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Longitudinal Hyperlipidemia Outcomes at Three Student-Run Free Clinic Sites

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Abstract

BACKGROUND AND OBJECTIVES: Student-run free clinics (SRFC) aim to improve health outcomes of vulnerable populations by providing care to those who have difficulty accessing the traditional health care safety net. Reducing low density lipoprotein (LDL) is known to improve health outcomes, yet uninsured patients remain especially susceptible to poor control. This study describes hyperlipidemia control over time among patients who received care at three University of California San Diego Student-Run Free Clinic Project (SRFCP) sites.

METHODS: The authors performed a retrospective review of clinic visits from August 2006–November 2010 from three sites of the SRFCP. Patients with a new diagnosis of hyperlipidemia, a baseline LDL level, and at least one follow-up LDL drawn between 6 weeks and 18 months were included in this study (n=96). Hyperlipidemia control was analyzed using descriptive statistics, Fisher's exact tests, paired *t* tests, and binary logistic regression.

RESULTS: At the last visit, 58.3% (56/96) of patients had achieved LDL goal. LDL decreased from a baseline mean of 135.8 mg/dL to 101.3mg/dL among the cohort. Statins were used in 86.5% (83/96) of patients. No significant differences were noted when stratified by language, gender, diabetes comorbidity, homelessness, or clinic site. When comparing Hispanics and Caucasians only, Hispanic patients had better LDL control than Caucasians.

CONCLUSIONS: This study demonstrates that a SRFC can effectively manage hyperlipidemia over time, and rates of control can exceed national standards.

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Cardiovascular disease (CVD) is the leading cause of mortality in the United States.[1] The benefit of LDL reduction is well documented, leading to reduction of cardiovascular events, coronary heart disease, and stroke.[2,3] However, hyperlipidemia remains uncontrolled in approximately two thirds of the US population, with worse control documented in minority groups and the uninsured.[4]

The Third Report of the Expert Panel on Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel III, or ATP III) guidelines[5] and the ATP III update[6] provide LDL goals and pharmacotherapy recommendations based on individual patient risk factors. The American College of Cardiology (ACC) and American Heart Association (AHA) released a guideline on the "Treatment of Blood Cholesterol to Reduce Atherosclerotic Cardiovascular Risk" in November 2013 that does not share the ATP III guideline's emphasis on achieving LDL goals but instead focuses on assessing cardiovascular risk with a new risk calculator and using moderate or high-dose statins as indicated.[7] These new guidelines have been controversial[8–10] and have not yet replaced the percentage of patients meeting the ATP III LDL goals as the standard of care by which we measure our health care delivery systems.

Student-Run Free Clinics (SRFCs) are a common venue for educating medical students and serving the underserved.[11,12] Given the ubiquity of these clinics in medical education, outcomes studies describing the impact of SRFCs on patient health are still relatively limited. Previous studies have documented that SRFCs are providing quality care, including diabetes,[13–15] smoking cessation,[16] patient satisfaction,[17] mental health,[18] preventive care,[19] and hypertension.[20] To our knowledge, there have been no published studies on hyperlipidemia outcomes in a SRFC.

During the time of this study, the University of California San Diego (UCSD) Student-Run Free Clinic Project (SRFCP)[14,21–23] operated in three clinic locations, with one clinic site open 4–5 hours each day, Monday through Friday. At least 85% of patients who seek care at the SRFCP are uninsured.[22] The clinics provided over 3,500 medical visits to more than 750 patients in 2010, including primary care as well as consultations in 20 specialties such as cardiology, nephrology, and neurology. Each location dispensed medications free of charge through onsite pharmacies, as well as offering social, legal, and acupuncture services. UCSD medical students from all 4 years provide health care to patients under the supervision of faculty and volunteer physicians as part of elective courses. These courses cover principles of care for vulnerable populations, humanism, and empathy along with topics such as access to health care and managing the workflow at each clinic site.

The purpose of this study was to describe longitudinal control of hyperlipidemia during routine care at the UCSD SRFCP.

Methods

This was a retrospective study of clinic visits from January 1, 2006 to November 15, 2010 comparing base-line and most recent LDL in patients with a new diagnosis of hyperlipidemia and at least one follow-up LDL, 6 weeks to 18 months after baseline. The

UCSD SRFCP maintained an electronic access (Microsoft Inc, Redmond, WA) database of patient information from each clinic visit. We queried the database for patient demographics, visit dates, and diagnoses of hyperlipidemia recorded by a medical student or physician during a clinic visit. Patients with an initial diagnosis of hyperlipidemia within the study time frame were considered for inclusion in this study. We obtained baseline and last visit LDL measurements by querying online laboratory results (Quest Diagnostics, Madison, NJ). Patients without baseline LDL values and at least one follow-up LDL value 6 weeks to 18 months from baseline were excluded. We examined paper charts to determine LDL goal and medications prescribed. Providers recorded LDL goals during routine clinical visits, categorized according to ATP III guidelines, including the 2004 ATP III update: very high risk (<70 mg/ dL), high risk (<100 mg/dL), moderate risk (<130 mg/dL), and low risk (<160 mg/dL).

We summarized patient demographics using descriptive statistics, including means and standard deviations for continuous variables and percentages for categorical variables. We used paired *t* tests to compare baseline to last measured LDL to determine the change over time. To determine demographic and clinical predictors associated with LDL goal attainment, we used univariable and multivariable binary logistic regression. Independent variables for this analysis included age, gender, ethnicity, primary language, diabetes, and housing status. In the univariable analysis, we investigated the predictors individually; computed unadjusted odds ratios of attaining LDL goal (and 95% CI) for each predictor; calculated the *P* value for the test of no association between the predictor and the LDL outcome, using Fisher's exact test, except for age where we used the likelihood ratio test of logistic regression. The multivariable model was determined via backward model selection with a 0.20 threshold for inclusion in the model. In the final model, a two-tailed *P* value of <.05 was considered significant. We performed statistical analyses using IBM SPSS software version 20.0. (SPSS Inc, Armonk, NY). The UCSD Institutional Review Board approved this study.

Results

The final cohort included 96 patients with hyperlipidemia. The mean age was 50.3 years (SD=9.4) and mean follow-up time was 5.5 months (SD 86.8). The study population was 52.1% (n=50) female, 47.9% (n=46) male, 54.2% (n=52) Hispanic, 34.4% Caucasian, 3.1% (n=3) Black, 75% (n=72) had type 2 diabetes, and 13.5% (13) were homeless (Table 1).

Baseline and last visit LDL measurements are represented in Table 2, including outcomes for each risk category. Overall, mean baseline LDL decreased from 135.8 mg/dL to 101.3 mg/dL (*P*<.001). In hyperlipidemia patients with comorbid diabetes, baseline LDL decreased from 133.6 mg/dL to 94.7 mg/dL, a mean difference of 38.9 mg/dL (*P*<.001).

The percent of patients attaining goal LDL by demographics and clinic site is described in Table 3. When considering all hyperlipidemia patients, baseline LDL was at goal in 20/96 (20.8%) patients, compared to 56/96 (58.3%) at the last visit (*P*<.001). No differences for LDL goal attainment were found between diabetics and non-diabetics (43/72; 59.7% for diabetics versus 13/24; 54.2% non-diabetics, *P*=.64). There were no LDL reduction

differences between sites (P=.66). Logistic regression did not reveal any language, age, gender, or clinic site associated with uncontrolled LDL (P>.05 for each variable). When comparing Hispanics and Caucasians only, Hispanic patients had better LDL control than Caucasians (P<.045).

Statins were prescribed in 83 (86.5%) patients, including atorvastatin (67), simvastatin (12), lovastatin (3), and rosuvastatin (1). More patients prescribed statins (62.7%; 52/83) achieved control than those who were not taking cholesterol medications (4/13; 30.8%; P=.03).

Discussion

Overall, LDL decreased from a base-line of 135.8 mg/dL to 101.3 mg/dL during routine care at three SRFC sites, with goal attainment achieved in 56 (58.3%) patients. This exceeds LDL control documented in the National Health and Nutrition Examination Survey (NHANES), with LDL control among the US population from 2003–2010 overall of 33.2%, 20.3% in Mexican Americans, and 29.0% among the uninsured.[24] In contrast to national trends, Hispanics achieved the highest percentage of any ethnic group in this SRFC. These data may reflect efforts to address the cultural and linguistic needs of the Hispanic population at these clinics, including the use of community health promoters, interpreters, and physicians who speak Spanish, as well as patient education and medication instructions provided in the patients' native language.

Prescription of statins for 86.5% of hyperlipidemia patients at the UCSD SRFCP is above the national average of 48.1% as described by NHANES.[24] Statin use increased the odds of achieving LDL goal almost four-fold in this study. Statin therapy, rather than LDL goal, is also the focus of the 2013 ACC/AHA Cholesterol Guidelines.[4] Whether comparing the percentage of patients who achieve LDL goal or percentage of hyperlipidemia patients who receive statin therapy, the SRFCP outperformed national cholesterol treatment outcomes as reported by NHANES.

While prospective randomized controlled trial (RCT) data regarding hyperlipidemia treatment, compliance, and outcomes in the underserved is limited, our findings are consistent with a RCT documenting low-income, uninsured, or underinsured patients (n=148) with excellent 1-year retention rates (91%) and reductions in LDL levels from 121 to 104, P<.03.[25] Researchers in that study attributed these positive outcomes in the disease management arm as compared to usual care as likely due to access to medications at low or no cost, patient/family education, and close monitoring.[25] Perhaps this may help explain how several SRFCs have been able to achieve outcomes that are better than would be expected in their challenging patient populations.[13–15,18–20] SRFCs may function more similarly to the disease management arm of this trial for uninsured or underinsured low-income patients rather than usual care clinics. For instance, our clinic offers patients medications at no cost, education, and close monitoring, which includes not only the traditional visit with a physician, but also an extended amount of time with medical students, who serve as health educators, as well as interdisciplinary services, including social work and laboratory services on site free of charge.

SRFCs may be ideal venues for teaching system-based practices,[26] and hyperlipidemia quality improvement projects could be implemented to further improve the LDL control of this patient population. Interventions may include systematic queries for patients who have not met goals, followed by phone calls to proactively schedule group or individual visits targeted at medication adjustment and compliance as well as health behavior changes. Chronic disease management in SRFCs offers an opportunity to encourage inter-professional education and collaboration with the potential to involve students and faculty from other fields such as nutrition, behavioral science, pharmacy, medicine, public health, and social work.

The study had several limitations. These results from a single institution cannot be generalized to other SRFCs. This study had a small number of subjects, which limits the power to detect certain difference that may exist; however, it is similar to or larger than the sample size of other published outcomes within SRFCs.[13,15,18–20]

Future areas of inquiry may include multi-institutional SRFC studies of chronic disease management including implementing and describing systems-level quality improvement approaches within SRFCs to improve patient outcomes.

In conclusion, this study demonstrates that hyperlipidemia can be effectively managed over time at a SRFC, and rates of control can exceed national standards.

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Table 1:

Demographics of Hyperlipidemia Study Participants at the University of California San Diego Student-Run Free Clinic Project From August 2006–November 2010 *

Patient Characteristic	n (%) or Mean (SD)
Age, years; mean (SD)	50.3 (9.4)
Gender, n (%)	
Female	50 (52.1)
Male	46 (47.9)
Ethnicity, n (%)	
Hispanic	52 (54.2)
Caucasian	33 (34.4)
Asian	4 (4.2)
Black	3 (3.1)
Other	4 (4.2)
Site, n (%)	
Downtown	43 (44.8)
Mountain View	30 (31.3)
Pacific Beach	23 (24.0)
Risk category, n (%)	
Very high risk	5 (5.2)
High risk	68 (70.8)
Moderate risk	18 (18.8)
Low risk	5 (5.2)
DM2 comorbidity, n (%)	
HL and DM2	72 (75.0)
HL only	24 (25.0)
Housing status, n (%)	
Housed	83 (86.5)
Homeless	13 (13.5)
Primary language, n (%)	

Patient Characteristic	n (%) or Mean (SD)
English	51 (53.1)
Spanish	45 (46.9)
Statin use, n (%)	
Yes	83 (86.5)
No	13 (13.5)

* n=96

HL—Hyperlipidemia

DM2—Diabetes mellitus, type 2

Table 2:

Mean Low Density Lipoprotein (LDL) at Baseline and Last Visit in Hyperlipidemia Participants, Overall by Risk Category. University of California San Diego Student-Run Free Clinic Project From August 2006–November 2010

	Baseline LDL, mg/dL (SD)	Follow-up LDL, mg/dL (SD)	Change in LDL, mg/dL (95% CI)	*P* Value
All participants (n=96)	135.8 (37.2)	101.3 (34.6)	−34.5 (−43.5, −25.5)	<.001
By risk status				
Very high risk (n=5)	131.2 (28.4)	78.0 (24.1)	−53.2 (−90.1, −16.3)	.016
High risk (n=68)	134.1 (40.3)	94.0 (28.6)	−40.1 (−50.4, −29.7)	<.001
Moderate risk (n=18)	140.7 (28.9)	121.6 (37.1)	−19.1 (−41.9, 3.7)	.096
Low risk (n=5)	145.8 (30.2)	150.4 (43.1)	4.6 (−62.1, 71.3)	.86

Table 3:

Hyperlipidemia Patients Attaining Goal Levels of Low Density Lipoprotein (LDL), by Demographics and Clinic Site. University of California San Diego Student-Run Free Clinic Project From August 2006–November 2010*

Patient Characteristic	n (%) At LDL Goal	Unadjusted Analysis[1]	
		OR (95% CI)	*P* Value[2]
Overall	56 (58.3)		
Age (per year)	NA	1.03 (0.99, 1.08)	.16
Gender, n (%)			.54
Female	31 (62.0)	1	
Male	25 (54.3)	0.73 (0.32, 1.65)	
Ethnicity, n (%)			.045[3]
Hispanic	34 (65.4)	1	
Caucasian	14 (42.4)	0.39 (0.16, 0.96)	
Asian	2 (50.0)	0.53 (0.07, 4.08)	
Black	3 (100)	Inf (0, Inf)	
Other	3 (75.0)	1.59 (0.15, 16.4)	
Site, n (%)			1.0
Downtown	25 (58.1)	1	
Mountain View	18 (60.0)	1.08 (0.42, 2.79)	
Pacific Beach	13 (56.5)	0.94 (0.34, 2.60)	
Risk category, n (%)			.91
Very high risk	2 (40.0)	0.47 (0.07, 2.98)	
High risk	40 (58.8)	1	
Moderate risk	11 (61.1)	1.10 (0.38, 3.19)	
Low risk	3 (60.0)	1.05 (0.17, 6.70)	
DM2 comorbidity, n (%)			.64
HL only	13 (54.2)	1	
HL and DM2	43 (59.7)	1.26 (0.50, 3.18)	
Housing status, n (%)			1.0

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Patient Characteristic	n (%) At LDL Goal	Unadjusted Analysis[1]	
		OR (95% CI)	*P* Value[2]
Housed	48 (57.8)	1	
Homeless	8 (61.5)	1.17 (0.35, 3.87)	
Primary language, n (%)			.30
English	27 (52.9)	1	
Spanish	29 (64.4)	1.16 (0.71, 3.66)	
LDL control at baseline, n (%)			1.0
No	46 (58.2)	1	
Yes	10 (58.8)	1.03 (0.35, 2.97)	
Statin use, n (%)			.038
No	4 (30.8)	1	
Yes	52 (62.7)	3.77 (1.07, 13.33)	

*n=96

HL—Hyperlipidemia

DM2—Diabetes mellitus, type 2

Notes:

*1*The multivariable analysis selected a model containing statin use as the single predictor of LDL control at follow-up

*2*Fisher's exact test, except for age: likelihood ratio test of logistic regression

*3*Comparing Hispanics and Caucasians only.