Diagnosis of Primary Hyperlipidemia based on cost benefit

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Cost-effectiveness

The benefits and cost-effectiveness ratios associated with the treatment of hyperlipidemia are calculated by means of the Cardiovascular Disease Life Expectancy Model.

The model estimates the reduction in cardiovascular events and the increased life expectancy or years of life saved (YOLS) after risk factor modification.

The incremental cost-effectiveness ratios incorporate

- the direct costs of treatment
- the cost savings of cardiovascular events averted

Cost-effectiveness

Cardiovascular Disease Life Expectancy Model

It can be applied to groups of patients

- free of diagnosed cardiovascular disease (primary prevention)
- those with prior coronary disease or stroke (secondary prevention).

The yearly transition probabilities to fatal events such as coronary death, stroke death, and non-cardiovascular death are estimated from multivariate risk equations developed from random sample.

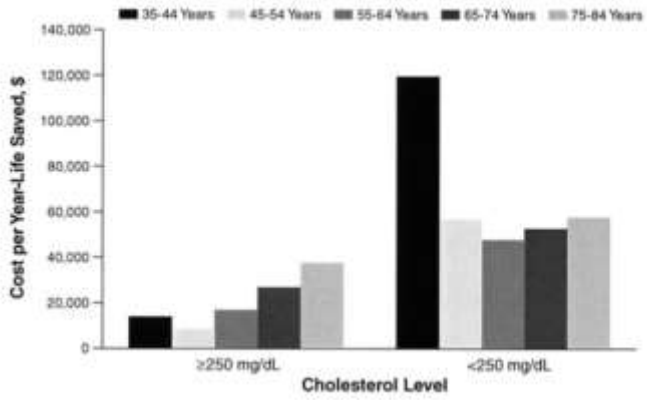
The cardiovascular risk factors used by the model include age, sex, mean blood pressure, the natural logarithm of the LDL/HDL cholesterol ratio, the presence of cigarette

Benefits of Lipid Therapy Among Diabetic and Non-diabetic Patients With and Without Known Cardiovascular Disease

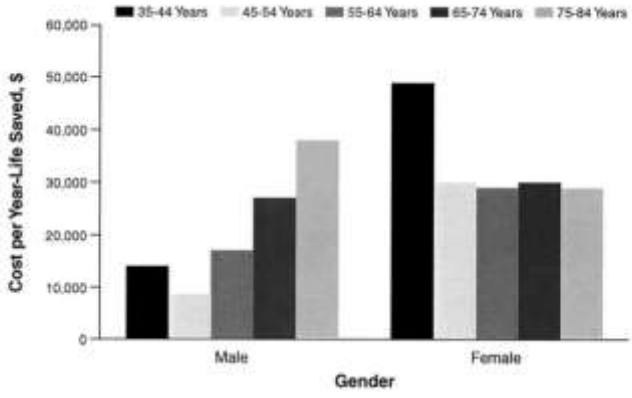
				Years of Life Saved							
				Diabetics				Nondiabetics			
Disease Status	Sex	Baseline LDL in mmol/L (mg/dL)†	LDL/HDL* Ratio	40	50	60	70	40	50	60	70
Known CVD	Male	5.46 (211)	5	5.3	3.93	2.35	0.78	3.92	3.17	2.11	0.77
		4.34 (168)	3.9	5.03	3.85	2.38	0.81	3.26	2.68	1.82	0.68
		3.85 (149)	3.5	4.81	3.74	2.35	0.81	2.92	2.41	1.65	0.62
	Female	5.46 (211)	5	4.58	3.63	2.35	0.83	2.7	2.27	1.59	0.62
		4.34 (168)	3.9	3.97	3.21	2.13	0.77	2.12	1.79	1.27	0.5
		3.85 (149)	3.5	3.63	2.96	1.98	0.73	1.84	1.56	1.11	0.44
No CVD	Male	5.46 (211)	5	5.4	4.12	2.53	0.79	2.5	2.02	1.32	0.44
		4.34 (168)	3.9	4.84	3.8	2.38	0.74	1.84	1.51	1	0.34
		3.85 (149)	3.5	4.47	3.54	2.24	0.69	1.55	1.28	0.85	0.29
	Female	5.46 (211)	5	2.78	2.33	1.58	0.54	1.2	1.03	0.73	0.26
		4.34 (168)	3.9	2.14	1.79	1.21	0.42	0.85	0.73	0.51	0.19
		3.85 (149)	3.5	1.84	1.53	1.04	0.37	0.71	0.6	0.43	0.16

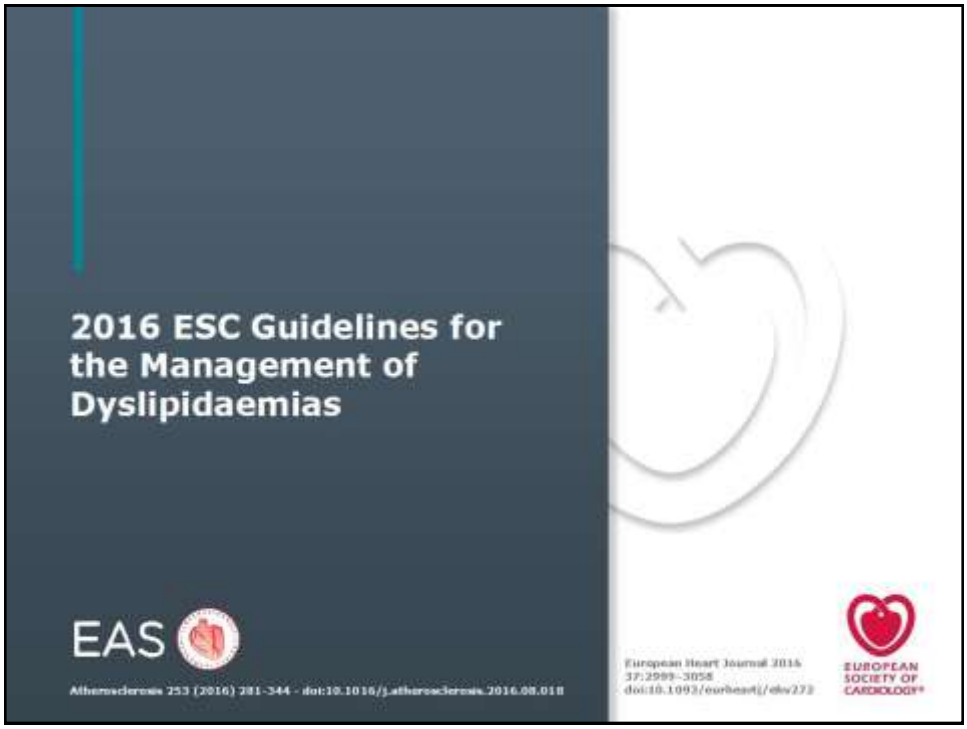
Grover et al., *Circulation*. 2000;102:722-727.

Cost-effectiveness of treatment by statin



Gender effect on Cost-effectiveness of treatment by statin (TC >250 mg/dl)




2016 ESC Guidelines for the Management of Dyslipidaemias
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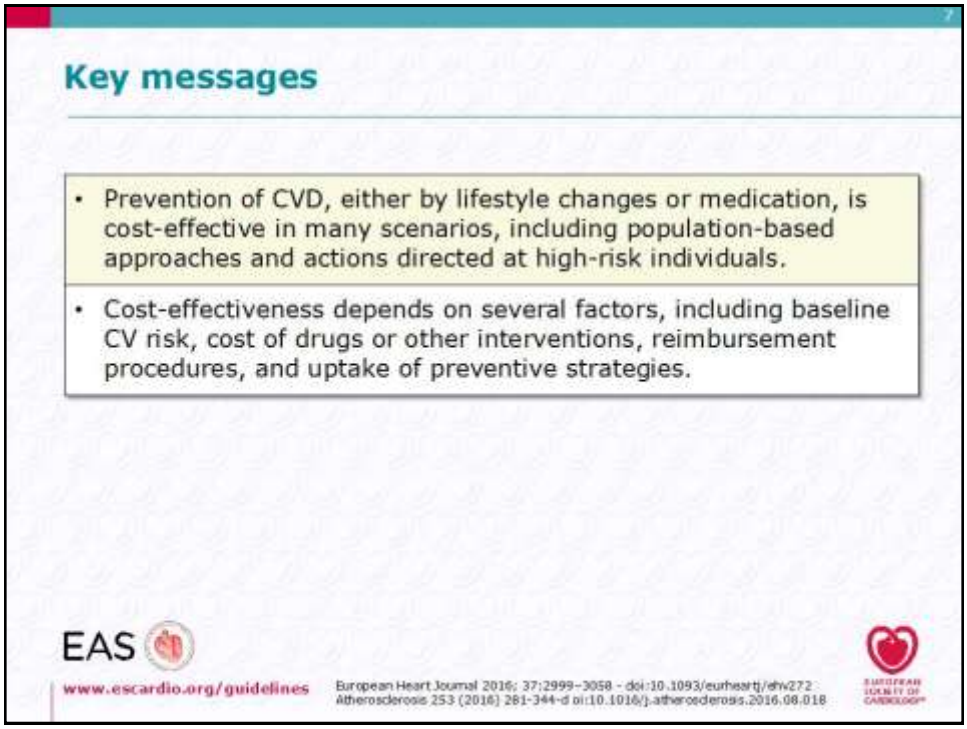
Key messages
• Prevention of CVD, either by lifestyle changes or medication, is cost-effective in many scenarios, including population-based approaches and actions directed at high-risk individuals.
• Cost-effectiveness depends on several factors, including baseline CV risk, cost of drugs or other interventions, reimbursement procedures, and uptake of preventive strategies.
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AACE 2017 Guidelines

AMERICAN ASSOCIATION OF CLINICAL ENDOCRINOLOGISTS AND AMERICAN COLLEGE OF ENDOCRINOLOGY GUIDELINES FOR MANAGEMENT OF DYSLIPIDEMIA AND PREVENTION OF CARDIOVASCULAR DISEASE

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HOW SHOULD INDIVIDUALS BE SCREENED FOR THE DETECTION OF DYSLIPIDEMIA?

Global Risk Assessment

Identify risk factors that enable personalized and optimal therapy for dyslipidemia

- The 10-year risk of a coronary event (high, intermediate, or low) should be determined by detailed assessment using one or more of the following tools
  - Framingham Risk Assessment Tool
  - Multi-Ethnic Study of Atherosclerosis (MESA) 10-year ASCVD Risk with Coronary Artery Calci cation Calculator
  - Reynolds Risk Score
  - United Kingdom Prospective Diabetes Study (UKPDS) risk engine

HOW SHOULD INDIVIDUALS BE SCREENED FOR THE DETECTION OF DYSLIPIDEMIA?

Screening

Familial Hypercholesterolemia

- Family history of:
  - Premature ASCVD (MI or sudden death before age 55 years in father or other male 1st degree relative, or before age 65 years in mother or other female 1st -degree relative) or
  - Elevated cholesterol levels (total, non-HDL and/ or LDL) consistent with FH

Young Adults (Men Aged 20-45 Years, Women Aged 20-55 Years)

- Evaluate all adults 20 years of age or older for dyslipidemia every 5 years as part of a global risk assessment

HOW SHOULD INDIVIDUALS BE SCREENED FOR THE DETECTION OF DYSLIPIDEMIA?

Screening

Middle-Aged Adults (Men Aged 45-65 Years, Women Aged 55-65 Years)

- In the absence of ASCVD risk factors, screen middle-aged individuals for dyslipidemia at least once every 1 to 2 years.
- More frequent lipid testing is recommended when multiple global ASCVD risk factors are present
- The frequency of lipid testing should be based on individual clinical circumstances and the clinician's best judgment

Older Adults (Older Than 65 Years)

- Annually screen older adults with 0 to 1 ASCVD risk factor for dyslipidemia
- Older adults should undergo lipid assessment if they have multiple ASCVD global risk factors (i.e., other than age)

HOW SHOULD INDIVIDUALS BE SCREENED FOR THE DETECTION OF DYSLIPIDEMIA?

Screening

Children and Adolescents

- In children at risk for FH (e.g., family history of premature cardiovascular disease or elevated cholesterol), screening should be at 3 years of age, again between ages 9 and 11, and again at age 18
- Screen adolescents older than 16 years every 5 years or more frequently if they have ASCVD risk factors, have overweight or obesity, have other elements of the insulin resistance syndrome, or have a family history of premature ASCVD

WHICH SCREENING TESTS ARE RECOMMENDED FOR THE DETECTION OF CARDIOVASCULAR RISK?

Fasting Lipid Profile

- It should include total cholesterol, LDL-C, TG, and non-HDL-C
- Lipids, including TG, can be measured in the non-fasting state if fasting determinations are impractical

LDL

- LDL-C should be directly measured in certain high-risk individuals such as those with fasting TG levels greater than 250 mg/dL or those with diabetes or known vascular disease

HDL-C

- Measurement of HDL-C should be included in screening tests for dyslipidemia

TG

- moderate elevations (≥150 mg/dL) may identify individuals at risk for the insulin resistance syndrome
- levels ≥200 mg/dL may identify individuals at substantially increased ASCVD risk

Lipid Goals

Lipid Goals for Patients at Risk for Atherosclerotic Cardiovascular Disease[a]	
Lipid parameter	**Goal (mg/dL)**
TC	<200
LDL-C	<130 (low risk) <100 (moderate risk) <100 (high risk) <70 (very high risk) <55 (extreme risk)
Non-HDL-C	30 above LDL-C goal; 25 above LDL-C goal (extreme risk patients)
TG	<150
Apo B	<90 (patients at high risk of ASCVD, including those with diabetes) <80 (patients at very high risk with established ASCVD or diabetes plus ≥1 additional risk factor) <70 (patients at extreme risk)

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Dutch Lipid Clinic Network diagnostic criteria for familial hypercholesterolaemia (1)

Criteria	Points
1) Family history	
First-degree relative with known premature (men: <55 years; women: <60 years) coronary or vascular disease, or	
First-degree relative with known LDL-C above the 95th percentile.	1
First-degree relative with tendinous xanthomata and/or arcus cornealis, or	
children <18 years of age with LDL-C above the 95th percentile.	2
2) Clinical history	
Patient with premature (men: <55 years; women: <60 years) coronary artery disease	2
Patient with premature (men: <55 years; women: <60 years) cerebral or peripheral vascular disease	1
3) Physical examination	
Tendinous xanthomata	6
Arcus cornealis before age 45 years	4

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Dutch Lipid Clinic Network diagnostic criteria for familial hypercholesterolaemia (2)

Criteria	Points
4) LDL-C levels	
LDL-C ≥ 8.5 mmol/L (325 mg/dL)	8
LDL-C 6.5–8.4 mmol/L (251–325 mg/dL)	5
LDL-C 5.0–6.4 mmol/L (191–250 mg/dL)	3
LDL-C 4.0–4.9 mmol/L (155–190 mg/dL)	1
5) DNA analysis	
Functional mutation in the LDLR, apoB or PCSK9 gene	8

Choose only one score per group, the highest applicable Diagnosis (diagnosis is based on the total number of points obtained)

A 'definite' FH diagnosis requires >8 points

A 'probable' FH diagnosis requires 6–8 points

A 'possible' FH diagnosis requires 3–5 points

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Points to remember

Cost-effective strategies should always be adopted by societies to maximize the benefits of the limited resourses

Lipids and cardiovascular risk constitute a continuum with no cut clear cutoff value

Cost-effectiveness can be measured by Years-Life Saved (or Quality Life saved)

Screening and diagnosis of different lipid abnormalities are based on cost-effectiveness

Lipid goals are also based on the effect of drugs on YLS or QLS

Thank You