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Research Article

Adherence to the 2018 American College of Cardiology and American Heart Association Guideline on the Management of Blood Cholesterol in ambulatory care settings: A cross-sectional study

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Abstract

Background: Dyslipidaemia is a major risk factor for heart disease. Adherence to treatment guidelines can help manage dyslipidaemia and decrease the incidence of complications.

Aim: To assess the adherence to the 2018 American College of Cardiology/American Heart Association Guideline on the Management of Blood Cholesterol by healthcare providers who assessed ambulatory patients for dyslipidaemia in Jordan.

Method: This was a multi-centre, prospective cross-sectional study. Adult patients assessed for dyslipidaemia were invited to participate in the study. Each patient's therapeutic plan was compared to the recommendations in the 2018 American College of Cardiology/American Heart Association Guideline, and adherence to the guideline was documented.

Results: Three hundred patients were recruited. Twenty-eight patients (9.3%) were secondary prevention patients with a history of atherosclerotic cardiovascular disease. Of the 160 primary prevention patients, 83 (51.9%) were excluded from the analysis due to an inability to calculate the 10-year atherosclerotic cardiovascular disease risk, either due to missing information or the patient's age being under 40. One-quarter of secondary prevention patients were initiated on therapeutic plans according to the guideline. None of the primary prevention patients that required statin initiation according to the guideline were initiated on statins.

Conclusion: Adherence to the 2018 American College of Cardiology/American Heart Association Guideline on the Management of Blood Cholesterol for ambulatory patients assessed for dyslipidaemia was suboptimal. Missing patient information that hinders the calculation of the 10-year atherosclerotic cardiovascular disease risk score needs to be addressed to facilitate compliance with the guideline.

Keywords

dyslipidaemia, Jordan, primary prevention, secondary prevention

Introduction

Dyslipidaemia is a major risk factor for heart disease, including coronary artery disease and stroke. Patients with dyslipidaemia may present with increased total cholesterol, low-density lipoprotein cholesterol (LDL-C), and triglyceride (TG) levels or decreased high-density lipoprotein cholesterol (HDL-C) (Kopin and Lowenstein 2017).

Statins have been the main and most commonly used group of medications to treat high LDL-C levels, which is an important risk factor for cardiovascular disease (CVD) (Kazi et al. 2017; Kampangkaew et al. 2017). In addition, statins are used for both primary and secondary prevention of CVD.

Other therapies that reduce LDL-C include ezetimibe and proprotein convertase subtilisin/kexin type-9 (PCSK9) inhibitors such as evolocumab and alirocumab. High HDL-C levels are protective against CVD. Although a number of therapies were developed to increase HDL-C levels, they were unfortunately not effective (Kampangkaew et al. 2017).

Worldwide, dyslipidaemia is a universal health disorder that is highly prevalent (Benjamin et al. 2019; Zhang et al. 2018; Abujbara et al. 2018). For example, in the United States of America, the Heart Disease and Stroke Statistics 2020 Update stated that mean total levels of total cholesterol, LDL-C, and HDL-C for adults between 2013 and 2016 were 190.8 mg/dL, 112.1 mg/dL, and 54.2 mg/dL, respectively. It also stated that between 2015 and 2016, the prevalence of age-adjusted high LDL-C (≥ 130 mg/dL) was 29.4%, and it was 28.5% in males and 8.9% in females for low HDL-C (< 40 mg/dL). On the other hand, the prevalence of high triglycerides (≥ 150 mg/dL) was approximately 22.2% between 2013 and 2016 (Benjamin et al. 2019). In China, the National Centre for Chronic and Non-communicable Disease Control and Prevention and the Chinese Centre of Disease Prevention and Control conducted a nationwide survey between 2013 and 2014 to assess the prevalence of dyslipidaemia in Chinese adults. The results showed that the overall prevalence of high cholesterol (≥ 240 mg/dL), high LDL-C (≥ 160 to > 190 mg/dL), low HDL-C (< 40 mg/dL), and high TG (≥ 200 mg/dL) were 6.9%, 6.1%, 20.4%, and 13.8%, respectively (Pengpid and Peltzer 2022).

In 2017, a cross-sectional national study was conducted in Jordan to investigate the prevalence of dyslipidaemia in Jordan. More than 4,000 participants were included in the study. The results showed that the prevalence of hypercholesterolemia is 44.3%, and the prevalence of hypertriglyceridemia is 41.9%. In addition, the study found that the prevalence of high LDL is 75.9% and low HDL is 59.5%. Moreover, the national survey found that males had significantly higher prevalence rates of hypertriglyceridemia (54.6%) compared to females (36.5%) (Abujbara et al. 2018).

In Jordan, a questionnaire-based study was conducted in 2018 to evaluate the knowledge of physicians with regards to the 2013 ACC/AHA Guideline on the Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk in Adults. More than 200 physicians from the private, governmental, and military sectors participated in the study. Although more than half of participants indicated that they knew about the guideline, only 36.7% gave correct answers with regards to factors used in the risk estimator for atherosclerotic cardiovascular disease (ASCVD). In addition, about two-thirds of participants answered the correct answer with regards to the recommended plan for patients with clinical ASCVD and less than or equal to 75 years of age (Rababa'h et al. 2021).

In 2018, the American College of Cardiology (ACC) and American Heart Association (AHA) issued the AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol (Grundy et al. 2019). The main objective of this study was to assess the frequency of adherence to the prescribed therapeutic plan for ambulatory patients in Jordan who were assessed for dyslipidaemia by their healthcare providers to the 2018

AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APhA/ASPC/NLA/PCNA Guideline on the Management of Blood Cholesterol (referred to as the ACC/AHA Guideline in this study) for ambulatory patients in Jordan who were assessed for dyslipidaemia by their healthcare providers.

Methods

The study was conducted prospectively at the outpatient clinics in two major hospitals in the north of Jordan: King Abdulla University Hospital, which is the largest medical structure in the north of Jordan with a 600-bed capacity, and Princess Basma Teaching Hospital, which has a capacity of more than 200 beds. The study protocol was approved by the Jordan University of Science and Technology Institutional Review Board (Research Number 39/144/2021) on 11 November 2021, and the Jordan Ministry of Health Ethics of Research on Humans Committee (Research Number MOHREC2333) on 10 February 2022.

The sample size was calculated at a 95% CI and a 5% margin of error, with a prevalence of high LDL-C of 75.9% (Abujbara et al. 2018). The minimum required sample size equalled 281.08 participants (Sharma et al. 2020).

Data collection took place in the period between March 2022 and May 2023. Adult patients who were assessed for dyslipidaemia based on the decisions of their healthcare providers and met the inclusion criteria were approached by a research assistant and invited to participate in the study. Those who agreed to participate had the research goals and methods explained to them and were asked to sign written consent forms. Each patient completed and signed voluntarily an informed consent form before enrolment in the study. The study excluded paediatric patients, pregnant and lactating women, patients previously diagnosed with dyslipidaemia, and patients previously prescribed statin or any other lipid-lowering agent.

Then baseline data were collected by asking patients and physicians and reviewing patients' medical records. Data collected included patients' demographics, past medical history, and ASCVD risk factors. Lab results, including the lipid profile, were documented.

Body mass index was calculated using the WHO equation, and classification was as follows: underweight (BMI < 18.5 kg/m2), normal (BMI 18.5–24.9 kg/m2), overweight (BMI ≥ 25 kg/m2), obese class I (BMI 30.0–34.9 kg/m2), obese class II (BMI 35.0–39.9 kg/m2), and obese class III (BMI above 40 kg/m2) (WHO 2010). The 10-year atherosclerotic cardiovascular disease risk was calculated using the ASCVD Risk Estimator using the ASCVD Risk Estimator Plus application (Android Apps on Google Play 2022). Metabolic syndrome was identified based on the Web Supplement to the 2018 ACC/AHA Guideline on the Management of Blood Cholesterol (ACC/AHA 2018).

Patient therapeutic plans, including lipid-lowering agent names, doses, and frequencies, were documented. If, at the baseline visit, lab results were not ready and patients were not prescribed lipid-lowering agents, patients' medical files were reviewed after their follow-up visit to document their therapeutic plan. Each patient's therapeutic plan was compared to the recommendations in the 2018 ACC/AHA Guideline on the Management of Blood Cholesterol and the adherence to the guideline was documented.

A research assistant with a pharmacy background collected the data. The research assistant was trained to conduct interviews and collect data by a professor of clinical pharmacy. Blood pressure, waist circumference, and weight were measured by a trained nurse. After the completion of the data collection period, each patient case was studied and analysed by two clinical pharmacists and compared to the 2018 AHA/ACC Guideline on the Management of Blood Cholesterol.

The data were analysed using Microsoft Excel. Descriptive statistics were used to analyse demographics, risk factors, blood biochemistry, and other data. The results of continuous variables were presented as means and standard deviations. Categorical variables were presented as frequencies and percentages. Pearson's chi-square test was used to compare the percentages of patients who were put on therapeutic plans adhering to the guideline between primary prevention and secondary prevention. A p-value of 0.05 (two-sided) was considered statistically significant.

Results

Data collection took place in the period between March 2022 and May 2023. A total of 328 patients were invited to participate in the study, with a response rate of 91.5%. Three hundred patients agreed and signed the consent form. The majority of patients were female (68.6%) and overweight (51.3%). The mean ± SD weight and waist circumference of patients were 77.8 ± 12.4 kg and 95.5 ± 16.7 cm, respectively. In addition, the mean ± SD systolic blood pressure and diastolic blood pressure were 128.4 ± 14.2 mmHg and 81.0 ± 9.4 mmHg, respectively. The past medical history of 28 patients (9.3%) included clinical ASCVD, and 119 patients had diabetes mellitus (39.6%). Table 1 shows patient demographics and other relevant clinical characteristics.

Table 1. Demographic and other relevant clinical characteristics of participants (N = 300).

Variable	n (%)
Age	
Mean ± SD	47.9 ± 11.2
Median (Range)	47 (19–85)
Gender	
Female	206 (68.6)
Male	94 (31.3)
BMI category	
Under weight	2 (0.6)
Normal	47 (15.6)
Overweight	154 (51.3)
Obese	71 (23.6)
Morbidly obese	10 (3.3)
missing	16 (5.3)
Tobacco use	
No	200 (66.6)
Former smoker	13 (4.3)
Current Smoker	55 (18.3)
Passive smoking	32 (10.6)
Water pipe use	
No	266 (88.6)
Former smoker	7 (2.3)
Current Smoker	27 (9)
Past Medical History	
Clinical ASCVD[a]	28 (9.3)
Diabetes mellitus	119 (39.6)
Hypertension	111(37)
Chronic kidney disease	13 (4.3)
History of congestive heart failure	19 (6.3)
Family history of premature ASCVD[b]	107 (35.6)
Metabolic syndrome[c]	81 (27)
History of preeclampsia or premature menopause	18 (6)
Chronic inflammatory disorders (e.g., rheumatoid arthritis)	22 (7.3)
Persistently elevated LDL-C levels ≥ 160 mg/dL (≥ 4.1 mmol/L)	47 (15.6)
Persistent elevations of triglycerides ≥ 175 mg/dL (≥ 1.97 mmol/L)	91 (30.3)
Apolipoprotein B ≥ 130 mg/dL, high sensitivity C-reactive protein ≥ 2.0 mg/L, ankle-brachial index < 0.9 and lipoprotein (a) ≥ 50 mg/dL.	ND

ASCVD: atherosclerotic cardiovascular disease; BMI: body mass index; ND: not done; SD: standard deviation.

[a]Clinical ASCVD is defined as acute coronary syndrome, atherosclerotic cardiovascular disease, those with a history of myocardial infarction, stable or unstable angina or coronary other arterial revascularization, stroke, transient ischemic attack, or peripheral artery disease, including aortic aneurysm, all of atherosclerotic origin.

[b]History of myocardial infarction, coronary death, or a coronary revascularization procedure in a male first-degree relative at < 55 years or a female first-degree relative at < 65 years.

[c]The diagnosis is made by the presence of any 3 of the following 5 risk factors: elevated waist circumference, elevated serum triglycerides, reduced HDL-C, elevated blood pressure, and elevated fasting glucose.

Table 2 shows the mean lipid profile values. The mean LDL-C, triglycerides, and HDL-C were 126.2 ± 59.2 md/dL, 166.5 ± 149.4 mg/dL, and 54.4 ± 66.4 mg/dL, respectively. The majority of patients who needed their 10-year ASCVD risk to be calculated in order to design their therapeutic plan had missing information that hindered the calculation of their 10-year risk score (51.6%). The most common missing information was blood pressure readings, followed by HDL-C and LDL-C levels. One patient had a 10-year ASCVD risk score > 20%, while 11 patients had 10-year ASCVD risks ≥ 7.5% to 19.9%. Details with regards to participants calculated 10-year ASCVD risk score are stated in Table 3.

After excluding 83 primary prevention patients from further analysis due to missing information that hindered the calculation of their 10-year ASCVD risk scores, the cases of 160 primary prevention patients were analysed, and their therapeutic plans were compared to the 2018 ACC/AHA Guideline on the Management of Blood Cholesterol. None of the primary prevention patients who should have received statins according to the guideline did receive statins. Two primary prevention patients with a 10-year ASCVD risk score < 5% received statins, although they were not recommended according to the guideline. Table 4 states the details with regards to blood cholesterol management for primary prevention patients.

Table 5 describes the blood cholesterol management provided for secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients. Of the 28 secondary prevention patients, 15 received statins. Of those 15, only seven received high-intensity statins (25%). None of the severe hypercholesteraemic patients (LDL-C ≥ 190 mg/dL) were initiated on statins. Less than one-third of patients diagnosed with diabetes mellitus who were 40 to 75 years of age and had LDL-C levels of 70 to 189 mg/dL were initiated on moderate- or high-intensity statins.

Less than one-third of the 300 total patients received education about lifestyle modifications (28%). Less than one-quarter of patients were started on pharmacological management (20.6%). With regards to pharmacological management, 66.1% were initiated on statins, 21.0% on fenofibrate, and 3.2% on gemfibrozil. Five patients were initiated on a combination of statin and fenofibrate (8.1%).

Table 2. Mean lipid profile values.

Lipid panel or profile	Value
LDL-C (mg/dL)	
Mean ± SD	126.2 ± 59.2
LDL-C (mmol/L)	
Mean ± SD	3.2 ± 1.5
Triglycerides (mg/dL)	
Mean ± SD	166.5 ± 149.4
Triglycerides (mmol/L)	
Mean ± SD	1.8 ± 1.3
HDL-C (mg/dL)	
Mean ± SD	54.4 ± 66.4
HDL-C (mmol/L)	
Mean ± SD	1.9 ± 8.3
Total cholesterol (mg/dL)	
Mean ± SD	202.6 ± 50.7
Total cholesterol (mmol/L)	
Mean ± SD	5.3 ± 1.3
Non-HDL-C (mg/dL)	
Mean ± SD	157.7 ± 73.2
Non-HDL-C (mmol/L)	
Mean ± SD	4.5 ± 7

HDL-C: high-density lipoprotein cholesterol; LDL-C: low-density lipoprotein cholesterol; SD: standard deviation.

Table 3. Patients calculated 10-year atherosclerotic cardiovascular disease risk[a] (N = 161)[b].

Variable	n (%)
Number of patients unable to calculate risk due to missing info or do not qualify to the calculator due to their age	83 (51.6)
Calculated 10-year ASCVD risk ≥ 20%	1 (0.6)
Calculated 10-year ASCVD risk ≥ 7.5% to 19.9%	11 (6.8)
Calculated 10-year ASCVD risk 5% to < 7.5%	2 (1.2)
Calculated 10-year ASCVD risk < 5%	63 (39.1)

ASCVD: atherosclerotic cardiovascular disease.
[a]The 10-year atherosclerotic cardiovascular disease risk was calculated using the ASCVD Risk Estimator using the ASCVD Risk Estimator Plus application.
[b]Patients with ASCVD, diabetes mellitus, and LDL ≥ 190 mg/dL were excluded.

Table 4. Blood cholesterol management for primary prevention patients (N = 160)[a].

Patients clinical characteristics	n	Number of patients that should receive statin	Number of patients that actually received statin	Compliance with 2018 AHA/ACC Guideline on the Management of Blood Cholesterol n (%)
Primary prevention patients with 10-year atherosclerotic cardiovascular disease risk ≥ 20%	1	1	0	0 (0)
Primary prevention patients with 10-year atherosclerotic cardiovascular disease risk ≥ 7.5%-<20%	11	5[b]	0	0(0)
Primary prevention patients with 10-year atherosclerotic cardiovascular disease risk ≥ 5.0%-<7.5%	2	2[c]	0	0 (0)
Primary prevention patients with 10-year atherosclerotic cardiovascular disease risk < 5% who are low risk patients and do not require statin	63	0	2	61(96.8)

[a]Eighty-three primary prevention patients were excluded from the analysis due to an inability to calculate 10-year atherosclerotic cardiovascular disease risk, either due to missing information or age under 40.
[b]Should receive statin due to the presence of a risk enhancer(s).
[c] Should receive a risk discussion due to the presence of risk enhancer(s).

Table 5. Blood cholesterol management for secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients (N = 140)[a].

Patients clinical characteristics	n	Number of patients that should receive statin	Number of patients that actually received statin	Compliance with the 2018 AHA/ ACC Guideline on the Management of Blood Cholesterol n()
Secondary prevention patients	28	28	15	7 (25)[b]
Severe hypercholesteraemic patients (LDL-C ≥ 190 mg/dL)	9	9	3	0 (0)[c]
Patients 40 to 75 years of age with diabetes mellitus and an LDL-C level of 70 to 189 mg/dL[d]	65	65	19	19 (29.2)[e]

[a]This 16 diabetic patients were secondary prevention patients and were included in the secondary prevention category.
[b]Of the 15 patients who received statins, only seven received high-intensity statins according to guidelines.
[c]All three patients received moderate-intensity statins instead of high-intensity statins.
[d]Fifty-four diabetic patients were excluded from the analysis: 23 for missing LDL-C readings, 10 for age < 40 or > 75 years, four with LDL-C < 70 mg/dL, and 16 were secondary prevention patients.
[e]Patients who received either moderate- or high-intensity statins were considered to be in compliance with the guidelines.

The most commonly prescribed statin regimen was atorvastatin 20 mg daily (80.5%), followed by atorvastatin 40 mg daily (12.2%), and rosuvastatin 20 mg daily (7.3%).

The adherence to the 2018 ACC/AHA Guideline on the Management of Blood Cholesterol was compared between primary prevention patients and secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients. The Pearson Chi-Square test results showed that primary prevention patient therapeutic plans were more in compliance with the guideline compared to secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients (Pearson's Chi-Square test, p value < 0.001). Further analysis was done after excluding patients that did not require a statin initiation. The results showed no statistically significant difference between primary prevention patients and secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients in terms of initiation of statins according to the guideline (Pearson's Chi-Square test, p value = 0.15).

Discussion

The findings of the current study highlighted inadequate adherence to the latest Guideline on the Management of Blood Cholesterol for patients assessed for dyslipidaemia in ambulatory care settings. This multi-centre study was the first to investigate patients assessed for dyslipidaemia at their initial stage of diagnosis. The current study has limitations. Missing information such as blood pressure readings and LDL-C and HDL-C levels was a limitation that prevented the analysis of some of the primary prevention patients. Although an effort was made to collect all required information to assist in the calculation of the 10-year ASCVD risk score through collaboration with the nursing team in the clinics, the busy and overloaded clinics prevented the complete collection of information. This indicates that the issue of missing information is even more pronounced than what was shown in the results.

In 2020, the Jordan Ministry of Health, in collaboration with the Centre for Strategic Studies of the University of Jordan, issued the results of a national survey of non-communicable diseases and their risk factors. The results showed that cardiovascular diseases, followed by cancer, diabetes, and chronic respiratory diseases, are the leading causes of death in Jordan (WHO 2019). Dyslipidaemia is a major risk factor for cardiovascular diseases (Kopin and Lowenstein 2017).

Inadequate adherence to the guideline can be related to a number of factors. One factor is clinicians' inadequate knowledge of the latest guideline. A study conducted in Jordan found that only 36.7% answered correctly with regards to factors used in the ASCVD Risk Estimator (Rababa'h et al. 2021). Another factor is related to the fact that the management of dyslipidaemia in primary prevention patients is a process that involves multiple steps (Grundy et al. 2019). The foundation step is to calculate the 10-year ASCVD risk score (Grundy et al. 2019). A number of web and mobile applications and links are available for the calculation of the 10-year ASCVD risk score (Android Apps on Google Play 2022; ASCVD Risk Estimator). In the current study, for the majority of primary prevention patients, the calculation of the 10-year ASCVD risk score was not possible, mainly due to missing information. One crucial fact that needs to be addressed is that using the calculator is time-consuming, especially at busy sites such as government and teaching hospitals in Jordan. Collecting baseline information for the calculator and calculating the risk score are expected to be the main obstacles that hinder designing therapeutic plans that comply with the guideline. One of the suggested solutions for the aforementioned obstacles is to assign the responsibility of calculating the risk score to a healthcare professional and to incorporate the 10-year ASCVD risk score calculator in the medical facility electronic system.

A randomised controlled study was conducted in Jordan to investigate the role of clinical pharmacy services in the management of patients with dyslipidaemia. The results of the previous study showed that 94.5% of the intervention group patients who were followed by a clinical pharmacist reached their LDL-C goals compared to 71.2% of the control group patients who received usual medical care (p value < 0.001) (Tahaineh et al. 2011). Spreading clinical pharmacy services over a larger scope can help increase compliance with the guideline.

Only one-quarter of secondary prevention patients were initiated on therapeutic plans according to the guideline. Although 60% of secondary prevention patients were started on statins, only one quarter received high-intensity

statins. Alarmingly, none of the severe hypercholesteraemic patients (LDL-C ≥ 190 mg/dL) were started on statins. For diabetes mellitus patients, higher but still modest compliance with the guideline compared to secondary prevention and severe hypercholesteraemic patients (29.2%) was documented in our study. Educational campaigns highlighting the recommended intensity of statin for the high-risk group are recommended to improve compliance with the guidelines. A recently published study that was conducted in Jordan investigated patients who had taken statin therapy for at least two months. The study aimed to evaluate patient therapeutic plans and compare them to the 2018 ACC/AHA Guideline. The majority of the recruited patients were secondary prevention patients (73.1%). The results of the previous study were in concordance with our study. The results showed that only one-half of participants (49.7%) received the recommended intensity of statin (Gharaibeh et al. 2023). A national cross-sectional study investigated dyslipidaemia awareness, treatment, and control in Jordan. The results showed that among patients on lipid-lowering agents, only one-quarter (25.4%) were controlled dyslipidaemia patients. The goal of LDL-C in this national cross-sectional survey was < 3.37 mmol/L, which equals < 130 mg/dL (Pengpid and Peltzer 2022).

In our study, less than one-third of diabetes mellitus patients were started on statins according to the 2018 ACC/AHA guidelines. In concordance, a previously published study was conducted between 2017 and 2018 in Jordan. The aforementioned study was a cross-sectional chart review study that included 1,200 patients with diabetes mellitus. The study found that LDL-C of less than 70 mg/dL was achieved in 15.9% of the participants (Hyassat et al. 2023).

Interestingly, in this study, the association between compliance with the guideline and patients' clinical characteristics, specifically comparing primary prevention patients with secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients, showed that the therapeutic plans for primary prevention patients were more in compliance with the guideline compared to the other group. However, after excluding primary prevention patients who did not require a statin initiation, the results showed no statistically significant difference between primary prevention patients and secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients in terms of the initiation of statins according to the guideline. This indicates a reluctance to apply the guideline when it requires statin initiation, or it could be related to not being aware of the guideline.

The current study has limitations. It was conducted in the north of Jordan, and the results may not be generalizable to the rest of the country, although the author believes the results will not differ significantly. Missing information such as blood pressure readings and LDL-C and HDL-C levels was another limitation that prevented the analysis of some of the primary prevention patients. Although an effort was made to collect all required information to assist in the calculation of the 10-year ASCVD risk score through collaboration with the nursing team in the clinics, the busy and overloaded clinics prevented the complete collection of information. This indicates that the issue of missing information is even more pronounced than what was shown in the results.

Conclusion

For ambulatory patients who were assessed for dyslipidaemia, compliance with the 2018 ACC/AHA Guideline on the Management of Blood Cholesterol was inadequate. Missing patient information that hinders the calculation of the 10-year atherosclerotic cardiovascular disease risk score is a main obstacle that can avert adherence to the guideline. In terms of initiating statin therapy according to the guideline, both primary prevention patients and secondary prevention, diabetes mellitus, and severe hypercholesteraemic patients were not in compliance with the 2018 ACC/AHA Guideline.

Competing interests

The author reports no conflicts of interest.

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