

Patients' Views of a Behavioral Intervention Including Financial Incentives

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Patient nonadherence to recommended treatment is a barrier to improving outcomes, but the use of financial incentives to overcome this barrier is increasing.^{1,2} Eighty-five percent of large employers use financial incentives to improve health behaviors in realms ranging from smoking and other addictions to weight control and medication adherence.³⁻⁵ In a recent randomized controlled trial focused on reducing low-density lipoprotein cholesterol (LDL-C) among patients with high cardiovascular risk or established cardiovascular disease, incentives based on principles of behavioral economics were used to motivate both patients and providers.⁶ In the parent study, 340 primary care physicians (PCPs) from 3 health systems and about 15,030 of their patients were enrolled into a 4-arm trial to test alternative incentive strategies to lower LDL-C. PCPs were randomized to 1 of 4 arms: physician financial incentives, patient financial incentives, shared incentives between physicians and patients, and a control arm. Progress was monitored through quarterly LDL checks and medication adherence via pill bottle opening. The primary outcome was LDL reduction over 12 months. The intervention was a compound of multiple behavioral economic strategies.

The main trial showed significant benefits for those in the shared incentive arm, but the effectiveness of the intervention ranged across individuals. The purpose of this current study was to investigate patients' perceptions of the intervention and learn from their stories of how the intervention affected their behaviors. The specific objectives were to investigate patients' perceptions of financial incentives and of multiple components of the behavioral intervention, including overall thoughts about benefits and challenges and how being in the study affected their relationship with their physician. We were particularly interested in how perspectives differed between patients who succeeded in lowering their LDL-C and those who did not. Secondarily, we examined if narratives about incentives differed among patients randomized to different arms of the study.

ABSTRACT

OBJECTIVES: Clinical trials are increasingly testing the effectiveness of paying patients' financial incentives for achieving desired clinical outcomes. Some researchers and providers are concerned that patient financial incentives will harm the doctor-patient relationship. How patients feel about these approaches, and these trials, is largely unknown. This study examined patients' perceptions of a compound behavioral and financial incentive intervention used in a large multicenter trial to lower low-density lipoprotein cholesterol (LDL-C), including their perceptions of benefits and challenges and the study's effect on patients' relationship with their primary care physicians (PCPs).

STUDY DESIGN: Semi-structured telephone interviews with patients post intervention.

METHODS: PCPs from 3 primary care practices in the northeastern United States were randomized to 1 of 4 arms: physician financial incentives, patient financial incentives, shared incentives between physicians and patients, and a control arm. Within each arm, 10 high, 10 medium, and 10 low performers in LDL-C reduction were interviewed. Interviews targeted reasons for enrolling in the study, the specific intervention elements that helped them reach the goal (incentives, engagement, monitoring), challenges faced in reducing cholesterol, and the impact of study participation on their relationship with their PCP.

RESULTS: Patients reported positive experiences with the study: 65% described personal changes to improve health and 61% reported increased awareness. Views about financial incentives varied: 71% clearly found them motivating and 36% claimed they made no difference. Patients noted that changing lifestyle (36%) and diet (65%) was difficult. Patients who substantially lowered their LDL-C revealed themes similar to those who did not.

CONCLUSIONS: Overall, behavioral interventions with financial incentives appear to be socially acceptable to patients who participate in them. Both adherence monitoring and financial incentives were well received, with little effect on the physician-patient relationship.

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METHODS

Overview/Summary of the Underlying Intervention

The protocol for the main trial is summarized briefly here.⁶ A total of 1503 patients with high cardiovascular risk or established cardiovascular disease were enrolled; they were nested within 340 PCPs from the University of Pennsylvania (Penn), Geisinger Health System (GHS), and Harvard Vanguard Medical Associates (HVMA). The study compared 4 approaches to reduce LDL-C: physician incentives, patient incentives, shared physician–patient incentives, or control (no financial incentive or regular feedback). For the patient and physician incentive arms, the maximum expected value of the incentive was \$1024 per enrolled patient who met LDL-C goals. PCPs and patients in the shared arm shared those possible financial incentives. Patients also received surveys, quarterly LDL-C checks, and wireless pill bottles (Vitality GlowCaps) which were used to store their cholesterol-lowering medication and electronically monitor bottle openings.

Design

In this study, semi-structured telephone interviews were conducted with patients post intervention from February 2014 through July 2014. The methods and script were approved by the University of Pennsylvania Institutional Review Board.

Patients

Purposive targeted sampling was used. Within each of the 4 arms, the goal was to interview 10 high, 10 medium, and 10 low performers in LDL-C reduction, stratified across the 3 study sites. Within each of the 12 cells, 5 patients were targeted from GHS, 4 from Penn, and 1 from HVMA, proportional to the total patient sample at each site. Patients were interviewed in multiple waves, formed as groups of patients completed their 15-month visits. The final number of interviews is shown in [Table 1](#). For each wave of completed data, usually for 60 to 80 patients, the mean change in LDL-C (baseline to 12-month) was calculated, then sorted by site within arms. Within each arm, the distribution was inspected and the 4 to 5 patients with the most improved, most worsened, and least changed LDL-C were prioritized, choosing only 1 patient per clinical site per wave. Therefore, “high” and “low” do not have a constant cut-off. However, across the selection waves, median changes in LDL-C among targeted patients were similar.

Script

The interview script was developed by a study team of health economists, physicians, and qualitative researchers. They drew on the literature and their expertise to develop conversational

TAKEAWAY POINTS

Patients who enrolled in a trial to lower low-density lipoprotein cholesterol (LDL-C)—one that included financial incentives to patients or to physicians or were shared between patients and physicians—spoke positively of the multifaceted intervention. One-on-one interviews revealed:

- ▶ Wireless pillboxes for monitoring served as a reminder to take medications.
- ▶ Blood draws every 3 months were reinforcing and informative.
- ▶ Financial incentives were appreciated but not viewed as particularly motivating.
- ▶ Patients who substantially lowered their LDL-C revealed themes similar to those who did not.
- ▶ Financial incentives were rarely discussed; they did not disrupt the patient–physician relationship.
- ▶ Overall, financial incentives appear to be effective and socially acceptable.

questions related to the study elements and the potential impact of behavioral interventions. Initial scripts were piloted and revised as necessary prior to the study and were constant for the duration of active interviewing. Revisions were based on queries about unclear questions, and the order of the questions was changed to improve flow. Pilot interviews are not included in the analyses. Key questions targeted reasons for enrolling in the study, parts of the study that helped them reach the goal (surveys, wireless pill bottle, cholesterol check every 3 months, and incentives, for patients in arms that received them), challenges faced in reducing cholesterol, and the effect of the study on their relationship with their doctor.

Interviews and Coding

Two trained interviewers conducted the interviews. Recordings of the interviews were transcribed by an independent transcription agency. De-identified transcripts were imported into NVivo version 10 (QSR International Pty Ltd) for coding and analysis.

Four trained coders analyzed the data using elements from grounded theory. The team first identified broad themes based on the first 6 transcripts and then applied open codes to the transcripts. The initial set of codes was tested on each subsequent interview transcript to refine the codebook. Codes were revised iteratively by constant comparison between and within transcripts, and more content-driven axial codes were applied. A final coding scheme was established and applied to all transcripts. In a post hoc analysis, the comments about financial incentives were grouped by arm, blinded, and reviewed by the senior author, with a goal of understanding the main trial results. Inter-rater reliability was assessed on samples exceeding 20% of transcripts. The research team met weekly to resolve discrepancies via consensus.

In the following section, results are organized around the major research questions, examining perceived benefits and facilitators of study enrollment and components, barriers to study participation and meeting goals, and how study participation affected their relationships with their doctors. Results focus on themes mentioned by more than 20% of the sample. The median kappa was 0.92, with a range of 0.64 to 1.0.

TABLE 1. Overview of Number of Completed Interviews in Each Arm, Stratified by Change in LDL-C

	Low Performance	No Change	High Performance
Physician incentive	G5 + P4 + H1 = 10	G5 + P4 + H0 = 9	G5 + P4 + H0 = 9
Patient incentive	G5 + P4 + H1 = 10	G5 + P4 + H0 = 9	G5 + P4 + H1 = 10
Shared incentive	G5 + P4 + H1 = 10	G4 + P4 + H0 = 8	G5 + P4 + H0 = 9
Control	G4 + P4 + H1 = 9	G4 + P3 + H1 = 8	G6 + P3 + H0 = 9

G indicates Geisinger Health System; H, Harvard Vanguard Medical Associates; LDL-C, low-density lipoprotein cholesterol; P, University of Pennsylvania Health System.

TABLE 2. Demographic Characteristics of Interviewees Compared With the Total Trial Sample

Variables	Total (n = 1503) n, %	Groups		P
		Subgroup (n = 110) n, %	Total Sample (n = 1393) n, %	
Age, years (start date minus DOB)				
Mean (SD)	62.09 (8.7)	62.5 (7.8)	62.0 (8.8)	.55
Gender ^a				
Female	639 (42.6)	56 (50.9)	583 (42.0)	.07
Male	860 (57.4)	54 (49.1)	806 (58.0)	
Ethnicity/race ^a				
White, non-Hispanic	1199 (80.4)	89 (80.9)	1110 (80.3)	.95
African American, non-Hispanic	232 (15.6)	16 (14.6)	216 (15.6)	
Other non-Hispanic	31 (2.1)	3 (2.7)	28 (2.0)	
Hispanic	30 (2.0)	2 (1.8)	28 (2.0)	
Annual household income ^a				
<\$50,000	635 (43.6)	54 (50.9)	581 (43.1)	.28
\$50,000-\$100,000	523 (36.0)	34 (32.1)	489 (36.3)	
>\$100,000	297 (20.4)	18 (17.0)	279 (20.7)	
Education ^a				
Less than college	486 (32.5)	41 (37.3)	445 (32.1)	.54
Some college	433 (28.9)	30 (27.3)	403 (29.1)	
College and postcollege graduate	577 (38.6)	39 (35.5)	538 (38.8)	
Marital status ^a				
Single	225 (15.1)	18 (16.4)	207 (15.0)	.79
Married	992 (66.4)	74 (67.3)	918 (66.3)	
Other	278 (18.6)	18 (16.4)	260 (18.8)	

DOB indicates date of birth; SD, standard deviation.
^aN is variable due to small amounts of missing data.

RESULTS

A total of 110 of 120 planned interviews were completed (Table 1). They came from a targeted list of 163 patients, representing a minimum 67.5% response rate; 9 patients refused and the remainder were not reached prior to saturation. Patients providing interviews were demographically and clinically similar to those in the parent trial (Table 2).

Prevalent themes are presented in italics, with quotations summarized in the **eAppendix** (available at www.ajmc.com). There were few differences between patients whose LDL-C improved greatly and those who did not improve. Similarly, meaningful differences among study arms were not prevalent. When substantial differences were discovered, they are noted at the end of each section.

Reasons for Joining

Patients expressed a range of reasons for joining the study. First, the *credibility* of a doctor's recommendation to join the study was a motivating factor for 40 (36%) patients. Second, 34 (31%) patients stated that they joined the study with the *hope of finding a solution* to their high cholesterol. A third reason for joining was *increasing awareness and knowledge* (n = 30; 27%). Other relatively common motivators were *financial gains* (n = 27; 25%), including free and more frequent monitoring, and the *benevolence* of helping with research (n = 25; 23%). The subgroup of interviewees whose LDL-C worsened gave more responses to this question, but the nature of what they said was not qualitatively different. The subgroup whose LDL-C improved often mentioned enrolling to facilitate healthy behaviors and to learn more about cholesterol issues.

Benefits and Facilitators: General

Patients offered a wide range of responses to queries about the benefits of enrolling in the study. Seventy-one (65%) patients described *personal changes* that affected the way they manage their health and their understanding of health-related topics. Commonly referenced topics were diet choice and exercise regimens. The study made patients think more about the foods that they were eating and the necessity of changing eating habits. These changes included reading labels before buying food, shopping for healthier food options, and portion control. The study also inspired patients to engage in more *exercise*. Some learned that they were able to control their cholesterol with diet and exercise and others learned the necessity of medication in controlling their cholesterol.

Just over half (n = 61; 55%) of the patients spoke of appreciating *the increased awareness and information*. Several patients explained

that being in the study made them more aware of the severity of their health condition; 34 (31%) specifically mentioned improved health. The subgroup of interviewees whose LDL-C got better more often gave examples of how they changed a health behavior and more frequently spoke of more consistent use of medication.

Benefits and Facilitators: Intervention Components

Three-month visits. More than half (n = 69; 63%) of the patients mentioned the benefits of receiving blood test results every 3 months; they *liked the awareness*, and tracking enabled them to make appropriate adjustments as well as understand how medication use affected their cholesterol levels. It was *also satisfying* to see how diet and exercise changes affected their cholesterol. They also appreciated the increased access to services (n = 48; 44%) and did not find the visits inconvenient (n = 47; 43%)

Wireless medication adherence devices. Patients generally agreed that the wireless devices were a facilitator in lowering their cholesterol. The devices served as a *reminder* to take medication (n = 39; 35%). Many thought the devices were easy to use and expected to continue to use them after the conclusion of the study. They liked being monitored (n = 33; 30%)

Surveys. Patients did not say much about the surveys. The most prevalent comment was about *increased awareness* (n = 40; 36%). The surveys provided a friendly reminder of the appropriate steps that patients should be taking to keep their cholesterol under control.

Financial incentives. Seventy-five patients provided comments about financial incentives. Many (n = 53; 71%) described the *beneficial effect* that the incentives had on their behavior, offering at least 4 different examples: 1) several thought it was good that the study provided them with *a benefit other than good health*, 2) many were happy to get a *boost to their income* and have some extra money to spend on other things, 3) multiple patients stated that the incentives made the other inconvenient aspects of the study more *bearable*, and 4) several patients felt the positive reinforcement *motivated* them to do the necessary things to lower their cholesterol and continue with the study. Most of the 42 (56%) who commented felt that the *size* of the incentives was *adequate* or better than they expected.

At the same time, 27 (38%) patients said that the incentives *had minimal influence* on their performance in the study; positive results were what motivated them to keep up their efforts. They were involved in the study to get healthier and learn about themselves. The blinded review of the comments about incentives yielded nothing to distinguish among the treatment arms with patient incentives.

Only 11 (15%) patients recalled talking about the incentives with their doctors; these conversations were brief affirmations of their participation in the program and encouragement to continue with their progress. Overall, 38 (51%) patients made some commentary

about physicians and incentives. Although there was no prevalent theme, the tone was generally indifferent (eg, it would not affect the patient's own performance) or supportive (eg, they were happy for their doctors to receive payment as part of the study). Few feared that physician incentives would affect the physician's impartiality.

There were no differences among subgroups of patients related to discussions about the 3-month visits, wireless medication devices, or the surveys. The subgroup of interviewees whose LDL-C improved more often spoke about the benefits of financial incentives.

Challenges and Barriers

Healthy diet and active lifestyle. In contrast to the many experienced benefits, some barriers to improving cholesterol remained. The main downfall of 72 (65%) patients was their inability to stay away from food that is believed to contribute to higher LDL-C levels, and for others (n = 40; 36%), it was their inability to maintain a healthy lifestyle. A host of reasons were given, including *friends and loved ones* who regularly ate or prepared unhealthful meals, *poor eating habits* that developed over time, and their *affinity for unhealthful food*. Comments about inadequate activity were often mentioned in the same context as *diet*. Multiple reasons were provided, often related to the weather, amount of time required for work, travel, or *being busy*. Issues regarding the difficulties of maintaining a healthful diet and lifestyle were more prevalent among the subgroup whose LDL-C worsened over the study period.

Wireless medication devices. For more than half (n = 67; 61%) of the patients and for a number of different reasons, the wireless medication device used in this study (Vitality GlowCap) was seen as a nuisance, but usually temporarily. Patients on multiple medications did not like the necessity of having *separate containers*. Many had early *technical issues*, such as finding an appropriate outlet and connectivity difficulties; but for most, these were transitory issues amid an overall positive experience. The subgroup that did particularly well in improving its LDL-C more often noted issues with the wireless medication devices, but also that the issues were infrequent and/or solved.

Issues with medication. Numerous patients (n = 49; 45%) referenced regular medication use as a challenge. A significant part of the commentary was about *adverse reactions*, such as muscle weakness and pain and liver complications. Side effects, such as feelings of illness, muscle and joint pain, and "fuzzy memory," were cited as reasons for dropping the medication altogether. Other patients *forgot* to take their medicine on a daily basis, and a significant number of patients stated they were *not interested* in taking any medication at all. The frequency and content of comments was similar between the high and low performers.

Relationship with doctor. Only 1 patient specifically noted a change in the relationship between the patient and physician. However, 29 (26%) indicated that the study led to more conversations with their doctor—typically about the *results of their blood work*,

especially if the labs demonstrated “poor results.” Some noted that they saw their physician more often due to participating in the study.

Sixteen (15%) patients said they *enrolled in the study because their doctor suggested it to them*. Many of these were from the group who did well. Most of these comments noted that a brief conversation took place during the course of an office visit, in which the doctor brought up the study and recommended participation, and the patients subsequently agreed to join.

DISCUSSION

This qualitative process evaluation of a large randomized trial has 4 main findings. First, patients reported positive experiences with the study; they enrolled based on a genuine desire for a healthier life. The structure of the study was similarly favorable: blood draws every 3 months were informative, and the wireless medication devices—although they not without their glitches—provided valuable reminders to take one’s medication. Second, views about financial incentives were varied. Some clearly found them motivating, whereas others claimed they made no difference. Importantly, no patients found them negative. In general, discussion of the study with their physicians, including financial incentives, was not extensive. Third, patients noted that changing behavior and diet was difficult. Food preferences, habits, and social times interrupted plans to make positive changes. There was also ambivalence about taking medication, and for some, there was a clear desire to avoid medication. Fourth, patients who substantially lowered their LDL-C revealed themes similar to those who did not.

These findings contrast with some of the concerns the study team had when developing the study, as well as those voiced by others.^{7,8} In preparation for study launch, some team members and participating physicians wondered whether explicit financial incentives might adversely affect existing physician–patient relationships. Those concerns seem to have been unjustified. There was also concern that the wireless medication adherence devices would be seen as intrusive, but they were not. Most importantly, different experiences and feelings based on different intervention arms were anticipated; it seemed logical to think that whether a patient or their physician is being paid for outcomes might alter one’s sense of the process. In fact, no differences were found across arms. Nor were there systematic differences based on how well patients did in the intervention arm in terms of improving their LDL-C.

There is little previous research examining patient perceptions of financial incentives to improve their health. One other published paper found nearly equal proportions of a clinic population had favorable or unfavorable opinions of incentives, but the authors noted greater enthusiasm when incentives were framed as a reward rather than a penalty, when they were offered by health insurers as part of benefit design, and when the survey respondent personally had the condition for which the incentives were offered (in the case

of smoking or obesity).⁹ Importantly, from a complementary perspective, this previous study was conducted among clinic patients who had not been enrolled in a trial of financial incentives.

Limitations and Strengths

Patients in the underlying study had to consent to participate; thus, by design, only the experiences of those who were willing to engage in the first place are represented in this study. High and low performers were oversampled, so it is possible that this sample was not effectively representative; however, the observation that no differences were observed between the extremes suggests that no differences would be observed among a more distributed sample. This study also has strengths: the team conducting this evaluation was different from the team that designed and implemented the trial, the sampling was systematic, and the sample included 110 patients, which is substantially larger than many process evaluations.

CONCLUSIONS

Behavioral interventions that include financial incentives offer promise to improve important health outcomes, but they must overcome 2 important evidentiary hurdles before widespread implementation. First, they need to demonstrate effectiveness. The results of the underlying study in this report suggest that a system of shared incentives offers significant benefit compared with a control incentive. Second, they must be socially acceptable. There are many stakeholders in such acceptance, including those who might finance these interventions, including the incentives, and the general public who might pass judgment upon them. This study’s results suggest that patients are willing to engage in these programs and generally felt participating was a positive experience. ■

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Full text and PDF at www.ajmc.com

eAppendix Table. Overview of Themes and Illustrative Quotes

REASONS FOR JOINING	
Credibility	<p>“My doctor referred me, so that’s why I really didn’t do any questioning on it. I mean, I read the letter and they explained what it was, and I didn’t see any issues with it.” – Low group^a patient 1010002805</p> <p>“Well, I hesitated at first. I wasn’t sure what to do and then my doctor said it was a very good program and so I decided for my health that I would do it.” – Low group patient 1010003096</p>
Hope for a solution	<p>“Well, my cholesterol was a little high and I figured I can lower it through the study and it did go down some.” – High group patient 1010002403</p> <p>“It seems like we couldn’t—every medicine we tried, it doesn’t work on me. And it gives me sore muscles or I can’t—I get so weak. And so, I’m just winging it, hoping for the best.” – High group patient 1010001269</p> <p>“Well, it benefited me because, like I said, I was on the fence as to whether I could take the meds or whether I could lower it myself and I tried lowering it myself with exercise and diet and that wasn’t working. And I had that feedback that told me that wasn’t working. So it was probably about halfway through the study I went on the meds and it was an incredible result.” – High group patient 1010004944</p> <p>“My regular doctor thought that my cholesterol was higher than it should be so then he was trying to put me on medication which I really didn’t want to take. So I talked him into letting me try it through the exercise and diet and all of that.” – High group patient 121004037</p>
Awareness and Knowledge	<p>“Well, I thought it would help me find out what I was doing wrong and how to do things right to change—you know, eating habits or habits that would cause the cholesterol to go up.” – High group patient 1010002070</p> <p>“My cholesterol was borderline and I thought maybe something would get some good suggestions or something would come out of it that would be beneficial. “ – High group patient 1010003252</p> <p>“...and I thought maybe they could help me if I was having a major problem with my cholesterol and give me something—tell me something I could do to make it better.” – High group patient 120130007</p>
Benevolence	<p>“Well, I’m a retired RN and I just felt that it was important to try to help people and, therefore, I just felt that that was a good idea to do.” – Medium group patient 1010001268</p> <p>“I really don't know how to answer that. I mean, I just said I figured if I could help, I said I would help, and that was it. I wasn’t getting anything</p>

	out of it that I know, you know, as far as my cholesterol. It's high. It's been high for quite awhile, and I just figured that I'd help with the study." – Low group patient 1010002404
Financial gains	<p>"No, just – well, they said that they would study it and then I would have to give blood every so often and they keep abreast of how I was doing. So this was ideal for me. And it didn't cost me so that was another good thing." – High group patient 1010003758</p> <p>"Well, because it sounded easy and really, the money." – Low group patient 120521258</p> <p>"The thought of getting paid when you're retired appealed to me." – Medium group patient 120621019</p>
BENEFITS AND FACILITATORS	
Personal changes	<p>"It made you more understanding of the importance of diet and exercise. And so I sort of felt that it just kinda made you wanna do good and try to eliminate bad habits that could affect your cholesterol level." – High group patient 1010003189</p> <p>"Again, I think it did help keep it more top of mind, so we try and eat a little healthier and not do as much – and do a little bit more exercising, so I would say again, it comes down to top of mind. It's – sometimes you just need little nudges or, you know what I mean? And this, getting a notification every few weeks that, hey, this is due, was helpful in that regard." – High group patient 120713124</p>
Increased awareness	<p>"Well, I guess because of the fact that I didn't know anything about cholesterol until the study started and then when I really got involved with it, I said well. So the thing was just to make sure I asked about the pill, and they said the pill will definitely help you so I said okay fine when I spoke to my doctor about it. And then I start watching what I was eating and that was the good part." – High group patient 1010003758</p> <p>"It basically let me know I can't make up a dose. If I miss a dose at night one night, I can't make it up the next night. I just have to go ahead and deal with just keeping on doing my regular dosage." – High group patient 1010001930</p> <p>"So it helped me in that respect because I was able to go to a nutritionist to try to find out the proper way to eat, to look on the back of the packages and read about the wheat flour and regular flour and don't eat white and all. So that – I felt like it was a good thing for me." – Medium group patient 120515109</p>
3-month blood draws	
Awareness	"I've been trying to do that for years. So, having the blood tests, I guess,

	increased my awareness of where I was, but, again, my doctor doesn't see me as a high risk, so it's not something I think about a lot." – Low group patient 1010001964
Satisfying	"Again, it was actually monitoring the cholesterol on a quarterly basis. I could see what impacts exercise and diet had on it. And I like something that's quantifiable and I could actually look at hard numbers and see them fluctuate and go down." – Low group patient 120907144
GlowCaps	
Reminder	<p>"Because I don't have the GlowCap sitting there and I do have my medication sitting out, but it doesn't draw my attention as much as that. And walking through my kitchen, I would see the plugged-in glow plug-in and you know you have to take your medicine. It was a reminder." – Low group patient 1010001772</p> <p>"I think the fact that the bottle and the little Glow light, the GlowCap, was positive because, like I said, I remembered more to take it." – Low group patient 1010001772</p> <p>"Well, I thought it was a good thing to do because having the nightlight here, the pill bottle reminded me to take my medicine and it did help lower my cholesterol. " – Low group patient 1010003096</p>
Surveys	
Increased awareness	<p>"It had me realizing that I need to live healthier." – Medium group patient 1010003259</p> <p>"Well, it just made me more aware of things that maybe I wouldn't have been aware of." – Low group patient 120608123</p>
Incentives	
Good	"Well, of course the lottery part was a lot of fun. That really – you thought, oh well – of course money is always a good thing to receive and it just was fun while doing the healthy part of it also." – Low group patient 1010003096
Extra income	<p>"Oh, lottery, oh, I see. I think it's great. I mean obviously I was doing it for my health, but to get the check in the mail is great. It was a little bit extra money and take my wife out for dinner or something. I thought it was great." – Medium group patient 1010001556</p> <p>"Well, that was kind of the sideshow of the whole thing and I think it was a good thing. For myself, I don't know where I fit in with everybody else, but it was pretty lucrative for myself. I made quite a bit of money off of it. And yeah probably made it a little bit easier to swallow that pill." – Low group patient 1010003763</p>
Motivating	"That was a contributing factor because I work constantly and for me just to have to take a simple pill and to go have my blood work drawn, a little inconvenient, out of my way, to go to the hospital to have it done, but

	<p>then I thought to myself, when I get that done, I'm going to get a check in the mail, so that's fine. I like to get paid for what I'm doing. I gauge everything in my life on what it would cost. Like with my children, time is so important. So, if they're thinking do you have this, yeah, I may have this, but for me to go look for it and get it, it's cheaper for me to go out and buy it. Everything in my life is gauged on time and what I would get paid to do it." Medium group patient 1010003259</p>
Minimal influence	<p>"Well, I mean, it really wasn't a motivation to me, because I volunteered to be part of the study and I take the medication every day anyway. So that really wasn't – that really didn't matter." – Medium group patient 1010002968</p>
CHALLENGES AND BARRIERS	
Diet	
Families & friends	<p>"The biggest impact, I would say, is that I tried to maintain a style of diet that would correspond with the lower cholesterol. But being picnic season and stuff like that, it's a little bit challenging. " – Low group patient 1010004216</p> <p>"Travel, and a husband that loves to grill... Although he doesn't like to grill salmon. He likes to grill beef... Yes, he hasn't found too many vegetables he cares for, so the constant struggle of who is providing the food, and so not always the best." – High group patient 120521024</p>
Poor habits	<p>"I probably didn't eat. For a while there I probably didn't eat right. I didn't – I mean, I was taking the medication, but yet I was still eating cholesterol-laden food." – Low group patient 1010003763</p> <p>"I like to eat too much, but that would probably be the big—controlling my diet properly is probably my biggest problem." – Medium group patient 120601220</p>
Like unhealthy food	<p>"Well, I guess dieting. I haven't really changed my diet to exclude cholesterol because everything I like has cholesterol in it or is bad for your cholesterol, I guess. I guess a lot of people are like that." – Medium group patient 1010001968</p> <p>"I think I might have a mild food addiction and it's food that's and it's comfort food too. I'm very, I use food as a comforting thing. I found that I centered – I think I've centered my life about what I'm going to eat or when I'm going to eat or what I have to eat. Like I can – I've gotten a little better sometimes about just not controlling the eating and I'm knowing that I really am not hungry. When I'm eating I'm doing it for nervousness. Yeah, so trying to realize why I eat so much, yeah, that's important." – Medium group patient 120718078</p>
GlowCaps	
Too bright	<p>"It helped me to remember to keep taking my pills on a regular basis, and so I mean it accomplished its goal that way. I did not particularly care for</p>

	<p>the monitoring device. The light is way, way, way too bright. It was very difficult to find a place to keep it in my house.” – High group patient 120521024</p> <p>“I think the only thing that was not really based on the study, but was annoyance to me is where I place the device. It was in my master bedroom in the bathroom, and so I just needed to close the door on a regular basis so that the light wouldn't illuminate through it, but other than that I really didn't have any concerns about being in the study.” – Low group patient 120608245</p>
Separate containers	<p>“Truthfully for me, that it was a nuisance, because I, with the amount of pills I take I put them in pill organizers. So I didn't even actually put my pills in the bottle. It was a case of I had to open it every morning just to register there that I was taking my medicine, but I really did not put my medicine in it... Basically it was just that it was an inconvenience, because I, like I said, I use a pill organizer for my pills, so it was I had to open the pill bottle every morning along with then opening my pill container to get all of my pills out of, because I don't only take one pill.” – Medium group patient 1010002461</p> <p>“It was just inconvenient to, when I took my other pills, while I usually was eating a meal, I had to make sure to get up and get that extra cholesterol pill that I should take.” – Medium group patient 1010003167</p>
Technical issue	<p>“It was no problem except when it didn't work. And then it was frustrating because I didn't know if it worked or not and I'd call in and it didn't seem like I should have to do that. Like I said, a checklist would have been so much easier. I mean, the Glow bottle that I had, as I read the instructions, some of them had a little light on them and would flash. Mine did not. The only time it made a signal was when my signal wasn't strong enough and it wasn't working properly. And that happened sometimes for like a day and a half, two days. It seemed it was more than it should be. It seemed a longer time than it should be.” – High group patient 120521067</p> <p>“The only problem I had with it is I had that little box that we used, and I think if you check my record, it stopped working months ago. So if your study—I guess your study's based on two things. One, coordinating when people take their medication, if they do, and what your results are from that. And if you don't correctly record what's going on, then to me, the study doesn't really mean anything. Know what I mean? Like I took my medication all except for one day. But if you look at my record, it's going to say that I hardly ever took it because that little box never worked. - High group patient 121005257</p>
Medication	
Adverse reaction	“Oh, very important. Very important because, like I said, I do have high

	<p>cholesterol, but I can't take the statin because we tried several of them and they affected me in a way that I could not take them, so my doctor took me off them." – Low group patient 1010004939</p> <p>"And unfortunately for me, I had trouble with the cholesterol medication, so I had to go off of them... Yes. Yes. I got severe muscle cramping and flu-like symptoms from the medication. And we had tried several different medications to see if we switched to something else if it would stop – not give me the same symptoms, but everything I took just made the symptoms worse, so I had to stop it." – Low group patient 120601002</p>
Forgot	<p>"But, challenging is that I take my medication and don't forget it. And that kind of eased up. And I was actually making sure that I was taking it, which was something that I didn't take just passively. I – right at it and did it. " – High group patient 1010003813</p> <p>"Well I know that I was forgetting to take my pills. Here's what happened. I took Zocor, the other drug I was on and I took it in the morning along with my coffee and never missed. That was for ten years. Well then my sister said to me oh I just read that you should take it at night. I said okay so then I put – the evening news comes on it's time to take your pill, you know some kind of reminder. I was not doing well." – High group patient 120515042</p>
Not interested	<p>"My only real concern was that I'm not a real individual who likes to take a lot of pills and medications. I keep myself pretty physically fit overall in my lifetime. I'm a former athlete professionally. I taught health and physical education in high school. And as you grow older, and having kids and grandkids, you want to stick around, at least I do, to see, assist with their growth and development." – High group patient 1010004949</p> <p>"Oh yeah. Yeah, we talked about that a ways. Yeah, we talked about that, yeah. But I didn't think it was high enough to go into that stage. I'm not a big fan of taking medication unless I really have to. So unless I really have to, I really don't like to take medication." – Low group patient 120508052</p>
RELATIONSHIP WITH DOCTOR	
Results of blood work	<p>"Just when my cholesterol – hold up here – just when my cholesterol got high, you know, I would talk to my doctor; hey, my cholesterol's high. Do I need to take a higher dose or what do I need to do, and he would let me know, and that'd be it." – High group patient 1010001493</p> <p>"Yeah, he received the lab results and we sort of discussed them, if anything was really out of whack, he would inform me, but things were all within the limits." – High group patient 1010001791</p>
Enrolled due to	<p>"The physician told me that it was a very good plan and that I should</p>

Doctor's suggestion	<p>probably be involved because I have high cholesterol, every time I got it checked was high and she thought it was a very good idea.” – Low group patient 1010003096</p> <p>“Well, I did my yearly exam and the doctor says, well you know, you’d be a good candidate because the cholesterol level wasn’t elevated, but it did need to go down. And he says, well, you’d be a good candidate. So he just said, well I’m gonna—how about if I recommend you? And I said, well, that’d be fine. And so that’s what started my participation in the program.” – High group patient 1010003189</p>
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^aPatients were identified as high, medium, and low performers in terms of changes in low-density lipoprotein from baseline to 12 months.

eAppendix

PATIENT INTERVIEW SCRIPT

Thank you for agreeing to talk with me today. We would like to learn from your thoughts about participating in the study.

1. Let's start by having you tell us about what it was like for you to participate in the study.
 - a. Now that the study is over, what did you think about it?
2. Think back to when the study started, why did you decide to participate in the study?
 - a. What are the things that made you want to join the study?
 - b. What did you see as the pluses?
3. Describe any concerns you had about participating in the study.
4. Describe any times you thought about leaving the study.

Agreeing to be in this study meant several things – that you agreed to be randomized, that you completed a questionnaire 3 times during the study, and that you returned to the lab to have your cholesterol tested at 3, 6, 9, 12, and 15 months after you started. You were also asked to put your cholesterol lowering medicine in the GlowCap pill bottle (if you were on a cholesterol lowering medicine).

5. What was your understanding of the purpose of the study?
 - a. How important is that to you?
6. Let's talk about the things you were asked to do.
 - a. From our perspective, the goal of this study was to get patients with moderate to high risk for heart attacks to lower their cholesterol. How important was it to you to reach this goal?
 - i. What parts of the study helped you reach this goal?
 - ii. What got in the way or was challenging about reaching your goal?
 - b. Now think about the surveys. What impact, if any, did they have on you?

- c. What did you think about using a pill bottle that sent a signal to the researchers every time you opened the bottle? *[Note: ask only if on medication]*
 - i. What were some issues or difficulties you faced with using the glowcap?
- d. What did you think about having your cholesterol checked every 3 months?

7. **NOTE ONLY ASK QUESTION #7 IF PATIENT IS IN ARM #3 OR #4**

What are your thoughts on using lottery payments to help motivate patients to stay in the study?

- a. How did the possibility of you getting an incentive affect what you did? How about the possibility of your physician getting an incentive?
- b. What are your thoughts about the size of the incentives for you? How about for your physician?
 - i. Describe how well compensated you felt for participating in the study.
- c. Describe any conversations you had with your physician about the incentives

- 8. Describe any effect participating in the study had on your relationship with your doctor.
- 9. What are some challenges that you have experienced in reducing your cholesterol?
 - a. Describe ways you have tried to reduce your cholesterol before this study.
 - b. How has participating in this study affected how you plan to keep working on lowering your cholesterol?
- 10. Describe any ways the study helped you in being successful in lowering your cholesterol.

11. Best performers: ONLY ASK QUESTION #11 FOR PATIENTS IN THIS

CATEGORY

During this study, you actually did very well in reducing your cholesterol and keeping it in a good range. Describe how the study helped you accomplish this. *(Prompt if needed wireless pill bottles, patient incentive, provider incentive, knowing someone was monitoring your adherence,).*

12. Worst performers: ONLY ASK QUESTION #12 FOR PATIENTS IN THIS CATEGORY

During this study, your cholesterol [did not change a lot/increased] [*Note: Interviewer substitute best descriptor*]. What things about the study were not helpful to you?

- i. *Prompt if needed: wireless pill bottles*
- ii. *patient incentive*
- iii. *provider incentive*
- iv. *knowing someone was monitoring your adherence*

What could have been more helpful to you in getting your cholesterol under better control?

Everyone

13. If you could have changed something about the way the study was done, what changes would have helped you better control your cholesterol?

14. Other than the effects on your cholesterol, describe how participation in this study affected you?

- a. For example, describe any impact on how you manage your medications or how you dealt with any other conditions you have?

15. Tell us about any suggestions you have about how we could make the study experience better or more effective for future participants?

16. Is there anything else important that you would like us to know about participating in this study that we have not asked specifically about?