

Can cardiac rehabilitation improve LDL-cholesterol target attainment after acute coronary syndromes?

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Atherosclerotic vascular disease progression and cardiovascular events can only be prevented with optimal risk factor modification. The significant decrease in events that we see in randomised trials can be replicated in real life if patients get to guideline recommended goals and stay there. The risk factor goals and target levels have clearly been stated in the European Society of Cardiology (ESC) / European Atherosclerosis Society (EAS) prevention guidelines.¹ However, there is a large gap between the scientific knowledge and real life implementation in which the guideline recommended goals are usually not reached. This has been documented over and over by the EUROpean Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE) and other studies.^{2,3} Since the under-implementation trends do not seem to change much over time, clearly we are not doing something right and need to improve our practices.

Patients who had an acute coronary syndrome (ACS) and patients who underwent coronary artery by-pass grafting (CABG) are at very high risk of recurrent events.⁴ In the 2016 European cardiovascular prevention guidelines, it is recommended to develop strategies for secondary prevention in patients with ACS after an index acute event before discharge to reduce mortality and morbidity.¹ This approach includes healthy lifestyle modification, risk factor control and optimisation of pharmacotherapy.

Low-density lipoprotein (LDL) cholesterol is one of the most important modifiable risk factors. There is strong and consistent evidence from Mendelian randomisation studies, epidemiological studies, and clinical studies that LDL-cholesterol is causal for atherosclerotic vascular disease.⁵ For these very high risk patients, the current ESC/EAS guidelines recommend a LDL-cholesterol goal of less than 1.8 mmol/L (70 mg/dL) or a reduction of at least 50% if the baseline LDL-cholesterol is between 1.8 and 3.5 mmol/L (70 and 135 mg/dL).¹ Evidence for further benefit from lowering LDL-cholesterol to even lower levels is emerging from the outcome studies using PCSK9 inhibitors.⁶ Patients with ACS and CABG are the subgroup of

patients who have more absolute risk reduction from lowering LDL-cholesterol beyond guideline recommended goals.^{7,8}

There is a price to pay for non-adherence to lifestyle modification and medications as well as not getting to recommended goals, making it important to invest in implementation. Guideline implementation is influenced by complex and overlapping factors including the healthcare system, healthcare provider and the patient. The healthcare provider has the responsibility of not only delivering evidence-based care, but also educating the patient, making the patient a responsible partner for their own health. Due to time constraints, a team-based structured rehabilitation approach is necessary to do this effectively.

In this issue of the journal, Schwaab et al.⁹ present the importance of an early and short-term in-patient cardiac rehabilitation (CR) programme on improvement in the rate of targeted LDL-cholesterol levels among patients treated for ACS or previous CABG who have been included in the PATIENT CARE registry from 20 different centres across Germany. Patients were managed conservatively or invasively and then started on a CR programme within an average of 19 ± 10 days after the index ACS event, which lasted for 22 ± 4 days. Although the rates of statin therapy at admission and discharge among all patients were similar (95.3% at admission vs. 96.7% at discharge), only 49.3% of them were using high-dose atorvastatin at admission which increased to 66.9% at discharge. In addition, the rate of ezetimibe use increased significantly at discharge compared to admission (2.9% vs. 10.6% among all participants). The LDL-cholesterol goal recommended by ESC/EAS dyslipidemia guideline

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recommendations were reached by 40.9% of all the patients. The rate of LDL-cholesterol target achievement was doubled at discharge in patients who underwent CR. Although these results are not optimal, they are still a significant improvement over the usual results we see in Europe. Compared to other European countries, the CR programmes are very well organised and developed in Germany.¹⁰ The results of the EUROASPIRE IV survey revealed that the attainment of LDL-cholesterol targets (<70 mg/dl) in patients with coronary heart disease was low (22% in men, 17% in women) at the 6-month follow-up among 24 countries in Europe.² In EUROASPIRE IV, only half of all coronary patients were referred and a minority attended a CR programme. Those attending were more likely to achieve lifestyle targets, had lower depression and anxiety, and better medication adherence, but not better lipid control.¹¹

CR is the intervention with the best scientific evidence to contribute reducing morbidity and mortality in post-ACS and revascularisation patients.¹² Thus participation in the specialized multi-component and multidisciplinary CR programmes for patients who have been hospitalised for an acute coronary event or revascularisation should be promoted by healthcare specialists appropriately. The type, structure and length of the CR programmes may vary among centres and countries according to the national standards or guidelines, regulations and reimbursement factors.¹³ Currently, the beneficial effects of CR most commonly occur through exercise training, effects on risk factors, behaviour and psychosocial condition.¹⁴ Although Schwaab et al.⁹ reported a high completion rate for the CR programme, the rate of achievement of target LDL-cholesterol was still less than half of the patients. This can be explained by several reasons. The 3–4 weeks of the CR programme may have been too short to assess the impact of several lifestyle changes and risk factor modification strategies. The fact that not all patients got nutritional consulting (78.8%) and exercise five times a week (84.8%) may be a reason. In the DYSIS II study, baseline body mass index (BMI) greater than 30 kg/m², diabetes, smoking, chronic kidney disease and statin dose were found to be predictors of LDL-cholesterol target attainment. In the study by Schwaab et al.⁹ the study group had a significant number of patients with renal failure, BMI greater than 30 kg/m², active smokers and diabetes, which may explain inadequate achievement of the LDL-cholesterol targets. However, the most important reason for not getting to the goal was not using lipid-lowering therapies to the full potential. Using more intensive lipid-lowering therapies with combination therapy where necessary would have increased goal achievement.

Despite the benefits of CR after ACS, it is vastly underutilised in Europe. In the European Cardiac Rehabilitation Inventory Survey¹³ although acute in-hospital CR programmes were available in 86% of European countries, only about one third of them reported provision to more than 80% of patients, and most common problems encountered by the centres were absent or inadequate legislation, funding and national guidelines. In a recent updated review, Anderson et al.¹⁵ demonstrated that home-based CR programmes are as effective as centre-based forms with regard to clinical outcomes in patients after myocardial infarction or revascularisation, which supports the development of home-based CR programmes. The preference of CR modality depends on local availability and patient willingness; home-based CR programmes may be more comfortable and cheap compared to those in hospital settings.⁹

Currently, the implementation of evidence-based strategies is lagging behind the scientific information we have. Although team-based approaches and structured programmes will have a significant benefit, we clearly need to do more. Using information technologies to coordinate the team approach, flagging patients not at goal, sending reminders and educational materials to patients, make the healthcare team aware of the patients' goal achievement and monitoring adherence may help improve implementation further.

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