# Lipid-lowering Therapy and Goal Achievement in High-risk Patients From French General Practice

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## ABSTRACT

**Purpose:** The goal of this study was to summarize patterns of lipid-lowering therapy (LLT) usage and achievement of guideline-identified lipid goals in a 2015 general practice cohort of French patients with atherosclerotic cardiovascular disease (ASCVD) and/or diabetes mellitus (DM).

**Methods:** From the IMS Health Real-World Data database, patients aged ≥18 years were classified hierarchically into mutually exclusive categories of ASCVD subgroups and DM. LLT use and lipid goal achievement were assessed on the date of lipid measurement. The data were compared with previously published results of LLT use and lipid goal achievement in a 2014 UK population.

**Findings:** Of 32,924 patients meeting the inclusion criteria, only 47.5% were prescribed a statin as of the index date. Hierarchically, the highest rates of use of any statin (73.3%) and high-intensity statins (43.3%) were among patients with recent acute coronary syndrome; rates in DM without ASCVD were 38.7% and 2.3%, respectively. Overall, achievement of LDL-C levels <1.8 mmol/L (<70 mg/dL) was only 13.9% for patients with ASCVD and 10.7% with DM. Relative to a 2014 UK population, the 2015 French cohort (data reanalyzed according to the UK statin categorization) were prescribed "high-dose statins" less frequently (31.4% vs 20.9%, and 18.7% vs 7.2%, for ASCVD and DM). Similarly, the proportion of patients with high-dose statins achieving LDL-C levels <1.8 mmol/L was higher in the 2014 UK population than in the 2015 French population (37.3% vs 22.2%, and 36.8% vs 20.3%, for ASCVD and DM).

**Implications:** In a large cohort of French patients with ASCVD and/or DM, LLT usage and LDL-C goal achievement were suboptimal, relative to current guidelines. (*Clin Ther*. 2018;40:XXX–XXX) © 2018 Elsevier HS Journals, Inc. (*Clin Ther*. 2018;■:1–34) © 2018 Elsevier Inc. All rights reserved.

**Key words:** acute coronary syndrome, cardiac risk factors and prevention, coronary artery disease, lipoprotein and hyperlipidemia.

## INTRODUCTION

In France, cardiovascular disease is the second most common cause of mortality after cancer.[1] Across the nation, ischemic heart disease and stroke account for 12% of all deaths.[2] Approximately 80,000 to 100,000 hospitalizations annually are due to acute coronary syndromes (ACS).[3]

Treatment guidelines for atherogenic cholesterol, the primary modifiable risk factor for adverse atherosclerotic outcomes, include those from the European Society of Cardiology (ESC)/European Atherosclerosis Society (EAS)[4] and the French National Authority for Health (Haute Autorité de Santé [HAS]).[5,6] As of 2006–2007,[7] the vast majority of high-risk patients , according to the definition by either guideline, had not achieved the recommended LDL-C goals, largely due to insufficient treatment with lipid-lowering therapy (LLT).[8]

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*Accepted for publication July 10, 2018.*
https://doi.org/10.1016/j.clinthera.2018.07.008
0149-2918/$ - see front matter

There are limited data on current atherogenic cholesterol management in patients at the highest risk of atherosclerotic events: those with established atherosclerotic cardiovascular disease (ASCVD) and/or diabetes mellitus (DM). The objective of the present study was to evaluate utilization of LLT medications as well as LDL-C and non−HDL-C goal achievement in these patients using a 2015 real-world, generalizable French cohort.

## PATIENTS AND METHODS

### Study Population

This was a retrospective, cross-sectional, observational study using electronic medical records from the IMS Health Real-World Data database in France (formerly known as the Longitudinal Patient Database) that included 1.85 million patients representing ~2.8% of the French population, from 1200 general practitioners in 2015. These secondary data consisted of anonymized observations that had been collected through electronic medical records completed by French physicians during office visits. The database has been validated and is representative of the French population.[9] In the present study, a retrospective analysis was conducted utilizing a secondary database consisting of existing anonymized observations for de-identified patients; thus, there was no requirement to seek specific Ethics Committee approval.

Inclusion criteria were: age ≥18 years; an LDL-C measurement within a valid range (0.0259−25.86 mmol/L [1−1000 mg/dL]) in 2015; ≥2 years of continuous representation in the database before the index date (defined as the last LDL-C measurement in 2015); and ≥1 high cardiovascular risk condition (conditions defined in the following paragraph). Continuous representation in the database before the index date was required to ensure optimal characterization of the cohort, including its demographic and clinical characteristics, as well as previous and current pharmacologic treatment.

Patients with evidence of any of the following categories of conditions during the preindex period were identified: (1) recent ACS (myocardial infarction [MI] or unstable angina ≤12 months before the index date); (2) chronic coronary heart disease (CHD; MI or unstable or stable angina >12 months before the index date and/or history of stable angina, coronary revascularization, or another CHD diagnosis); (3) ischemic stroke/transient ischemic attack (TIA); (4) peripheral arterial disease (PAD; abdominal aortic aneurysm, carotid and intracerebral artery disease without evidence of stroke/TIA, or any revascularization or repair of these arteries); and (5) DM (type 1 or type 2). High cardiovascular risk conditions were identified by using French Thesaurus codes mapped to the ninth and tenth revisions of the *International Classification of Diseases* (see Supplemental Table I in the online version at doi:10.1016/j.clinthera.2018.07.008).

Two methods were used to perform classification. The first, hierarchical classification, entailed assigning each patient to the highest mutually exclusive category for which he or she was qualified (using the aforementioned order). The second, prevalent classification, entailed assigning each patient to all the categories for which he or she was qualified. Thus, in hierarchical classification, each patient could only be assigned to 1 category but in prevalent classification, each patient could be classified into >1 category. For the present article, the results are reported by using the hierarchical classification method; the Supplemental Materials (in the online version at doi:10.1016/j.clinthera.2018.07.008) include analyses using the prevalent classification method. The first 4 high cardiovascular risk categories are collectively referred to as "ASCVD" in the article.

### Determination of LLT

For any medication, patients were considered to have been treated on the index date if medication supply via a written prescription was available on or within 30 days before the index date, regardless of the duration of the prescription. Patients not currently treated, but with evidence of a past prescription, were considered to have a history of treatment. Patients with no recorded prescription during the 2 years prior were considered to have no evidence of treatment (see Supplemental Figure 1 in the online version at doi:10.1016/j.clinthera.2018.07.008).

Statins were classified as high-intensity (atorvastatin 40 mg, 80 mg; rosuvastatin 20 mg, 40 mg; and simvastatin 80 mg) or low- to moderate-intensity (all other statin medications and doses). For patients prescribed statins, the use of concomitant nonstatin LLT was evaluated by using a hierarchical classification: (1) statin plus ezetimibe; (2) statin plus a fibrate (ie, gemfibrozil, fenofibrate, ciprofibrate, bezafibrate); (3) statin plus the bile acid sequestrant cholestyramine; and (4) statin without any of these nonstatin LLT medications (termed "statin monotherapy"). For patients prescribed only nonstatin LLT, the same hierarchical classification of these medications was used.

### Determination of Lipid Levels

LLT was evaluated on the index date to ensure that lipid measurements best reflected the impact of treatment.