines; barriers

Introduction

Dyslipidaemia is a well-established major risk factor for cardiovascular disease. There is a large body of consistent evidence from large-scale clinical trials showing that lipid management with statins reduces the risk of coronary heart disease occurrence and progression [1–3]. Accordingly, statin therapy is currently a cornerstone of risk reduction in primary and secondary prevention. It has been implemented in numerous international and national guidelines [3, 4].

Although more than 90% of physicians know these guidelines [5, 6], many patients do not receive guideline-recommended lipid-lowering treatment. Furthermore, many patients do not reach recommended cholesterol levels despite lipid-lowering treatment [6–13].

Recent studies and surveys have been published on the quality of primary care cholesterol diagnosis and treatment in various risk groups,

and on how current guidelines are followed in US [5, 13, 14], Canadian [15], European [6, 11, 12, 16–18] and Swiss [8] populations. However, we did not find studies investigating the patients' reasons for guideline non-adherence by expert review of charts of unselected primary and secondary prevention patients in the general practitioner's office. The above-mentioned studies were performed by sending patients questionnaires or performing telephone surveys. These methods may not be as reliable as direct information from the attending general practitioner.

To address these unresolved issues we analysed the quality of cholesterol management in 1000 primary care patients. Each of 20 general practitioners protocolled cardiovascular risk data and the reasons for their diagnostic and treatment decisions in 50 consecutive patient charts. An independent study physician checked all the data.

Ethical approval: The study was approved by the local ethics committee.
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Conflict of interest: None.

Methods

Study setting and population

We conducted a cross-sectional study on dyslipidaemia management in general practitioners' offices in 2005. We collected consecutive patient charts of a predetermined period from 15 January to 15 February 2005 for analysis. 20 experienced general practitioners from urban and rural areas in northwestern Switzerland who were unaware of the planned study period agreed to participate. In March 2005 the participating general practitioners were informed of the exact period for retrospective analysis of recent patient data, data relevant for cardiovascular risk stratification and data on cholesterol measurement and dyslipidaemia treatment. They filled in the prepared protocol for the first 50 patients aged 35–80 years who entered their office starting 15 January. In patients aged under 35 dyslipidaemia screening is not generally recommended and in elderly patients clear benefit from cholesterol interventions was not sufficiently evident at study start. To avoid information bias we did not perform prospective data collection but analysed the patient charts retrospectively. These patient chart data had been collected as a matter of routine by the participating general practitioners. At that time they were still unaware of any study protocol and had not received study-specific guideline training.

Guideline adherence of the participating general practitioners in the 5 years prior to the survey was analysed. In order to study a random sample starting 15 January 2005, 50 consecutive patients aged 35–80 were included. The participating physicians were unaware of the study protocol. Data collection was based on the agenda. The charts were reviewed in summer 2005.

We obtained reliable data on the quality of cholesterol management of 996 primary care patients. Due to the retrospective design, 130 patients had incomplete chart data for exact risk stratification. 866 patients had complete data in their charts for risk stratification. Data were also considered complete if missing data did not influence the risk category, e.g., in case of CHD the patient was high risk, regardless of whether additional data were recorded or not.

In addition to the current cholesterol values (total cholesterol, HDL, LDL) the number of risk factors was recorded (none, one, two or more). Diabetes mellitus and/or documented atherosclerosis were also recorded (secondary prevention).

All protocols were checked in detail by a university-affiliated study physician with primary care experience. To maximise reliability he had previously been trained by the study team. He had access to all patient charts. He visited the participating general practitioner in his office and performed a structured interview focusing on the exact reasons for guideline non-adherence. Finally, all data collected and checked were entered for statistical analysis.

Guidelines and definition of non-adherence

Diagnostic non-adherence was defined as failure to measure cholesterol as recommended by the guidelines.

We used the 1999 Swiss guidelines, which are based on age, gender, menopause status, cholesterol, number of additional risk factors and the indication for secondary prophylaxis. They recommend measurement of total cholesterol in all individuals aged 35–80 years. Where total cholesterol is below 5 mmol/l without additional cardiovascular risk factors, further measurements are recommended at 5-year intervals and otherwise at yearly intervals along with measurement of LDL and HDL cholesterol.

Treatment non-adherence was defined as failure to treat dyslipidaemia despite the presence of two or three of three dyslipidaemia criteria in any risk category (table 1).

Treatment adherence was defined as prescription of a lipid-lowering agent, usually statin, or initiation of lifestyle modifications, usually dietary changes supervised by professional diet specialists, as recommended by the guidelines. Treatment non-adherence was defined as failure to treat dyslipidaemia when guidelines recommended treatment. Thus, we did not focus exclusively on drug treatment non-adherence but evaluated overall dyslipidaemia management in a representative patient sample in GP practice. Taken together, based on chart review, the study physician decided whether the individual patient had an indication for treatment or not, and whether treatment guidelines were followed or not.

Reasons for non-adherence

To evaluate the quality of cholesterol guideline adherence, the decisions (diagnosis and treatment) were analysed according to individual patient risk (primary, secondary prevention).

All reasons for non-adherence were assessed by the study physician, in particular physician-related reasons (e.g., insufficient knowledge of guidelines, disagreement with guidelines), patient-related reasons (e.g., other relevant disease of the patient, severe comorbidity; patient's refusal to be screened or treated, non-compliance). These reasons had previously been identified in a pilot study. The study physician decided whether guidelines were not adhered to for physician or patient-related reasons.

Other relevant disease implies that the patient required medical attention in fields other than dyslipidaemia. As a consequence it was not possible or deemed necessary to screen or treat dyslipidaemia at that moment.

Additional severe comorbidity means that the patient suffered from a severe disease with a poor prognosis concerning long-term survival. As a consequence screening or treatment of dyslipidaemia was not considered urgent in the situation.

Priority of other disease implies the presence of a disease needing to be treated before dyslipidaemia with the expectation that treatment would reduce cholesterol values, e.g., hypothyroidism or overweight.

Emergency means that the patient was only seen once for an emergency.

Reasons for not adhering to guidelines were graded on a 5-point scale (1 = absolutely yes; 5 = absolutely no). A dichotomous decision and a ranking of decisions was possible by taking 1 and 2 as positive answers (yes, present), and 3–5 as negative answers (no, absent).

Statistical analysis

For univariate and multivariate analysis, data were analysed using SPSS 16.0 for Mac (SPSS Inc., Chicago, IL, USA). Categorical data are given as absolute numbers

Table 1

Lipid thresholds for prescription of a lipid-lowering agent: the presence of two or three of three criteria in either risk category qualified for treatment.

Risk category	Total cholesterol (TC) (mmol/l)	TC/HDL-Chol	LDL-Chol (mmol/l)
Low risk	>8.0	>6.5	>5.0
Moderate risk	>6.5	>5.0	>4.0
High risk	>5.0	>5.0	>3.0

Low risk: premenopausal women with 0–1 CHD risk factors or postmenopausal women and men with no risk factors.

Moderate risk: premenopausal women with 2 and more risk factors or postmenopausal women and men with 1 and more risk factors.

High risk: CHD patients and diabetic patients.

or percentages of the study population. Continuous data are given as mean \pm SD. Factors related to guideline adherence, diagnostic or therapeutic errors were identified in univariate analysis. To identify independent predictors for adherence to guidelines, diagnostic or treatment non-adherence, parameters that were statistically significant in

the univariate analysis were entered into a binary logistic regression model using a stepwise backward approach with adherence to guidelines, or diagnostic or therapeutic errors as dependent variables. A *p* value of <0.05 was considered to be statistically significant.

Results

Data of 866 primary care outpatients were analysed. 22% of all patients were aged 35–50 years, 35% 51–65 years, and 43% 66–80 years. 47% were male and 53% female, 23% of the latter were premenopausal and 77% postmenopausal.

Table 2 shows the additional risk factors and the cholesterol values. 49.8% had hypertension, 24.6% smoked, 48% had total cholesterol above 5 mmol/l, 77% of men and 60% of women were aged over 50 and 60 years, respectively.

252 patients (29.1%) qualified for secondary prevention, 199 (23%) with diabetes mellitus or arteriosclerosis (CHD/stroke/PAOD) and 53 (6.1%) with diabetes mellitus and arteriosclerosis. 13.6% had diabetes mellitus without overt signs of arteriosclerosis.

6.1% had no additional cardiovascular risk factors, 23.9% one and 40.9% 2 or more.

Guideline adherence

Guidelines were followed in 43.9% and not followed in 56.1% of all cases.

In 325 of all 866 cases (37.5%) we found only diagnostic non-adherence. In 86 of 866 cases (10%) only treatment non-adherence was found. 75 patients (8.5%) had both diagnostic and treatment non-adherence to guidelines.

We found treatment non-adherence in 161 of 480 patients (33%) with an indication for treatment according to guidelines and as judged by the study physician's chart review. Of these patients, 143 did not receive correct statin treatment (45% of 315 patients with an indication for statin treatment) and 18 did not receive professional advice for diet modification. 172 patients received correct statin treatment and a total of 319 patients had correct dyslipidaemia treatment.

In a univariate analysis significant predictors for treatment non-adherence were higher age ($p < 0.001$), number of consultations in the preceding year ($p < 0.001$), hypertension ($p < 0.001$), obesity ($p 0.027$), lack of physical activity ($p < 0.001$), number of risk factors ($p < 0.001$), diabetes ($p < 0.001$), and CHD, PAOD and history of stroke ($p < 0.001$).

In multivariate analysis independent positive predictors for treatment non-adherence were diabetes with a likelihood ratio (LR) of 7.1 (CI 95% 4.7–10.6; $p < 0.001$), higher age with LR of 2.1 (CI 95% 1.3–3.4; $p 0.004$) and lack of physical activity with LR of 1.6 (CI 95% 1.1–2.3; $p 0.024$).

Positive predictors for diagnostic non-adherence could not be identified. On the other hand, several conditions were predictors for diagnostic adherence. Positive predictors for diagnostic ad-

Table 2

Additional cardiovascular risk factors and cholesterol values in 866 general practitioners' patients.

Cardiovascular risk	Yes	No	Not recorded
Cardiovascular event (CHD, stroke, peripheral arterial occlusive disease/PAOD) in first-degree relatives (men <55 years, women <65 years)	11.4% (N = 99)	52.3% (N = 453)	36.3% (N = 314)
Age M >50 , F >60	68% (N = 589)	32% (N = 277)	0% (N = 0)
Smoker	24.6% (N = 213)	72.6% (N = 628)	2.8% (N = 24)
Arterial hypertension $>140/90$ mm Hg	49.8% (N = 429)	47.6% (N = 410)	2.7% (N = 23)
Obesity (BMI >30 kg/m ²)	26.7% (N = 230)	70.8% (N = 611)	2.5% (N = 22)
Lack of physical activity ($<3 \times 30$ minutes per week)	29.6% (N = 256)	58.1% (N = 503)	12.4% (N = 107)
Triglycerides >2 mmol/l	19.7% (N = 168)	61.6% (N = 526)	18.7% (N = 160)
Diabetes mellitus (fasting glucose >6.0 mmol/l or >11 mmol/l non-fasting)	19.7% (N = 171)	74.5% (N = 645)	5.8% (N = 50)
CHD, PAOD, stroke	15.5% (N = 134)	82.3% (N = 713)	2.2% (N = 19)
Cholesterol (TC) >5 mmol/l	47.8% (N = 414)	30.2% (N = 262)	22% (N = 190)
HDL-cholesterol <1 mmol/l	12.6% (N = 109)	51.4% (N = 445)	36% (N = 312)
TC/HDL-cholesterol >5	15.3% (N = 133)	47.9% (N = 415)	36.7% (N = 318)
LDL-cholesterol >3 mmol/l	34.3% (N = 297)	28.2% (N = 245)	37.4% (N = 324)

herence were particularly advanced age, number of consultations, presence of diabetes and elevated triglycerides (cholesterol values did not enter this analysis).

In multivariate analysis independent positive predictors for diagnostic adherence were higher age with LR of 0.673 (CI 95% 0.5–0.9; *p* 0.008) and elevated triglycerides with LR of 0.68 (CI 95% 0.48–0.98; *p* 0.039).

In a univariate analysis significant positive predictors for overall guideline adherence were

number of consultations in the preceding year (*p* 0.010), hypertension (*p* 0.022), cardiovascular event in family (*p* 0.024), elevated triglycerides (*p* <0.001), number of risk factors (*p* 0.003) as well as CHD, PAOD and history of stroke (*p* 0.013).

In multivariate analysis independent positive predictors for overall guideline adherence were cardiovascular event in family with LR of 1.57 (CI 95% 1.0–2.4; *p* 0.037) and elevated triglycerides with LR of 1.7 (CI 95% 1.2–2.4; *p* 0.002).

Reasons for non-adherence, categorised by physician and patient-related reasons

The reasons for not adhering to guidelines could be identified in 480 of 486 patients with guideline non-adherence (table 3).

The main reasons for diagnostic non-adherence were other relevant diseases and the belief that the risk does not require screening. Main reasons for treatment non-adherence were the belief that the risk does not require therapy, other relevant diseases, priority of other disease, additional severe comorbidity and patient's refusal to take drugs.

The leading patient-related reasons for diagnostic non-adherence were other relevant diseases, the priority of other disease, additional se-

vere comorbidity followed by patient's unwillingness to take drugs.

The leading physician-related reason for diagnostic non-adherence was the belief that the risk does not require screening.

The leading patient-related reason for treatment non-adherence was another relevant disease.

The leading physician-related reason for treatment non-adherence was the belief that the risk does not require therapy.

Table 3 shows the reasons for not following guidelines. Definitions are given in the methods section.

Discussion

This is the first study assessing the quality of dyslipidaemia management performed exclusively by general practitioners in a relatively large repre-

sentative general practitioner-patient population and checked by an independent expert.

Diagnostic non-adherence to guidelines oc-

Table 3
Cumulative frequency of reasons for not adhering to guidelines (n = 480).

Physician-related reasons for non-adherence N = 480	Total N = 480	Diagnostic non-adherence N = 396	Therapeutic non-adherence N = 158	Diagnostic and therapeutic non-adherence N = 74
Do not agree with guidelines	33%	33%	28%	23%
Believe risk does not require screening	35%	42%	12%	23%
Believe risk does not require therapy	32%	30%	38%	38%
Forgot to follow guidelines	20%	19%	20%	20%
No time for prevention	10%	12%	6%	9%
Patient-related reasons for non-adherence N = 482	Total N = 480	Diagnostic non-adherence N = 396	Therapeutic non-adherence N = 158	Diagnostic and therapeutic non-adherence N = 74
Other relevant disease	43%	45%	42%	53%
Additional severe comorbidity	22%	20%	32%	36%
Priority of other disease	22%	20%	34%	32%
Patient refuses drugs	24%	22%	33%	28%
Patient refuses diet	15%	14%	25%	27%
Patient not compliant	13%	11%	22%	23%
Patient refuses screening	8%	9%	5%	7%
Emergency situation	8%	9%	1%	1%
Polypharmacotherapy	10%	7%	22%	19%
Social and financial barriers	6%	6%	7%	7%

curred in 46% of all patients. They did not receive correct cholesterol measurements for screening or control of dyslipidaemia.

Treatment non-adherence occurred in 19% of all patients and in 33% of those with an indication for treatment, particularly in patients with diabetes mellitus, of more advanced age and with a sedentary lifestyle.

We analysed the reasons for guideline non-adherence in dyslipidaemia management among participating general practitioners.

Patient-related reasons for treatment non-adherence were mainly other relevant diseases. Physician-related reasons for treatment non-adherence were mainly physicians' misperception of the situation.

The findings show that general practitioners fail to follow standard dyslipidaemia guidelines in 56% of patients.

These results are in accordance with other reports [6, 8–10, 18].

However, these studies related to different populations, often not in primary care. Moreover, the reasons for non-adherence were not assessed by independent experts. The secondary prevention Euraspire Study, using telephone interviews in nine European countries, found that 60% of patients still had elevated total cholesterol levels 6 months after a coronary intervention [6, 9]. A recently published follow-up Euraspire Study with data from the year 2000 showed marginally improved hyperlipidaemia treatment in CHD patients as compared to the first 1996 survey [18]. However, 60% of patients still did not reach treatment goals.

Muntwyler et al. [8] used a mail questionnaire to study a random sample of office-based physicians across Switzerland. They were instructed to record current drug prescription of outpatients with coronary artery disease in the years 2000/2001. The patient epidemiology and adherence quality are comparable.

Hobbs et al. [12] reported in the 2002 RE-ACT study that 89% of GPs and family doctors from five European countries (France, Germany, Italy, Sweden and the UK) agreed with the current guidelines and 81% reported using them. However, only 18% of physicians believed that guidelines were being implemented to a major extent. Lack of time (38% of all physicians), prescription costs (30%), and patient compliance (17%) were considered the key barriers to greater implementation.

A questionnaire study involving gynaecologists and cardiologists published in 2005 [13] concluded that perception of cardiovascular risk was the primary factor associated with CVD preventive recommendations. The authors called for action to improve physician education [13].

According to another review paper [11] barriers

to effective implementation of guideline recommendations are common, despite the existence of well-established and safe pharmacological therapy to lower cholesterol and prevent CVD. The reasons could be that many patients have little knowledge of the main risk factors and that many physicians overestimate patients' awareness of CVD. It is reported that many physicians claim lack of time or motivation for guideline implementation and improvement of patient education.

Recently, Goldberg et al. [5] found that 92% of primary care physicians questioned in an internet survey claimed that they were aware of and most of the time followed national guidelines for the treatment of patients with hyperlipidaemia. However, incongruence was observed concerning reportedly adequate physician knowledge and serum lipid levels, as well as recommendations of lifestyle changes to patients with hyperlipidaemia. The authors called for provider education.

Steinhagen et al. [16] reported a prevalence of dyslipidaemia (defined by the latest strict thresholds of serum lipids) of 76% in 35 000 German primary care patients. Men were more often affected than women. Lifestyle interventions controlled dyslipidaemia in 10% of patients. 34% of men and 27% of women were monitored when receiving pharmacotherapy. The chance to be diagnosed and subsequently monitored using pharmacotherapy was higher in men, in patients with concomitant cardiovascular risk factors, with hypertension and with known cardiovascular disease.

In Swedish hypertensive primary care patients female physicians more often reached the treatment goal for cholesterol levels than did male physicians [17].

We analysed the reasons for guideline non-adherence distinguishing between diagnostic and treatment non-adherence. Treatment non-adherence is often patient-related. Nevertheless, the general practitioner's opinion is often not in conformity with guidelines, which may be due to the guidelines' rapidly changing content. False non-adherence by physicians may occur in patients with newly diagnosed glucose elevation, in which the GP preferred to wait for further results and confirmation or a successful diet.

Diagnostic non-adherence may be less deleterious than treatment non-adherence. Failure to measure cholesterol values at recommended intervals in low-risk patients may have minor prognostic implications. On the other hand, diagnostic non-adherence may also miss high-risk patients who require treatment, and thus treatment failure is underestimated.

Measures to improve guideline adherence may be more successful when specifically planned with respect to the reality of daily practice, and when physician non-adherence is clearly distinguished from patient non-adherence.

Strengths and limitations of the study

The strengths of the study are the quantity of unselected primary care patients, the involvement of independent experts for the collection and interpretation of the data, and recording of the reasons for guideline non-adherence.

First, an important limitation is the choice of the 1999 national dyslipidaemia guidelines as standard for our study. However, we examined cholesterol management in 2004 and preceding years, and the international guidelines at that time were comparable.

We admit that the latest stricter guidelines with lower LDL target values may have been followed even less accurately, and therefore the situation could be more problematic than depicted.

We performed a preliminary analysis of the data from the perspective of the new 2005 guidelines. An additional approximately 10% of patients in a secondary prevention situation would not have been treated as recommended by the new guidelines.

Another potential limitation is the retrospective design, extracting information from routine records. However, we chose this design to prevent information on the study aims from influencing physicians' diagnostic and treatment behaviour. As a result we were able to analyse uninfluenced dyslipidaemia management.

The selection of the participating general practitioners may have influenced the results in respect of management quality, although the patient epidemiology was generalisable. It is possible

that the physicians willing to collaborate are those who are more likely to be guideline-adherent.

Conclusions

Primary care dyslipidaemia management is often not in accordance with standard guidelines. Many high-risk patients after cardiovascular events still do not receive the recommended treatment. The reasons for non-adherence are to an equal extent physician and patient-related. Guidelines must respect specific conditions in primary care. Measures to improve guideline adherence should aim at information of physicians and motivation of patients. Further research in primary care should focus on insufficiently treated high-risk patients, ideally in intervention studies.

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