Low-Density Lipoprotein Cholesterol Goal Attainment among Post Myocardial Infarction Patients on Lipid Lowering Therapy at Siriraj Outpatient Clinic

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Background: *Cardiovascular disease is leading cause of death in the world and third order in Thailand. A number of large-scale clinical trials have demonstrated that statins reduce cardiovascular morbidity and mortality. Nevertheless, in clinical practice less than 50% of these patients could achieve the LDL-C goal based on NCEP ATP III treatment goal. The objective of this study is to assess the percentages of post myocardial infarction patients who attained LDL-C goal in Siriraj Hospital.*
Material and Method: *This is a retrospective review of all adult patients diagnosed with first event myocardial infarction (STEMI and NSTEMI) at Siriraj Hospital between 2007 and 2009. Patients were included if they were 18-75 years-old, received statins therapy before discharge and followed-up regularly at least 1 year at OPD. Patients were excluded if triglyceride >400 mg/dL. Patient demographics, type of reimbursement and discharge medication data were collected. The goal attainment was assessed and result was demonstrated in percentages of patients who achieved LDL goal compare with all patients meeting exclusion and inclusion criteria. This goal is based on NCEP ATP III 2004 for the management of dyslipidemias treatment goal of LDL-C <100 mg/dL.*
Results: *Eight hundred and eighty eight patients were diagnosed with myocardial infarction from 2007 to 2009. One hundred seventy-nine patients meet inclusion and exclusion criteria. Seventy-three percent are male with mean age 58.64±10.21 year-old. Civil servant reimbursement is most common type of reimbursement, for about half of patients. LDL-C goal achievement based on NCEP ATP III 2004 for the management of dyslipidemia was 84.9%. The majority of prescribed lipid lowering agent was simvastatin 72.1%, and then atorvastatin 20.7% and rosuvastatin 7.3%, respectively. LDL-C goal achievement did not depend on type of statin, type of reimbursement or type of specialist follow-up at OPD.*
Conclusion: *Patients who were diagnosed first event of myocardial infarction (STEMI and NSTEMI) admitted in Siriraj hospital from 2007 and 2009, 84.9% of them could achieve LDL-C goal based on NCEP ATP III 2004.*

Keywords: *LDL goal attainment, Statin, Secondary prevention, Myocardial infarction*

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Cardiovascular disease is leading cause of death in the world. In Thailand, cardiovascular disease is the third cause of death, next after cancer and accident[1]. Risk factor plays important role in development of cardiovascular disease.

Patients who were diagnosed coronary heart disease have very high risk for recurrent cardiovascular event.

Every 1 mmol/L (~40 mg/dL) reduction of LDL can decrease 22% of cardiovascular events[2] HMG CoA reductase inhibitors (Statins) can decrease LDL by 18-55%[3,4] depend on type and dose. Furthermore, a number of large-scale clinical trials have demonstrated that statins reduce cardiovascular morbidity and mortality either through primary or secondary prevention by means of clinical benefit, depending on how much LDL-C decreased.

Multiple large clinical trials such as CARE[5] MIRACL[6] and PROVE IT-TIMI 22[7] showed benefit of statin therapy in reduce cardiovascular events. A4S and LIPID studies demonstrated CVD mortality reduction 42% and 24%, respectively, in long term care of post myocardial infarction patients[8-10].

ESC/EAS Guidelines for the management of dyslipidemias 2011 recommended using LDL-C level for target of secondary prevention in patients with established cardiovascular disease and especially in patients after post myocardial infarction. Based on

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AHA/ACCF Guidelines for Secondary Prevention 2011, ACC/AHA Guideline for UA and NSTEMI 2007 ACC/AHA, Guidelines for the Management of STEMI 2009, LDL-C <100 mg/dL (Recommendation Ia) or <70 mg/dL (Recommendation IIa) was recommended. In case of failure to achieve LDL-C target due to high baseline LDL-C, attempts were made to keep LDL-C below than 50% from baseline by statin monotherapy or lipid lowering agent combination.

Recent ESC/EAS Guidelines for the management of dyslipidemias (2011), further recommend to a target LDL <70 mg/dL or below than 50% of baseline (Recommendation Ia).

Although many recent studies showed benefit from LDL-C reduction for secondary prevention in coronary heart disease, less than 50% of patients in clinical practice could achieve the LDL-C goal according to The Adult Treatment Panel III of the National Cholesterol Education Program 2004 (NCEP ATP III 2004)[11,12].

The objective of the present study was to assess the percentage of post myocardial infarction patients who attained LDL-C goal at discharge and at 1 year.

Material and Method

This is a retrospective studybased on reviews from medical records including out-patient and in-hospital medical records and the electronic database of all adults who were diagnosed, post 1st event, as myocardial infarction, ST segment elevation myocardial infarction and non-ST segment elevation myocardial infarction, and admitted at Siriraj Hospital between 2007-2009. The authors selected patients using the medical record division of Siriraj Hospital by searching from ICD-10 codes; I 210 (Anterior wall MI), I 211 (Inferior wall MI), I 213 (transmural MI), I 214 (non-STEMI), I 219 (non-specific MI). There was one proportion of myocardial infarction patients (non-STEMI) that were observed and received treatment at short-stay department who were not counted for admission; therefore, this group of patients was not recorded in data pool of ICD-10. Patients were excluded if not on statin therapy, not able to get to a regular follow-up at Siriraj OPD had no lipid profile test of more than 2 times within 1 year post MI had TG >400, were lost to follow-up, or if the MI event was not the first event. Patients who met inclusion and exclusion criteria were enrolled.

Patient demographic and co-morbidity that were collected included age, sex, body weight, height, concomitant disease, baseline LDL-cholesterol level after admission within 24 hours, type and dose of lipid lowering agents received before discharge from hospital and classification of reimbursement. We also collected the type and dose of lipid lowering agent, type of specialist who taking cared for the patients, etc.

Patients were divided in two groups; Group A included the patients who achieved LDL goal attainment at 1 year; Group B included the patients who did not achieve LDL goal attainment at 1 year. Baseline demographic and clinical data between the two groups were compared. Because of collection of data from database from 2007-2009, the LDL goal attainment the Adult Treatment Panel III of the National Cholesterol Education Program 2004 guideline (NCEP ATP III 2004) is <100 mg/dL. Nevertheless, ESC/EAS Guidelines for the management of dyslipidemias was released in 2011; categorizing coronary heart disease patients as very high risk group for which an LDL-C goal of less than 70 mg/dL was recommended; the alternative was reduction of LDL-C at least 50% from baseline (Recommendation Ia). The study protocol was approved by Siriraj Institution Review Board, Faculty of Medicine Siriraj Hospital, Mahidol University.

Sample size calculation

The present study aim for assessment prevalence of LDL-C goal attainment in 1st event of post myocardial infarction patients who received statin for standard lipid therapy of Siriraj Hospital according to NCEP ATP III 2004 recommendation. From a literature review: it was revealed that LDL-C goal attainment in clinical practice based on guideline of The Adult Treatment Panel III of the National Cholesterol Education Program NCEP ATP III 2004 (NCEP ATP III 2004) achieved a goal of only 48.7%[13]; the proper formula for sample size estimation is then done by calculating proportion of one group with 0.073 defined as acceptable error of 15% of prevalence of LDL-C goal achievement at less than 100 mg/dL and defined as standard score; Z was calculated to be 1.96 when confidence interval is 95%. The present study must include sample size for at least 180 patients. Considerations about number and repletion of data, the authors led us to add to the sample size 10% more than the calculated sample size $\frac{10 \times 180}{100} = 20$ patients; the total calculated sample size is 200 patients.

Definition of acute coronary syndrome

STEMI is defined by 'criteria for the diagnosis of acute myocardial infarction' of Joint ESC/ACCF/

AHA/WHF Task Force for the Redefinition of Myocardial Infarction[14,15] NSTEMI is defined by ECG ST-segment depression or prominent T-wave inversion and/or positive biomarkers of necrosis (e.g. troponin) in the absence of ST-segment elevation and in an appropriate clinical setting (chest discomfort or anginal equivalent)[16].

LDL cholesterol measurement

Blood sampling from fasting plasma or serum for 9-12 hours was sent for total cholesterol, HDL cholesterol and triglycerides. Serum was collected in anticoagulant-free tube and plasma was collected in lithium or heparin tube. Level of lipid derived from plasma is less than serum, approximately 3%[17]; after that, lipid parameters were calculated by Friedewald formula for LDL-C level while triglycerides remained; less than 400 mg/dL.

LDL cholesterol = total cholesterol-HDL cholesterol-triglycerides/5

LDL cholesterol measurement was performed by Modular Pre-Analytics Evo (MPA) of Roche® by Homogeneous enzymatic colorimetric assay technique.

Statistical methods

All statistical data was analyzed using SPSS version 13.0. Continuous data was expressed as mean and standard deviation or median and range as appropriate. The categorical data were expressed by numbers and percentages. LDL-C goal achievement according to NCEPATP III 2004 was demonstrated in percentage. Relationship between factors, esp demographic, co-morbidity, classification of reimbursement and type and dose of statins with LDL-C goal achievement were tested by Chi-square or Fisher's exact test if data are numerical; independent t-test or Mann-Whitney U test was used when the data were continuous. If any factors show p-value <0.05, Multiple logistic regression was used to test between the relationship of multiple factors and LDL-C achievement and results were demonstrated by adjusted odds ratio and 95% confidence interval.

Results

Eight hundred and eighty-eight patients were diagnosed with myocardial infarction from 2007 to 2009. One hundred seventy-nine patients meet inclusion and exclusion criteria. Table 1 shows causes of exclusion; most common causes of exclusion were from among those with a prior history of myocardial infarction.

Baseline clinical characteristics of the patients are shown in Table 2 and baseline reimbursement status and anti-lipid agents in Table 3. The mean age of study population was 58.64±10.21 year-old. Seventy-three percents were men. Diabetes mellitus and hypertension were thirty-eight and sixty-four percent of the concomitant diseases. STEMI was the largest proportion of myocardial infarction (61.5%). Civil servant reimbursement is the most common type of reimbursement, about 50%. Before discharge, the proportions of prescribed lipid lowering agents were simvastatin 72.1%, atorvastatin 20.7% and rosuvastatin 7.3%, respectively. A high proportion of patients received aspirin 100%, clopidogrel 90.1%, beta-blockers

Table 1. Causes of exclusion

Year causes of exclusion	2007	2008	2009
Loss to F/U	58 (20.4)	55 (20.0)	36 (25.3)
Measured LDL-C <2 time	29 (10.2)	35 (12.7)	15 (10.5)
Death	36 (12.7)	37 (13.5)	18 (12.6)
No statin	12 (4.2)	11 (4.0)	5 (3.5)
Prior MI/PCI/CABG	60 (21.1)	65 (23.7)	33 (23.2)
Transfer to Siriraj >24 hrs from onset	28 (9.8)	22 (8.0)	11 (7.7)
Admission from other causes	14 (4.9)	10 (3.6)	6 (4.2)
Appointment for CAG/CABG	39 (13.7)	33 (12.0)	14 (9.8)
Triglyceride >400 mg/dL	3 (1.0)	0 (0)	3 (2.1)
Repeated data	4 (1.4)	4 (1.4)	0 (0)
In complete data	1 (0.3)	2 (0.7)	1 (0.7)
Total	284	274	142

LDL-C = Low-density lipoprotein cholesterol; MI = myocardial infarction; PCI = percutaneous coronary intervention; CABG = coronary artery bypass graft surgery; CAG = coronary angiogram

Table 2. Baseline clinical characteristics of the patients

	All patients n = 179	Achieved (LDL <100 mg/dL) n = 152	Non-achieved (LDL >100 mg/dL) n = 27	p-value
Age (years), mean ± SD	58.64±10.21	59.11±9.91	56.0±11.61	0.145
Sex: male n (%)	131 (73.2)	113 (74.3)	18 (66.7)	0.407
Body weight (kg), mean ± SD	67.71±11.20	67.89±11.06	66.75±12.11	0.635
Height (cm), mean ± SD	164.66±7.27	164.56±6.97	165.26±9.07	0.669
Concomitant disease				
Diabetes mellitus n (%)	69 (38.5)	59 (38.8)	10 (37.0)	0.861
Hypertension n (%)	115 (64.2)	100 (65.8)	15 (55.6)	0.307
CKD n (%)	13 (7.3)	11 (7.2)	2 (7.4)	1.000
DLP n (%)	127 (70.9)	105 (69.1)	22 (81.5)	0.191
ST elevation MI	110 (61.5)	96 (63.2)	14 (51.9)	0.080
LAD n (%)	49 (44.5)	39 (40.6)	10 (71.4)	
Lcx n (%)	2 (1.8)	2 (2.1)	0 (0)	
RCA n (%)	59 (53.6)	55 (57.3)	4 (28.6)	
Non-ST elevation MI n (%)	69 (38.5)	56 (36.8)	13 (48.1)	0.266
Presenting complication n (%)	64 (35.8)	51 (33.6)	13 (48.1)	0.145
Heart failure n (%)	41 (60.2)	32 (21.1)	9 (33.3)	0.162
Cardiogenic shock n (%)	13 (19.11)	8 (5.3)	5 (18.5)	0.029
Cardiac arrest/VT/VF n (%)	8 (11.76)	7 (4.6)	1 (3.7)	1.000
Complete heart block n (%)	6 (7.35)	6 (3.9)	0 (0)	0.593

DLP = dyslipidemia; CKD = chronic kidney disease; ST elevation MI = ST segment elevation myocardial infarction; LAD = left anterior descending artery; Lcx = left circumflex artery; RCA = right coronary artery; Non ST elevation MI = non-ST segment elevation myocardial infarction; VT = ventricular tachycardia; VF = ventricular fibrillation

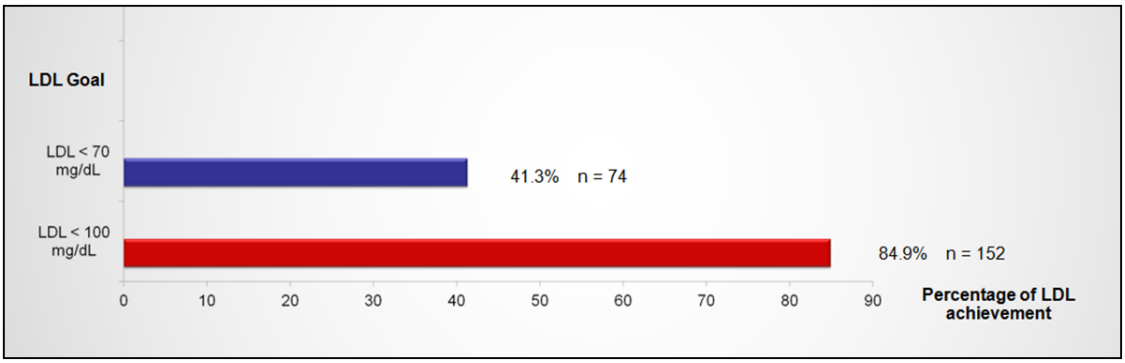

Fig. 1 Percentage of LDL-cholesterol goal achievement.

70.4%, ACEI 62% and ARB 8.4%. The overall baseline lipid profile after admission was LDL-cholesterol level 125.19±36.25 mg/dL, HDL cholesterol 43.23±11.21 mg/dL and triglyceride 143.27±74.95 mg/dL.

After discharge, most of the patients achieved LDL-cholesterol goal according to NCEP ATP III (<100 mg/dL) within 1 year. LDL-C goal achievement based on NCEP ATP III 2004 was 84.9% (Fig. 1). Average cost of statins per patient in order to achieve LDL-C goal treatment group was 747.3 Baht (90-32,059), according to Siriraj Hospital drug list 2007.

Characteristics of the patients between achieved and non-achieved LDL-C goal group were similar: mean age 59.11±9.91 and 56.0±11.61 year-old, men 74.3% and 66.7%, concomitant disease (diabetes 38.8% and 37%, hypertension 65.8% and 55.6%), type of reimbursement (civil servant 49.7% and 51.9%, national health care 34% and 37%, social security fund 6.1% and 7.4%), follow-up specialist (medicine staff 25% and 20%, fellow of cardiology 55.5% and 56%),

Table 3. Baseline reimbursement status and anti-lipid agents

	All patients n = 179	Achieved (LDL <100 mg/dL) n = 152	Non-achieved (LDL >100 mg/dL) n = 27	p-value
Reimbursement				0.799
Civil servant n (%)	87 (50)	73 (49.7)	14 (51.9)	
National health care n (%)	60 (34.5)	50 (34.0)	10 (37)	
Social security fund n (%)	11 (6.3)	9 (6.1)	2 (7.4)	
Self-payment n (%)	16 (9.2)	15 (10.2)	1 (3.7)	
Lipid lowering agent				0.956
Simvastatin n (%)	129 (72.1)	109 (71.1)	20 (74.1)	
Atorvastatin n (%)	37 (20.7)	32 (21.1)	5 (18.5)	
Rosuvastatin n (%)	13 (7.3)	11 (7.2)	2 (7.4)	
Aspirin n (%)	179 (100)	152 (84.9)	27 (5.1)	N/A
Clopidogrel n (%)	163 (90.1)	141 (92.8)	22 (81.5)	0.071
Beta-blockers n (%)	126 (70.4)	105 (69.1)	21 (77.8)	0.362
ACEI n (%)	111 (62)	97 (63.8)	14 (51.9)	0.238
ARB n (%)	15 (8.4)	15 (9.9)	0 (0)	0.132
Total cholesterol, mg/dL (n = 139), mean ± SD	196.24±46.35	192.41±42.62	192.41±42.62	0.028
HDL cholesterol, mg/dL (n = 137), mean ± SD	43.23±11.21	43.20±11.27	43.41±11.11	0.936
LDL cholesterol, mg/dL (n = 144), mean ± SD	125.19±36.25	120.19±33.58	151.44±39.16	0.001
Triglyceride, mg/dL (n = 138), mean ± SD	143.27±74.95	143.10±73.67	144.13±82.80	N/A

ACEI = angiotensin-converting enzyme inhibitors; ARB = angiotensin II receptor blockers; HDL-cholesterol = high-density lipoprotein cholesterol; LDL-cholesterol = low-density lipoprotein cholesterol

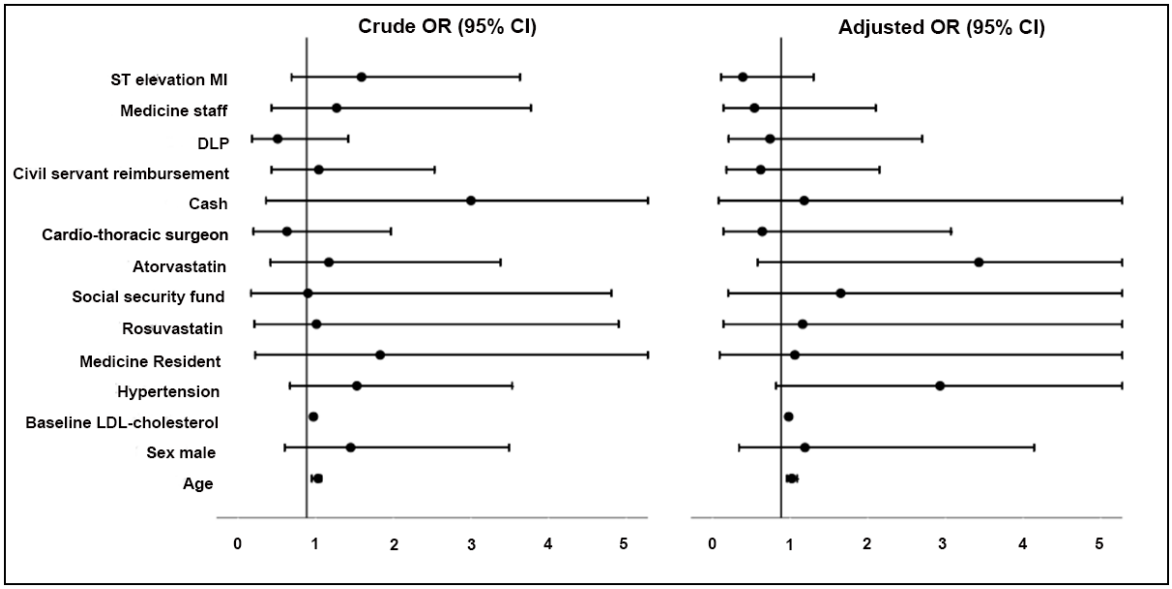

Fig. 2 Odds ratio and confidence interval between multiple factors and LDL-C goal achievement.

type of myocardial infarction (STEMI 63.2% and 51.9%), type of statins (simvastatin 71.1% and 74.1%, atorvastatin 21.1% and 18.5%, rosuvastatin 7.2% and 7.4%).

Interestingly, baseline LDL-C after admission was the only one of the characteristics of the patients between achieved and non-achieved LDL-C goal groups that was different. Non-achieved LDL-C goal group had a significantly higher level of LDL-C than the achieved LDL-C goal group, 151.44$\pm$39.16 mg/dL and 120.19$\pm$33.58 mg/dL (p-value = 0.001).

Multiple logistic regression was used to test the relationship between multiple factors and LDL-C achievement; results are demonstrated in Fig. 2. LDL-C goal achievement was dependent on level of baseline LDL-C; multiple logistic regression analysis showed adjusted odds ratio of 0.98 (95% confidence interval 0.96 to 0.99; p = 0.001). LDL-C goal achievement did not depend on age, sex, concomitant disease, type of statins, type of reimbursement and follow-up specialist at OPD.

Discussion

Reduction of LDL-C can reduce cardiovascular disease and lead to reducing morbidity and mortality from cardiovascular disease. Nevertheless, many recent studies showed benefit from LDL-C reduction for secondary prevention in coronary heart disease; patients (less than 50% in clinical practice) could achieve LDL-C goal according to NCEP ATP III 2004.

It is interesting and challenging to study about LDL-C treatment in coronary heart disease patients in our institute, Siriraj Hospital, in order to find what percentages of our patients could achieve the goal of LDL-C.

In our retrospective study from medical records, we evaluated prevalence of LDL-C goal attainment after first event of post myocardial infarction; the patients received statin for standard lipid therapy, were discharged from hospital and received regular follow-up for medicine OPD at Siriraj Hospital between 2007 and 2009, according to the Adult Treatment Panel III of the National Cholesterol Education Program 2004 (NCEP ATP III 2004) and ESC/EAS Guidelines for the management of dyslipidemia (2011) in order to find out what factors influenced LDL-C achievement.

Eight hundred and eighty-eight patients were diagnosed with myocardial infarction from 2007-2009. One hundred seventy-nine patients meet inclusion and exclusion criteria. We sourced patients from ICD-10 codes, therefore, we may have missed some patients that visited hospital at short-stay department but were not admitted.

The biggest problem of a retrospective study is lack of and/or incompleteness of data, a problem also found in the present study, inevitable since the authors would like to know about previous prevalence and practices of our institution.

Baseline LDL-C after admission in the non-achieved LDL-C goal group had higher than achieved LDL-C goal group. The authors found that a higher LDL-C level at baseline was a significant predictor of failure of goal attainment, similar to the PRIMULA-Thailand study[11], a retrospective cohort study at 5 main Thai teaching hospitals. In addition, similar results were observed in LDL-C goal achievement between our study and the PRIMULA-Thailand study of high risk group patients, 84.9% and 73.7%, respectively.

Large clinical studies in Asia, such as CEPHEUS Pan-Asian survey[13] and REALITY Asia study[12] revealed that the LDL-C goal attainment is around 48% and it is even lower at 38% in a very high risk population, such as those with diabetes and patients with established coronary artery disease. Comparison of the primary outcome, LDL-C goal attainment, with our study, showed the a higher proportion of post myocardial infarction patients of Siriraj Hospital could achieve LDL-C treatment goal according to NCEP ATP III 2004 (LDL-C < 100 mg/dL).

The proportion of our patients that achieved a goal of LDL-C less than 70 mg/dL was only 41.3%; this finding could be explained by the recommendation of lower LDL goal by ESC launched in 2011; but our retrospective was a review of the period 2007 to 2009.

From the present study ; baseline LDL is a strong predictor of failure to achieve LDL-C goal attainment, When physicians meet high baseline LDL-C patients, they must be aware that patients have high risk for failure LDL-C goal achievement therefore potent and high dose statin should be initiated before discharge. After discharge, adjustment of statin was not overlooked and other lipid-lowering agent should be unhesitatingly prescribed for combination therapy if LDL-C goal was not achieved. Advice was provided about life style modification and smoking cessation for further LDL-C and cardiovascular mortality/morbidity reduction beyond benefit from lipid lowering agent.

There are multiple limitations in the present study. It is a retrospective review from medical records. A significant portion of patients was excluded due to

incomplete medical records, being lost to follow-up, having no regular OPD visit, etc. The present study thus might not be able to present the whole practice in our institution.

Conclusion

Patients who were diagnosed as first event for myocardial infarction (STEMI and NSTEMI) admitted to Siriraj Hospital from 2007-2009, could achieve LDL-C goals, based on NCEP ATP III 2004 and ESC/EAS Guidelines for the management of dyslipidemia in 2011 were 84.9% and 41.3%, respectively. Higher LDL-C levels at baseline were a significant predictor of failure of goal attainment.

Potential conflicts of interest

None.

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การบรรลุเป้าหมายในการควบคุมระดับไขมัน LDL cholesterol ในผู้ป่วยกล้ามเนื้อหัวใจขาดเลือดที่ได้รับการรักษาด้วยยาลดไขมันที่ตึกผู้ป่วยนอกภาควิชาอายุรศาสตร์โรงพยาบาลศิริราช

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วัตถุประสงค์: โรคหัวใจและหลอดเลือด (coronary heart disease) เป็นโรคที่เป็นสาเหตุอันดับ 1 ของการเสียชีวิตของประชากรทั่วโลกและอันดับที่ 3 ในคนไทย ผู้ป่วยกลุ่มนี้เป็นกลุ่มที่มีความเสี่ยงสูง การใช้ยาในกลุ่ม statin จะสามารถลดอัตราการเสียชีวิตในผู้ป่วยกลุ่มนี้ได้ อย่างไรก็ตามใน clinical practice ยังพบว่ามีผู้ป่วยไม่ถึง 50% ที่สามารถลดระดับ LDL-cholesterol ได้ตามแนวทางการรักษาของ NCEP ATP III 2004 จึงเป็นที่น่าสนใจว่าในโรงพยาบาลศิริราชซึ่งเป็นโรงเรียนแพทย์มีศักยภาพของโรงพยาบาลในระดับ Tertiary care จะมีการดูแลรักษาผู้ป่วยที่มี coronary heart disease ควบคุมระดับของ LDL-C ได้ตามเป้าหมายของ NCEP ATP III 2004 เป็นสัดส่วนทั้งหมดเท่าไร

วัสดุและวิธีการ: เป็นการศึกษา Retrospective study จาก medical records ในผู้ป่วย Post 1st event of myocardial infarction (STEMI และ NSTEMI) อายุ 18-75 ปี ที่รับตัวไว้รักษาในโรงพยาบาลศิริราชตั้งแต่ปี พ.ศ. 2550-2552 ร่วมกับได้รับยาลดไขมันในกลุ่ม statin และสามารถมาตรวจติดตามการรักษาอย่างต่อเนื่องเป็นระยะเวลาอย่างน้อย 1 ปี ที่ตึกผู้ป่วยนอก หลังจำหน่ายออกจากโรงพยาบาลแสดงผลการ achieved LDL-cholesterol goal ของผู้ป่วยที่ได้รับการรักษาติดตามอาการที่ตึกผู้ป่วยนอก จนระดับไขมันอยู่ในเป้าหมายเทียบกับ จำนวนผู้ป่วยทั้งหมดในรูปร้อยละภายในระยะเวลา 1 ปีโดย LDL-cholesterol goal อ้างอิงตาม NCEP ATP III 2004 คือน้อยกว่า 100 mg/dL

ผลการศึกษา: จากผู้ป่วยทั้งหมด 888 ราย ที่รับตัวไว้รักษาใน ร.พ. ศิริราช ตั้งแต่ปี พ.ศ. 2550-2552 เหลือผู้ป่วยที่ผ่านการคัดเลือกตาม inclusion และ exclusion criteria จำนวน 179 ราย อายุเฉลี่ย 58.58±10.23 ปี เป็นเพศชาย 73.2% สิทธิการรักษาส่วนใหญ่ เบิกจ่ายจากต้นสังกัด (50%) พบว่าสามารถควบคุมระดับของ LDL-C ได้ตามเป้าหมายของ NCEP ATP III 2004 เท่ากับ 84.9% ยาลดไขมันที่ใช้มากที่สุดคือ Simvastatin 68.2% รองลงมาคือ Atorvastatin 22.5% และ Rosuvastatin 9.3% ตามลำดับ โดยพบว่า LDL cholesterol goal attainment ไม่ขึ้นกับชนิดของยา statin, สิทธิการรักษาและแพทย์ที่ดูแลที่ตึกผู้ป่วยนอก

สรุป: ผู้ป่วยในกลุ่ม post 1st event of myocardial infarction (STEMI และ NSTEMI) ที่รับตัวไว้รักษาใน ร.พ. ศิริราช ตั้งแต่ปี พ.ศ. 2550-2552 สามารถบรรลุเป้าหมายระดับ LDL-cholesterol ตาม NCEP ATP III 2004 ได้ 84.9%