

Health-related quality of life with coronary heart disease prevention and treatment

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Abstract

Estimating the net benefits of dyslipidemia treatment is limited by the lack of comprehensive and standardized information on the preference for dyslipidemia and coronary heart disease. In a hospital-based study, we measured the health-related quality of life (HRQOL) of healthy participants without dyslipidemia ($n = 307$) and with dyslipidemia ($n = 251$) and patients with coronary heart disease ($n = 320$). Compared to the healthy participants without dyslipidemia, those with dyslipidemia reported lower adjusted mean scores on the Rating Scale (-2.8 points, $P = 0.02$) and the SF-36 General Health Scale (-3.3 points, $P = 0.02$). No differences were observed on the Time Trade-off and the Standard Gamble Scales. Coronary patients reported lower scores on all preference scales and most SF-36 scales. The causes of the small but real reduction in HRQOL reported by dyslipidemic individuals should be identified in order to optimize the net benefits of lipid therapy. © 2001 Elsevier Science Inc. All rights reserved.

1. Introduction

Several pharmacoeconomic studies have estimated the cost-effectiveness of dyslipidemia treatment to prevent coronary heart disease (CHD) [1–10]. However, these analyses were limited by the lack of comprehensive and standardized information on the preference-based health-related quality of life (HRQOL) for CHD and dyslipidemia.

Dyslipidemia may be associated with lower HRQOL due to rigid dietary prescriptions, side effects of medications, and the need for regular medical follow-up [11]. Several other aspects of the diagnosis and treatment of dyslipidemia may cause adverse psychological responses [12]. For exam-

ple, people may confuse a risk factor with actual disease and consider themselves as unhealthy (labeling effect). The inherent biologic variability of the blood cholesterol level may be a source of frustration and misunderstanding for patients. In addition, the dietary efforts to reduce the cholesterol level are not uniformly effective and may cause disappointment, confusion, and a sense of failure.

Few studies have investigated the impact of detecting and treating dyslipidemia on HRQOL. Forrow *et al.* conducted a prospective study on 1052 voluntary participants involved in a cholesterol screening program and found that people classified as being at high risk of CHD had increased worry and concern about health [13]. Havas *et al.* could not identify a negative labeling effect as a result of a community-based screening, education, and referral programs [14]. However, their negative results were attributable to the positive and supportive approach taken by the research team. In another screening study by Irvine and Logan [15], no psychological effects of screening were observed but approximately half of the participants did not believe they actually had hypercholesterolemia despite being told otherwise. In the Beaver Dam Health Outcomes Study, no significant im-

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pairment was observed when comparing the HRQOL of participants taking dyslipidemia medication ($n = 78$) with the other participants [16]. However, this study was limited by the small number of dyslipidemia subjects.

This study was therefore conducted to measure, using a standardized methodology and a large sample size, the preference of asymptomatic individuals with and without dyslipidemia and symptomatic patients with CHD for their current health. We have chosen a patient-center preference assessment because people experiencing the health states may produce more accurate appreciation of their conditions and are more likely to capture the possible subtle effect of dyslipidemia on HRQOL [17].

2. Methodology

2.1. Study population

We interviewed consecutive outpatients attending cardiology, internal medicine, lipid, and hypertension clinics, accompanying friends and family members of consecutive patients undergoing day surgery, and hospital workers in two university teaching hospitals. Approvals from the Institutional Review Boards were obtained and participants signed an informed consent. Participants were also offered the possibility of winning cash prizes in a lottery to encourage study participation.

Subjects were classified into one of three study groups: asymptomatic without dyslipidemia (healthy), asymptomatic with dyslipidemia (dyslipidemia), and coronary heart disease (coronary). Subjects were classified in the coronary group if a diagnosis of angina, myocardial infarction or congestive heart failure was reported on their medical chart. The presence of a prescription for nitroglycerin or a loop diuretic was necessary to document angina or congestive heart failure, respectively. Subjects without CHD were classified in the dyslipidemia group if they reported following a diet prescribed by a physician or dietician or taking medication for dyslipidemia. Therefore, to be classified in the dyslipidemia group, participants had to report having been told by a physician that their serum cholesterol was high and following a low-fat and low-cholesterol diet or taking lipid-lowering medication. We did not measure serum lipids. Subjects without CHD or dyslipidemia were classified in the healthy group.

We included men and women between 30 and 74 years of age. To decrease the likelihood of recruiting individuals reacting temporarily to a newly diagnosed condition, we included only coronary patients diagnosed for at least 6 months and participants with dyslipidemia on treatment for at least 1 month. To control for the effect of comorbid conditions, we excluded pregnant women, all subjects with temporary illnesses such as a cold, and healthy and dyslipidemia subjects currently trying to quit smoking. Subjects were asked if they had any other health problem confirmed by a physician. For those reporting other health problems,

health problems were identified by reading a list including the most prevalent health conditions reported in the Beaver Dam study [18] and by asking them to report any other health problem not included in the list. We excluded healthy and dyslipidemia subjects who reported symptoms from a comorbid condition in the past 4 weeks. We also asked Coronary patients which health problem had most affected their quality of life in the past 4 weeks. They were eligible for participation only if they answered “none” (meaning they had not been bothered by any health problem), “heart disease,” or “a CHD risk factor” such as hypertension or dyslipidemia.

We also used two comorbidity indexes. The first index, the comorbidity index, consisted of adding the number of comorbid conditions reported by each participant [19]. In the second index, the weighted comorbidity index, each comorbid condition untreated with prescribed medication was assigned a weight of 1, while those treated with prescribed medication(s) were assigned a weight of 2. For each participant, the weighted comorbidity index score was equal to the sum of the weighted comorbid conditions. For the healthy and the dyslipidemia participants, the weighted comorbidity index was equivalent to the Cumulative Illness Rating Scale (CIRS) [20]. In contrast to the CIRS, our comorbidity indexes were based on information collected directly from participants rather than by chart review.

2.2. Outcome measures

During the interviews, French or English questionnaires were administered in the following order: (1) SF-36 Health Survey (SF-36); (2) medical history; (3) preference assessments; and (4) sociodemographic information. Items 2 and 3 were administered in a face-to-face interview by one of four trained interviewers and items 1 and 4 were self-administered.

The medical history included the Specific Activity Scale (SAS) which was used to classify coronary participants by their degree of physical disability [21,22]. Participants in class I could perform activities requiring ≥ 7 METS = metabolic equivalents of oxygen consumption (jogging, basketball) while those in class IV could only complete activities requiring < 2 METS (dressing) and had symptoms at rest.

The SF-36 evaluates eight HRQOL domains in the past month [23]. Scores range from 0 to 100, where 100 represented the best possible health. We also computed two summary scores: the Mental Component Summary and the Physical Component Summary. They have a standardized score of 50 and a standard deviation of 10 relative to the general U.S. population [24].

As described elsewhere [25,26], the participants evaluated their preference for their present health using the Rating Scale (RS), the Time Trade-Off (TTO) and the Standard Gamble (SG).

Briefly, the RS was administered using a feeling thermometer [27]. Perfect health and immediate death were placed by the interviewer at the top (score = 100) and the

bottom (score = 0) of the thermometer respectively. Participants placed their present health on the thermometer. Their preference for their present health was determined by the distance between immediate death and their present health.

For the SG, the participants were offered two choices: their present health for the rest of their life (choice A) or a lottery with a probability P of perfect health for the rest of their life and a probability $(1-P)$ of an immediate death (choice B). The probability P was changed, using a two-step ping-pong approach until the participants were indifferent between the two choices. At the indifference point, the utility of their present health was equal to P . We used a visual aid where each 1% probability of an immediate death was represented by shading one of 100 faces [28].

For the TTO, the participants were given the choice between living in perfect health for time t or living with their present health for time x , where $t < x$, after which they would die without pain. Time t was varied, using a three-step ping-pong approach, until the participant became indifferent between the two choices. At the indifference point, the value of their present health was equal to $[(t/x) \times 100]$. We used a visual aid [27] and time x was defined based on the Canadian age and gender specific mean life expectancy for the healthy and the dyslipidemia participants. A shorter duration was used for coronary participants and varied according to the severity of CHD.

2.3. Statistical analysis

Although the raw values from the preference measures, particularly the TTO and the SG scores, were skewed toward lower values, the residuals from ordinary least squares models were roughly normally distributed. Nevertheless, we compared coefficient estimates and 95% CI given by the ordinary least squares models with those obtained from robust and monotonic regressions (using the Visual Statistics System statistical package), which produce coefficients that are less sensitive to outliers and nonnormal error distribu-

tion. For each preference measure and the SF-36 General Health scale, the tested models produced nearly identical regression coefficients and 95% CI for age, gender, comorbidity and each study group. For this reason, we reported only ordinary least squares results.

Several least squares multivariate linear models were created to evaluate the preference and the SF-36 scores. In all models, the preferences or SF-36 scores decreased significantly with additional comorbid conditions. Adjusting for gender, age, body mass index, comorbidity index or weighted comorbidity index, and adding an interaction term between the study group and the comorbidity index or the weighted comorbidity index did not substantially change the results. We, therefore, used the ordinary least squares models and reported the mean score (95% CI) of each study group for participants reporting 1.3 comorbid conditions, which represents the mean number of comorbid conditions for the entire sample. The chi-square and Wilcoxon rank sum tests were used to assess the statistical significance of differences between proportions and distributions of HRQOL scores, respectively.

Results

We approached 2786 individuals. A total of 781 refused or were unable to participate and 1127 did not comply with the eligibility criteria due to: language difficulties (146), temporary illness (172), pregnancy (4), trying to quit smoking (81), congestive heart failure without a loop diuretic (2), coronary diseases < 6 months (25), dyslipidemia < 1 month (3), age outside the appropriate range (106) and/or subjects with significant comorbid conditions (717). A total of 878 interviews were performed. Among those who refused to participate, a total of 323 individuals had completed a short screening questionnaire and were eligible for recruitment. Participants ($n = 878$) and eligible non-participants ($n = 323$) were similar in terms of age, gender and

Table 1
Characteristics of the participants^a

Characteristic	Healthy ($n = 307$)	Dyslipidemia ($n = 251$)	Coronary ($n = 320$)
Age (yr)	48 ± 12	55 ± 12	62 ± 9
Gender: n (%) male	100 (33)	149 (59)	233 (73)
Comorbidity status: n (%) ^b			
No other health problems	168 (55)	103 (41)	43 (13)
Asymptomatic health problems	139 (45)	148 (59)	201 (63)
Symptomatic health problems	NA ^c	NA ^c	60 (22)
Number of comorbid conditions	0.7 ± 1.0	1.0 ± 1.0	2.3 ± 1.8
Number of comorbid conditions treated with prescribed medication(s)	0.3 ± 0.6	0.5 ± 0.7	1.3 ± 1.3
Body mass index (kg/m ²)	25.2 ± 4.2	25.9 ± 3.5	26.9 ± 3.9
Response rate			
Rating Scale	300 (98)	245 (98)	300 (94)
Time Trade-off	283 (92)	230 (92)	285 (89)
Standard gamble	297 (97)	229 (91)	282 (88)

^aPlus-minus values are means ± SD.

^bPercent may not add up to 100% due to rounding process or missing observations.

^cNot applicable. Subjects with symptomatic comorbid conditions were excluded from these study groups.

number of comorbid conditions. We evaluated the reliability and validity of each preference measure [25]. They were consistent with findings reported by others; suggesting that preferences were properly measured.

Compared to the healthy group, participants in the dyslipidemia and the coronary groups were more likely to be older, male and reported more comorbid conditions (Table 1). In the coronary group, 115 participants were diagnosed with angina, 84 had a previous myocardial infarction, 85 had angina and a previous myocardial infarction and 36 had congestive heart failure. For each preference measure, the response rate varied from 88% to 98% across the study groups. Because the study sample was large and the response rate was high, we did not substitute for missing data and did not exclude participants with incomplete preference-based measures.

3.1. Preference-based health-related quality of life

On the RS, the median scores of the healthy and dyslipidemia groups were equal to 95.0 and 90.0, respectively (Fig. 1). The distributions of the TTO and SG scores were highly skewed, particularly for the healthy and the dyslipidemia groups.

The mean RS score, adjusted for the number of comorbid conditions, of the dyslipidemia group was lower than that of the healthy group with a difference of -2.6 units ($P = 0.03$) (Table 2). Using the weighted comorbidity index did not substantially change the results (-2.5 units, $P = 0.04$). A similar difference (-2.5 points, $P = 0.05$) was observed when the mean scores were adjusted using the comorbidity index as well as the participant's age and gender. No differences were noticed on the TTO and SG scales. When compared to the healthy participants, the coronary participants reported lower adjusted mean scores on each preference scale.

3.2. Descriptive health-related quality of life

After adjusting for the number of comorbid conditions (comorbidity index), the healthy and the dyslipidemia groups reported very similar HRQOL on all SF-36 scales with the exception of the General Health scale (Table 3). The mean General Health score of the dyslipidemia group was -3.1 units ($P = 0.03$) lower than the healthy group. Using the weighted comorbidity index did not substantially change the results (-2.9 units, $P = 0.04$). The addition of participants' age and gender did not change the results (difference: -2.9 points, $P = 0.05$). Compared to the healthy group, the adjusted mean scores of the coronary group were lower on all scales with the exception of the Bodily Pain, Mental Health and the Mental Component Summary scales.

3.3. Secondary analyses

We compared healthy participants reporting no health problems at all to dyslipidemia participants reporting no health problems other than dyslipidemia (Table 4). As expected, participants in this subsample reported slightly better health than participants from the entire sample. The dif-

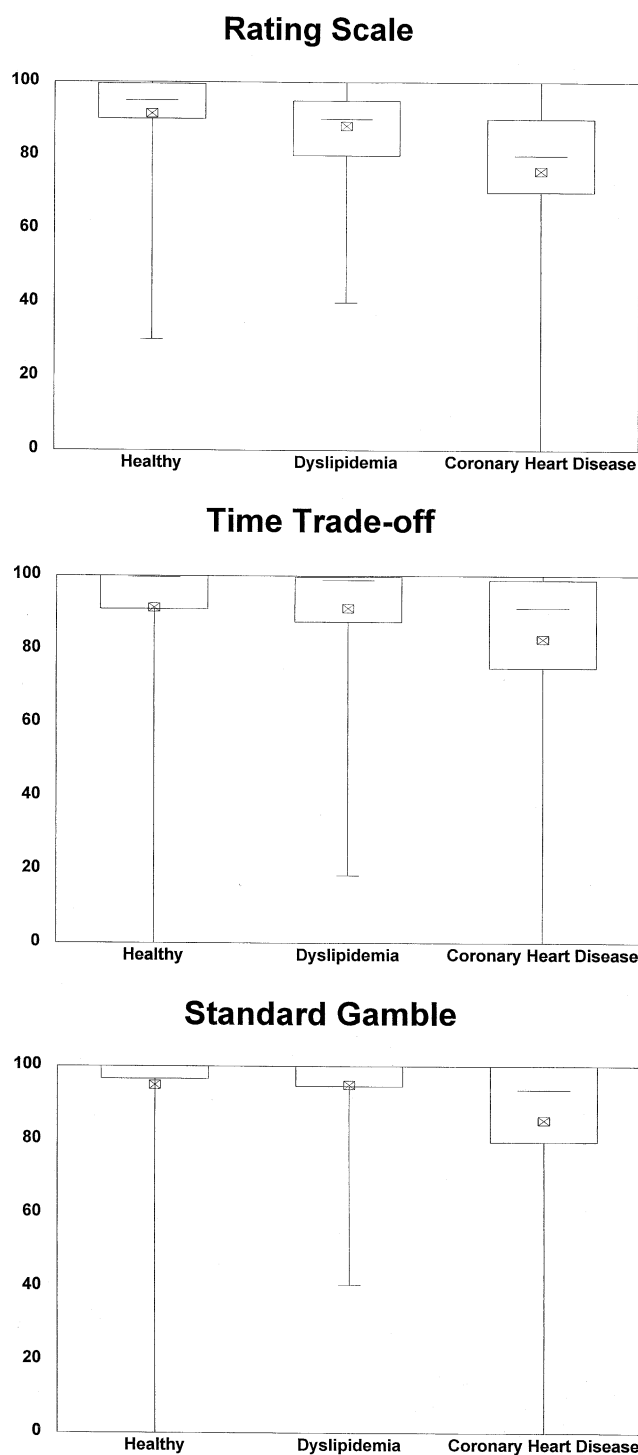


Fig. 1. Distribution of preference scores by study group. The bottom and top edges of the box are located at the sample 25th and 75th percentiles. The center horizontal line is drawn at the sample median. The vertical lines outside the box extend to the smallest and largest observations. The squared X represent the unadjusted mean scores.

ferences between the mean scores of the healthy and the dyslipidemia groups were even larger. When compared to the healthy group, the mean scores from the dyslipidemia group were 5.1 units ($P = 0.004$) and 4.0 units ($P = 0.003$)

Table 2
Mean (95% confidence interval) preference scores adjusted for the number of comorbid conditions reported by the participants

	Healthy (n = 307)	Dyslipidemia (n = 251)	Coronary (n = 320)
Rating Scale	89.8 (88.1, 91.4)	87.2 ^a (85.4, 89.0)	78.2 ^a (76.5, 79.9)
Time Trade-off	89.7 (87.4, 92.0)	90.1 (87.6, 92.6)	85.2 ^a (82.9, 87.6)
Standard Gamble	94.0 (92.3, 95.8)	94.5 (92.5, 96.4)	86.7 ^a (84.8, 88.5)

^aTwo-tailed P-value less than 0.05 when compared to the healthy group (analysis of variance).

lower on the SF-36 General Health scale and the RS, respectively. The mean scores did not vary significantly on the TTO and the SG scales. Adjusting for age and gender did not substantially change the results. We also used non-parametric test to compare the distribution of scores from the healthy and the dyslipidemia groups. Participants in the dyslipidemia group reported lower scores compared to the healthy group on the SF-36 General Health scale (Wilcoxon rank sum test; $P = 0.008$), the RS (Wilcoxon rank sum test; $P = 0.0008$) and the TTO (Wilcoxon rank sum test; $P = 0.002$). No difference was detected on the SG scale (Wilcoxon rank sum test; $P = 0.20$).

To support the hypothesis that the HRQOL impairment observed among dyslipidemia participants might be attributed to a labeling effect, we asked participants to guess how much their blood cholesterol was elevated and assessed the relationship between their anticipated cholesterol level and their preference and HRQOL. Among the participants in the dyslipidemia group, 2%, 15%, 51% and 29% predicted their cholesterol to be extremely elevated, very elevated, slightly elevated or normal, respectively. The corresponding proportions in the healthy group were significantly different ($P = 0.001$) and equal to 0%, 2%, 13% and 82%, respectively. As reported in Table 5, the SF-36 General Health, the RS, the TTO and the SG adjusted mean scores tended to decline among participants expecting their cholesterol level to be more elevated, particularly among those who anticipated their cholesterol to be highly or extremely elevated.

We also asked each dyslipidemia participant how long ago they were first told their blood cholesterol was elevated.

The mean and median time from diagnosis was equal to 5 years ($SD \pm 5$ years) and 3 years, respectively. When entered as a continuous variable in the multivariate linear models, time did not explain a statistically significant proportion of the variance of the SF-36 General Health and the preference measures. However, participants diagnosed more recently (2–52 weeks) reported lower scores than those diagnosed for more than 1 year. The trend was consistent across the SF-36 General Health scale, TTO and SG but was not statistically significant as seen by the overlapping of the confidence intervals. These results may suggest that the HRQOL after the diagnosis of dyslipidemia may improve over time.

One hundred and eight (108) dyslipidemia participants reported taking lipid-lowering drugs. The most often reported drugs were the 3-hydroxy-3-methylgluteryl (HMG)-CoA reductase inhibitors or statins (60%), the fibrates (27%), the niacin derivatives (6%) and the bile acid sequestrants (6%). As reported in Table 5, we observed no HRQOL differences between the dyslipidemia participants treated with diet only and those who reported taking lipid-lowering drug(s). Additional adjustment for the time from diagnosis did not substantially change the results.

4. Discussion

In this study asymptomatic participants who declared having high blood cholesterol confirmed by a physician and receiving cholesterol-lowering treatment [diet with or without lipid-lowering drug(s)] reported a small reduction in HRQOL on the SF-36 General Health scale and the RS, when compared to a similar group of asymptomatic participants without dyslipidemia and who were not treated for their cholesterol. No significant differences were observed on the TTO and SG. These results may indicate that asymptomatic people diagnosed and treated for dyslipidemia may not perceive themselves as being as healthy as those not reporting dyslipidemia treatment. However, they are not more willing to sacrifice a proportion of their life expectancy or to take an immediate risk of death to avoid their present health. The etiology of this reduced HRQOL cannot be identified in a cross-sectional study and may be due to co-

Table 3
Mean (95% confidence interval) SF-36 scores adjusted for the number of comorbid conditions reported by the participants

	Healthy (n = 307)	Dyslipidemia (n = 251)	Coronary (n = 320)
General Health	80.9 (78.9, 82.8)	77.8 ^a (75.7, 79.9)	68.5 ^a (66.6, 70.5)
Physical Functioning	89.1 (87.0, 91.2)	90.6 (88.4, 92.9)	75.0 ^a (72.8, 77.1)
Role-Physical	91.1 (88.1, 94.2)	94.1 (90.8, 97.4)	74.5 ^a (71.4, 77.7)
Role-Emotional	88.5 (85.2, 91.8)	91.2 (87.6, 94.7)	81.6 ^a (78.2, 85.0)
Social Functioning	90.4 (88.4, 92.3)	90.8 (88.7, 92.9)	86.2 ^a (84.2, 88.2)
Bodily Pain	72.3 (69.3, 75.3)	74.6 (71.4, 77.8)	70.4 (67.4, 73.5)
Vitality	72.3 (70.3, 74.2)	71.2 (69.1, 73.3)	65.3 ^a (63.3, 67.3)
Mental Health	78.6 (76.8, 80.3)	78.9 (77.1, 80.8)	77.6 (75.8, 79.3)
Physical Component Summary	51.8 (50.9, 52.7)	52.1 (51.1, 53.1)	46.1 ^a (45.2, 47.0)
Mental Component Summary	53.3 (52.3, 54.2)	53.3 (52.3, 54.4)	53.0 (52.0, 54.0)

^a Two-tailed P-value less than 0.05 when compared to the healthy group (analysis of variance).

Table 4

Mean (95% confidence interval) and median (25th percentile, 75th percentile) scores from participants reporting no comorbid conditions

	Healthy (<i>n</i> = 168)		Dyslipidemia (<i>n</i> = 103)	
	Mean (95% CI)	Median (25th, 75th)	Mean (95% CI)	Median (25th, 75th)
Rating Scale	93.8 (92.1, 95.4)	95.0 (90.0, 100.0)	89.8 ^a (87.7, 91.9)	92.0 ^b (85.0, 97.0)
Time Trade-off	92.4 (89.5, 95.4)	99.9 (95.3, 100.0)	93.8 (90.2, 97.5)	99.4 ^b (91.7, 100.0)
Standard Gamble	96.8 (95.1, 98.4)	100.0 (98.5, 100.0)	95.8 (93.7, 97.9)	100.0 (97.5, 100.0)
SF-36 General Health	85.6 (83.5, 87.7)	85.0 (80.0, 95.0)	80.5 ^a (77.8, 83.2)	85.0 ^b (70.0, 95.0)

^aTwo-tailed P value less than 0.05 when compared to the Healthy group (analysis of variance)^bWilcoxon rank sum test P value less than 0.05 when compared to the Healthy group

morbid conditions, dyslipidemia itself, awareness or treatments for dyslipidemia.

People with comorbid conditions have more frequent medical visits and are more likely to have their dyslipidemia detected and treated [29]. They may also report lower HRQOL. For this reason, we have used several methodological approaches to control for comorbidity. We excluded all healthy and dyslipidemia participants who reported any symptoms from a comorbid condition in the month preceding the interview. All group comparisons were adjusted for the number of comorbid conditions reported by participants. As an attempt to take into account the seriousness of the comorbid conditions, we also weighted each comorbid condition by its treatment status. We also compared healthy and dyslipidemia participants reporting no comorbid conditions and obtained very similar results. Finally, on the SF-36, the healthy and the dyslipidemia groups reported very similar scores on all scales, except the General Health

scale, suggesting that the control for comorbidity was adequate. If dyslipidemia participants had more important comorbidities, we would have seen differences on other SF-36 scales such as the Bodily Pain or the Physical Functioning scales. It is therefore unlikely that the observed differences between the healthy and the dyslipidemia groups could be attributed to confounding by the comorbidity.

However, by applying strict eligibility criteria and by recruiting participants at two university teaching hospitals, we may have reduced our ability to generalize the results to all dyslipidemia individuals, particularly those with symptomatic comorbidities, those treated by family physicians and those who discontinued medical supervision and treatment. In our sample, most dyslipidemia participants believed they had elevated cholesterol levels despite being treated and were continuing medical supervision more than 1 year after their diagnosis. Therefore, we may have overestimated the HRQOL impairment of dyslipidemia participants by select-

Table 5

Adjusted mean (95% confidence interval) and median (25th percentile, 75th percentile) scores of Dyslipidemia participants stratified by their anticipated cholesterol level, time from diagnosis of dyslipidemia and type of cholesterol treatment

	SF-36 General Health		Rating Scale		Time Trade-off		Standard Gamble	
	Mean (95% CI)	Median (25th, 75th)	Mean (95% CI)	Median (25th, 75th)	Mean (95% CI)	Median (25th, 75th)	Mean (95% CI)	Median (25th, 75th)
Anticipated cholesterol level ^a								
Normal (<i>n</i> = 71)	81.7 (78.5, 84.9)	85.0 (70.0, 95.0)	88.5 (86.0, 91.1)	91.0 (80.0, 96.0)	93.0 (89.6, 96.4)	99.2 (91.3, 100.0)	96.2 (93.8, 98.6)	100.0 (96.5, 100.0)
Slightly elevated (<i>n</i> = 126)	79.5 (77.1, 81.9)	80.0 (70.0, 90.0)	88.8 (86.9, 90.7)	90.0 (81.0, 96.0)	91.5 (89.1, 94.0)	98.8 (86.3, 99.6)	95.2 (93.4, 97.0)	100.0 (95.5, 100.0)
High / extremely elevated (<i>n</i> = 42)	74.7 (70.5, 78.9)	75.0 (65.0, 85.0)	84.6 (81.3, 87.9)	88.0 (80.0, 95.0)	89.1 (85.0, 93.2)	95.6 (86.3, 99.7)	92.3 (89.3, 95.3)	99.5 (89.5, 100.0)
Time from diagnosis								
2–52 weeks (<i>n</i> = 45)	75.6 (71.6, 79.6)	75.0 (65.0, 85.0)	87.4 (84.2, 90.7)	90.0 (80.0, 95.0)	86.3 (81.9, 90.6)	91.3 (81.7, 99.6)	92.3 (89.2, 95.5)	98.5 (89.5, 100.0)
53–104 weeks (<i>n</i> = 47)	78.2 (74.3, 82.2)	75.0 (70.0, 90.0)	86.5 (83.4, 89.6)	90.0 (80.0, 96.0)	92.9 (88.9, 96.9)	98.8 (90.0, 99.6)	95.9 (93.1, 98.7)	100.0 (99.0, 100.0)
105–156 weeks (<i>n</i> = 39)	83.0 (78.8, 87.4)	85.0 (75.0, 95.0)	89.6 (86.2, 92.9)	90.0 (85.0, 95.0)	91.8 (87.4, 96.2)	99.1 (89.0, 99.8)	93.7 (90.6, 96.9)	100.0 (95.5, 100.0)
>156 weeks (<i>n</i> = 120)	79.6 (77.2, 82.1)	80.0 (70.0, 90.0)	88.4 (86.5, 90.4)	90.0 (81.0, 96.0)	91.9 (89.3, 94.5)	99.2 (88.3, 100.0)	95.9 (94.0, 97.7)	100.0 (96.5, 100.0)
Type of cholesterol treatment								
Diets only (<i>n</i> = 143)	78.8 (76.5, 81.1)	80.0 (70.0, 90.0)	88.6 (86.8, 90.4)	90.0 (84.0, 96.0)	91.5 (89.2, 93.9)	99.2 (88.8, 99.7)	95.4 (93.7, 97.1)	100.0 (96.5, 100.0)
Diets / lipid lowering drug(s) (<i>n</i> = 108)	79.7 (77.1, 82.3)	80.0 (70.0, 90.0)	87.4 (85.3, 89.5)	90.0 (80.0, 95.0)	90.6 (87.8, 93.4)	97.5 (85.0, 99.6)	94.3 (92.3, 96.3)	100.0 (91.5, 100.0)

^aTwelve participants did not know the answer or refused to answer

ing a group of patients who were particularly concerned about their cholesterol problem and by interviewing most of them at the time of their physician visit, when they may be most concerned about their cholesterol problem. On the other hand, our dyslipidemia group clearly believed they had a cholesterol problem, as seen by their anticipated cholesterol level, which is representative of patients following active therapy.

We did not detect any difference between the healthy and the dyslipidemia groups on the TTO and the SG scales. These results are in accordance with previous reports documenting the poor sensitivity of these scaling techniques [30–33]. Why would people be ready to give up a portion of their life expectancy or take a risk of an immediate death to avoid an asymptomatic condition? Our results suggest that TTO and SG methodology may not be well adapted to the valuation of relatively good health states.

A 2 to 3 point reduction of the RS and the SF-36 General Health scale is small but measurable and comparable to the negative effects of other “relatively mild” chronic conditions such as thyroid disorder, sinusitis, migraine and glaucoma [18]. It is also comparable to hypertension, another risk factor for CHD [19,34]. From a public health point of view, it is also sufficient to reduce the cost-effectiveness of dyslipidemia treatment. The cost-effectiveness ratio is highly sensitive to the assumptions about the quality of life with dyslipidemia treatment because dyslipidemia treatment lasts for very long periods of time, and is experienced immediately, whereas CHD events occur in the future and are therefore discounted [11,35]. A reduction as small as 1 point was sufficient to make the cost-effectiveness ratio of cholesterol treatment less favorable.

In summary, this study suggests that in primary prevention, the diagnosis and treatment of dyslipidemia may be associated with a small but real reduction in HRQOL. Further research is required to confirm these results and elucidate the causes of this small negative impact on HRQOL in order to optimize the net benefits of lipid therapy.

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