



The Attitudes of Physicians Toward Guideline Recommendations for the Management of Dyslipidemia in Clinical Practice - The VIPFARMA ISCP Project

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Abstract: The aim of this study was to explore the different attitudes of physicians regarding international recommendations for the management of dyslipidemia in routine medical practice. Seven clusters of questions were designed to characterize the surveyed population. Eight hundred ninety-eight physicians answered the survey, 68.3% cardiologists and 40.0% had specialties related to cardiovascular prevention. 29.6% of physicians supported LDL goals above 70 mg/dL in

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secondary prevention. Acceptance of values lower than 70 mg/dL was associated with greater levels of continuing education (OR 0.64, 95% CI 0.45-0.91; $P = 0.014$), specialization in preventive cardiology (OR 0.49, 95% CI 0.28-0.88; $P = 0.017$) or diabetology (OR 0.48, 95% CI 0.24-0.98; $P = 0.043$). A less aggressive attitude toward the achievement of guideline goals were observed in physicians who considered LDL values higher than 70 mg/dL as the goal in secondary prevention. One-third of physicians in the survey do not follow goals recommended by international guidelines. (Curr Probl Cardiol 2023;48:101434.)

Background

Cardiovascular knowledge is rapidly evolving, with new tools becoming available to reduce cardiovascular events and mortality in high-risk populations. Among these tools, drugs for the management of dyslipidemia feature prominently.¹ Guidelines have continued to propose more ambitious lipid goals due to the emergence of new and powerful therapies that demonstrate better cardiovascular outcomes with a larger LDL-cholesterol reduction.²⁻⁶

Recommendations based on trial evidence and/or expert consensus, provide physicians clear treatment goals for patients at different levels of cardiovascular risk.⁷ However an important gap appears to exist between guideline recommendations and “real-world” clinical practice.⁸⁻¹⁴ Furthermore, international registries such as the European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE) have demonstrated marked differences in care delivery between guidelines and clinical practice, with a clear geographic variation observed.¹⁵

This study aims to determine whether the attitude of physicians is one of the causes of this discrepancy, which may contribute to many hospitalizations and deaths, with a high cost for health systems.¹⁶⁻¹⁷

The International Society of Cardiovascular Pharmacotherapy (ISCP) designed the *Surveillance of prescription drugs in the real world Project (VIPFARMA - ISCP Project)* as a survey to obtain relevant and representative data from a specific population of physicians regarding adherence to guideline-recommended pharmacological therapeutic protocols for the management of dyslipidemia.

Methods

This pilot study was conducted in Argentina. A cross-sectional online survey was submitted to physicians of different specialties, mostly cardiology and internal medicine, which frequently treat patients with dyslipidemia. Invitations to participate were sent either directly as personal invitations or as mass invitations through scientific societies. We estimate that the population of physicians who were invited to answer the survey, with the management of patients in cardiovascular prevention, was 5000. The questionnaire included 30 questions, using Google Forms (Mountain View, CA). It is found in Appendix 1.

Questions contained dichotomous, Likert-scale, rank-order, and open-ended response choices. Questions were not compulsory and respondents were allowed to select multiple responses depending on the question content. Questions were divided into 7 clusters. A detailed explanation of the study design, the survey, and rationale of each cluster of questions has been previously published.¹⁸

Statistical Analysis

Continuous variables were expressed as mean and standard deviations or median and interquartile range, according to their distribution. The normality of each variable was evaluated using graphic tools (histograms and normal probability plots) and the Shapiro-Wilk test. Categorical variables were expressed by numbers and percentages. Student's test was used for comparisons between groups of the continuous variables that were normally distributed. When the distribution was non-normal, the Wilcoxon rank sum test was applied. Comparisons between proportions were made using the Chi-square test or Fisher's exact test depending on the frequency of expected values. A multiple logistic regression model was constructed manually to explore which variables were associated with the selection of a LDL cholesterol target in secondary prevention below 100 mg/dL. All variables that obtained a value of $P \leq 0.2$ in the univariate model were evaluated in the multiple logistic regression model, as well as those that, due to their clinical relevance, included on a clinical basis. Once the final model was obtained, its predictive capacity was evaluated by constructing a Receiver operating characteristic (ROC) curve, and its goodness of fit was evaluated by means of the Hosmer-Lemeshow test, comparing the predicted values by deciles. In all cases, the tests were 2-tailed, and an alpha error of 5% was assumed to establish statistical significance. The analyses were performed with STATA version 13.0.

Results

The VIPFARMA ISCP Project included 898 surveys answered by physicians. The profile of this population is shown in [Table 1](#).

The population was predominantly male (66.1%), cardiologists (68.3%), with more than 10 years of practice (74.3%). They mostly carried out academic activities (80.6%), had access to scientific journals (85.7%) and most of the respondents reported having read at least 1 scientific article in the last 30 days (88.2%). A significant number of responders reported experience in the management of familial hypercholesterolemia (56.6%) and coronary heart disease.

Table 1.

Profile of the population surveyed		Number	%
Total population		898	100%
Gender			
	Male	594	66.10%
	Female	304	33.90%
Specialties			
	Cardiology	513	68.30%
	Internal Medicine	124	13.80%
	Primary care	63	7.00%
	Endocrinology	15	1.70%
	Others	183	20.37%
Years of practice			
	<10 y	231	25.70%
	10-20 y	247	27.50%
	>20 y	420	46.80%
Site of practice			
	Private centers	308	34.30%
	Public hospitals	230	27.60%
	Private and public	155	17.30%
	Consulting room	205	21.00%
Size of cities (Inhabitants)			
	< 100,000	193	21.50%
	100,000-500,000	229	25.50%
	>500,000	476	53.00%
Medical education			
	Academic activities	724	80.60%
	Access to scientific journal	770	85.70%
	Read an article in the last 30 d	792	88.20%
	None of 3 precedents	17	1.90%
Type of patients that follow			
	Familial hypercholesterolemia	508	56.60%
	CHD 1-10 patients/wk	438	48.80%
	CHD 10-20 patients/wk	275	30.60%
	CHD 20-30 patients/wk	103	11.50%
	CHD >30 patients/wk	82	9.10%

Table 2.

Attitudes regarding dyslipidemia management	Number	%
LDL goal in secondary prevention		
<100 mg/dL	266	29.60%
<70 mg/dL	425	47.30%
<55 mg/dL	196	21.80%
Statins doses in secondary prevention		
High dose	732	81.50%
Moderate dose	80	8.90%
Low dose	86	9.60%
In case of not reaching the desired LDL goal		
Add ezetimibe 10 mg/d	664	75.00%
Wait to next visit	43	4.90%
Adjust dietary recommendations	127	14.40%
Add iPCSK9	51	5.70%
In case reach LDL value lower than 35 mg/dL		
Keep the same dose	522	58.10%
Reduce the dose	338	37.60%
Stop statin therapy	38	4.30%
Statins in pre-diabetic patients		
No inconvenience to prescribe	703	79.90%
Prefer not to use statins	43	4.90%
This condition is a limitation to use	62	7.00%
Regarding the power to reduce LDL with iPCSK9		
Good expectation about iPCSK9	570	69.50%
Should be administered carefully	214	26.10%
iPCSK9 may involve some risk	37	4.50%
Hypertriglyceridemia increase in cardiovascular risk		
Relevant	736	82.00%
No relevant	91	10.10%
Not Know	62	7.90%

As shown in [Table 2](#), one-third of the physicians considered that a target of < 100 mg/dL of LDL was a better option than a target of < 70 or < 55 mg/dL in the secondary prevention setting, and 1 in 5 used low or moderate statin doses in these patients. In cases where the patient did not reach their LDL goal, 1 in 5 physicians reported they would not add another drug. Furthermore, in cases where LDL reduction reached a level of 35 mg/dL, more than 40.0% chose to stop the administration of statins or reduce the dose.

When asked about perceived frequency of side effects that were severe enough to discontinue therapy in high-intensity statins, rated on a scale of 1-10, 321 surveyed participants (36.1%) answered ≥ 4 . When asked to rate the excess risk of developing diabetes in pre-diabetic patients receiving statins, 80.3% of the participants considered it was of no concern,

whereas 11.4 % preferred not to use statins in that scenario or considered prediabetes a contraindication to their use.

Controlled trials assessing the efficacy of inhibitors of the proprotein convertase subtilisin–kexin type 9 (iPCSK9) were known by 58.9% of the responders. Regarding the evidence that iPCSK9 could reduce LDL cholesterol by 60% and achieve levels even lower than 40 mg/dL, 69.5% of the participants believed this pharmacological class was beneficial, 26.3% that these drugs should be administered carefully, and 4.3% that they represented a risk. Seven hundred thirty-six participants (82.0%) answered that hypertriglyceridemia contributes to increased cardiovascular risk, 91 (10.1%), believed that it does not, and 62 (7.9%) were uncertain. Finally, 408 responders (45.4%) declared that they usually prescribe omega-3 fatty acids, while 656 (73.1%) prescribe fibrates when plasma triglycerides are over 175 mg/dL.

After adjustment by age, sex, time from completion of medical residency, workplace, inhabitants in a city of residence, academic activities, experience in caring for patients with familial hypercholesterolemia, number of medical consultations per week, knowledge of PCSK9 inhibitors, appreciation of the importance of statin adverse effects, opinion regarding the role of triglycerides in cardiovascular risk, and the prescription of fibrates and Omega-3, multivariate analysis showed an inverse association between belief that the LDL cholesterol target in secondary prevention should be >70 mg/dL and the specialty of the medical doctors (preventive cardiology and diabetes) and the performance of academic activities. Otherwise, we found an inverse association between the number of years since graduation and the opinion that the use of high-intensity statins led to development of diabetes in pre-diabetics (Table 3).

The model showed adequate goodness of fit in the Hosmer-Lemeshow (Table 4) test ($P = 0.72$) and a good predictive capacity assessed with a ROC curve with an area under ROC curve = 0.81 (Fig 1).

Discussion

This study shows that a significant proportion of physicians have different beliefs regarding the management of dyslipidemia from published guidelines. Indeed the main findings were: (1) One in 3 who look after patients with cardiovascular disease use LDLc goals above those recommended by international guidelines; (2) One in 5 of the physicians surveyed used statins of moderate or low intensity in secondary prevention patients; (3) One in 5 were afraid of the risk of developing new diabetes

Table 3.

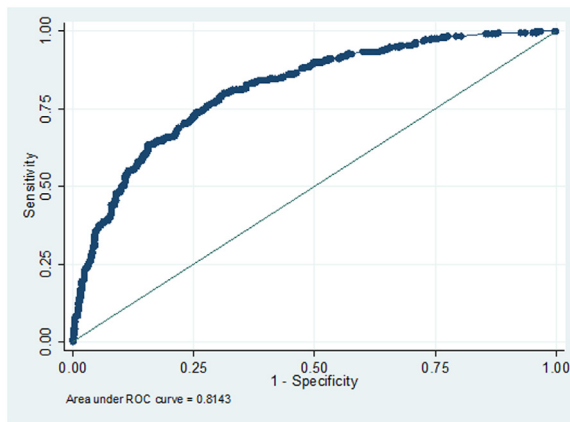
Profile of physician responders	OR	IC 95%	"P"
> 10 y of practice	1.43	1.15 - 1.78	0.002
Speciality			
Cardiovascular prevention	0.49	0.28 - 0.88	0.017
Diabetes	0.48	0.24 - 0.98	0.043
General cardiology	0.66	0.42 - 1.04	0.072
Size of the city			
100,000-500,000 inhabitants	1.74	1.12 - 2.69	0.014
< 100,000 inhabitants	1.93	1.28 - 2.90	0.002
All academy activities	0.64	0.45 - 0.91	0.014
Non-use High statins dose	1.33	0.86 - 2.06	0.205
If control show LDL < 35 mg%			
Reduce statin dose	2.87	2.02 - 4.10	<0.001
Stop treatment	4.32	1.81 - 10.29	0.001
Knowledge of iPCSK9 main trials	0.42	0.29 - 0.61	<0.001
Attitude when no reach goal of LDL			
No change dose and give recommendations	1.72	1.09 - 2.72	0.021
Wait the next visit to take a decision	1.91	0.92 - 3.93	0.081
Those who interpret that AE of statins are frequent (≥ 4)	1.34	0.94 - 1.91	0.107
Prescription of statins in pre-diabetic patients			
Use a specific statin	1.76	0.99 - 3.10	0.051
Use only low dose statins	1.87	0.98 - 3.55	0.057
Prefer not to use statins	2.83	1.30 - 6.18	0.009

in pre-diabetic patients receiving statins; (4) One in 2 of the participants did not know of new drugs such as PCSK9 inhibitors; and (5) One in 5 participants did not consider hypertriglyceridemia as a cardiovascular risk factor or did not have a formed opinion about it. These findings may partially explain the gap between guidelines and daily clinical practice in the real world, and raises alarm regarding potential impact of the "physicians factor" on patients.

Previously published studies reinforce this perspective. The PALM Registry collected provider surveys for 774 clinicians treating patients at 51 primary care practices, 82 cardiology practices, and 8 endocrinology practices.¹⁹ In a hypothetical scenario involving secondary prevention, in patients with persistently high LDL-C despite treatment adherence with

Table 4.

Group	Prob	Obs_1	Exp_1	Obs_0	Exp_0	Total
1	0.064	2.0	4.1	85.0	82.9	87
2	0.088	6.0	6.4	81.0	80.6	87
3	0.123	11.0	10.7	90.0	90.3	101
4	0.168	12.0	10.3	60.0	61.7	72
5	0.219	14.0	16.4	72.0	69.6	86
6	0.298	25.0	22.8	64.0	66.2	89
7	0.388	26.0	29.2	59.0	55.8	85
8	0.530	46.0	39.4	40.0	46.6	86
9	0.697	53.0	53.1	34.0	33.9	87
10	0.967	66.0	68.8	20.0	17.2	86

**Figure 1.**

high-intensity statin therapy, 26.9% of providers chose to change the statin, 51.4% chose to add a non-statin lipid-lowering agent (ezetimibe, fibrate, fish oil, or bile acid sequestrant), and 18.0% of clinicians chose to not change treatment. These findings are consistent with our study. However, when 288 primary and secondary prevention patients with LDL-C ≥ 130 mg/dL who were already on high-intensity statin therapy treated by these physicians were evaluated, it was found that in real-life practice these physicians were observed to change the statin in 8 patients (2.8%), add ezetimibe in 11 patients (3.8%), and add fibrate, fish oil, or bile acid sequestrant in 57 patients (20.0%). The majority of patients ($n = 217$, 75.4%) were managed by continuation of statin therapy without change in drug or dose, or addition of a non-statin lipid-lowering medication. Similarly, when only secondary prevention patients were examined ($n = 161$), only 34 (21.1%) were managed with a non-statin lipid-lowering

medication. In other words, doctors sometimes think one thing but do another. The decision to discontinue statins physicians is very frequent. The EPHEBUS Registry showed that the main causes of discontinuation of statin therapy were negative media coverage (32.1%), and recommendations of physicians to stop the lipid-lowering therapy (29.6%).²⁰ In our study, 40% of physicians agreed to reduce or suspend statins if the LDL values achieved were very low or if the patient was at risk of diabetes. A web-based survey by the European Society of Cardiology and European Atherosclerosis Society was distributed to 70,696 individuals at 2-time points, before and after publication of the 2019 ESC/EAS dyslipidemia guidelines.²¹ Regarding the LDL-C goal (<1.4 mmol/L for very high-risk patients) 31% noted that implementation should consider available local resources and patient preferences. This fact confirms that sometimes doctors make decisions based on their own opinion despite recommendations.

Acknowledging this problem, many institutions have begun to develop a suite of quality indicators to evaluate cardiovascular practice and support the delivery of evidence-based care.²² The Quality Indicator Committee of the European Society of Cardiology (ESC) formed the Working Group for Cardiovascular Disease Prevention Quality Indicators in collaboration with Task Force members of the 2021 ESC Guidelines on Cardiovascular Disease Prevention in Clinical Practice and the European Association of Preventive Cardiology and have selected 6 domains of care for Atherosclerotic cardiovascular disease (ASCVD) prevention: (1) structural framework, (2) risk assessment, (3) care for people at risk for ASCVD, (4) care for patients with established ASCVD, (5) patient education and experience, and (6) outcomes.²³ This initiative has the promise to be an effective strategy to bridge the gap between guidelines and clinical practice.

Our study analyzes the attitude of physicians with respect to lipid-lowering therapies. We found more agreement with international guidelines in doctors with a preventive specialty and academic activities. Consequently, continuous medical education appears to be a second tool to reduce the gap.

Important opinion leaders may help motivate physicians to enhance continuous learning. Valentin Fuster described 5 keys for success in continuous learning based on (1) *Scheduling*: courses scheduled close to the weekend, so most practitioners are less likely to have to take time off from their regular work (2) *Comprehensiveness*: courses that seek to integrate all aspects of the cardiovascular field, specifically, new developments that have transpired over the last year on each subject and

expected evolution in the near and distant future (3) *Speakers*: colleagues with clinical expertise, who are recognizable and are passionate about the subject matter (4) *Presentation length*: a minimum length of 20 minutes and a maximum of 30 minutes. Lectures that are <20 minutes usually do not fulfill the educational mandate of a comprehensive review, while lectures which surpass 30 minutes tend to lose the attention of the audience. (5) *Interactive*: It is important to allow the audience to present questions to the speakers, who are encouraged to answer the questions in ≤ 1 minute.²⁴

A decade ago, the results of the PURE study established the need to improve treatment for high-risk patients in middle-income countries such as Argentina.²⁵ The present study helps to characterize knowledge and attitudes of physicians as an important factor in the discrepancies between the recommendations of the guidelines and clinical practice, and may help to find appropriate solutions to these challenges.²⁶

Limitations

Most of the participants in this study were cardiologists, which makes it difficult to extrapolate these findings to other specialties. In addition, most of the participants were professionals linked to scientific societies and with high levels of continuous education. This raises the possibility that prescribing practices in the general medical environment are worse than that found in our survey. The questionnaire used in this study is not validated for this purpose. However, as the recipients were health professionals with a high educational level, it can be speculated that the questions were fully understood, and that there were no misunderstandings in the answers. Finally, it is not possible to establish a linear correlation between the responses to a questionnaire and the behaviors adopted in patient care. Despite this, our study constitutes the first survey on this issue in the region, and we believe that it lays the foundations for developing concrete actions that seek to optimize the management of patients with dyslipidemia.

Conclusions

One-third of physicians in the survey do not follow goals recommended by international guidelines for secondary prevention. Lower levels of continuing medical education and incomplete knowledge of the recommended treatment goals appear to be important reasons for not implementing guideline recommendations in clinical practice.

Author Contribution

The VIPFARMA researchers are grateful for the contribution of Engineer Gonzalo Piskorz for the development of the virtual platform used for the project.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.cpcardiol.2022.101434](https://doi.org/10.1016/j.cpcardiol.2022.101434).

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