Web-Based Education Prior to Outpatient Orthopaedic Surgery Enhances Early Patient Satisfaction Scores

A Prospective Randomized Controlled Study

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Background: A good patient-surgeon relationship relies on adequate preoperative education and counseling. Several multimedia resources, such as web-based education tools, have become available to enhance aspects of perioperative care.

Purpose/Hypothesis: The purpose of this study was to evaluate the effect of an interactive web-based education tool on perioperative patient satisfaction scores after outpatient orthopaedic surgery. It was hypothesized that web-based education prior to outpatient orthopaedic surgery enhances patient satisfaction scores.

Study Design: Randomized controlled trial; Level of evidence, 1.

Methods: All patients undergoing knee arthroscopy with meniscectomy, chondroplasty, or anterior cruciate ligament reconstruction or shoulder arthroscopy with rotator cuff repair were eligible for inclusion and were randomized to the study or control group. The control group received routine education by the surgeon, whereas the study group received additional web-based education. At the first postoperative visit, all patients completed the OAS CAHPS (Outpatient and Ambulatory Surgery Consumer Assessment of Healthcare Providers and Systems) survey. Differences in patient satisfaction scores between the study and control groups were determined with an independent t test.

Results: A total of 177 patients were included (104 [59%] males; mean age, 42 ± 14 years); 87 (49%) patients were randomized to receive additional web-based education. Total patient satisfaction score was significantly higher in the study group (97 ± 5) as compared with the control group (94 ± 8; P = .019), specifically for the OAS CAHPS core measure “recovery” (82 ± 13 vs 82 ± 23; P = .001). Age, sex, race, workers' compensation status, education level, overall health, emotional health, procedure type and complexity, and addition of a video did not influence patient satisfaction scores.

Conclusion: Supplemental web-based patient education prior to outpatient orthopaedic surgery enhances patient satisfaction scores.

Keywords: orthopaedic surgery; outpatient; web based; education; patient satisfaction; OAS CAHPS

A good patient-surgeon relationship relies on adequate preoperative education and counseling. This is also an important part in the shared decision-making process.25,26 Informed consent for a proposed procedure can be given by the patient only after he or she demonstrates adequate understanding of the information provided by the surgeon.15 McGaughey18 reported that when a patient perceives there to be a lack of information, his or her satisfaction with the surgeon and the facility decreases.

Previous studies have shown that education by the surgeon alone may not be adequate for patients to retain and recall all the provided information.9,10,14 Several multimedia resources, such as web-based education tools, have become available to enhance aspects of the perioperative care.3-6,13,21 These education platforms may aid outpatient centers in increasing patient satisfaction of the outpatient surgical experience7,19 while improving patient safety.16,27 Public reporting of patient satisfaction with the surgeon and the experience with a facility has become a national standard.1 This has led to increased transparency in the quality of health care and accountability. It has been a longtime practice for physicians and hospitals to obtain information on patient satisfaction for internal use.2

The Orthopaedic Journal of Sports Medicine, 6(1), 2325967117751418
DOI: 10.1177/2325967117751418
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However, until the arrival of the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, there was no national standard for collecting or publicly reporting this information.\textsuperscript{19,23} Having a universal national standard allows for comparisons to be made among hospitals. In addition, hospital scores are becoming increasingly important to maintain market share and to avoid the loss of reimbursement. The Centers for Medicare and Medicaid Services (CMS) plans to extend this standard to involve outpatient surgical centers in the coming years. A version of the HCAHPS survey specifically designed for outpatient surgery centers was recently released: the Outpatient and Ambulatory Surgery Consumer Assessment of Healthcare Providers and Systems (OAS CAHPS; https://oascahps.org/) (see the Appendix). This survey received final accreditation in February 2015 after field testing, reliability analysis, and finalization of the survey items.

The objective of this study was to evaluate the effect of an interactive web-based education tool on perioperative patient satisfaction scores after outpatient orthopaedic surgery. It was hypothesized that supplemental web-based education prior to outpatient orthopaedic surgery enhances patient satisfaction, as measured by the OAS CAHPS survey.

\section*{METHODS}

Prior to the start of this prospective study, institutional review board approval was obtained (PRO00042142). All subjects gave informed consent to participate. Patients were eligible for inclusion in the study if they were seen in the office by either of the 2 senior authors (M.B.B., R.A.G.) and scheduled for 1 of the following procedures: knee arthroscopy with meniscectomy and/or chondroplasty, knee arthroscopy with anterior cruciate ligament (ACL) reconstruction, or shoulder arthroscopy with rotator cuff repair. These procedures were chosen because perioperative web-based patient education protocols had been previously created and successfully implemented for those surgery types. Furthermore, the perioperative instructions for these procedures vary in complexity, ranging from “simple” knee arthroscopy instructional modules to more “complex” modules for procedures, such as ACL reconstruction and rotator cuff repair. Including this diversity in procedures would allow analysis of the influence of procedure type and complexity on the effect of web-based education. The 2 senior authors who enrolled their patients are partners in a private practice setting.

Patients were required to be 18 to 65 years old and comfortable with internet use and access. Patients were excluded if their English was not proficient enough to follow the instructions or complete the survey. Eligible patients were identified from the electronic medical record and surgical scheduling system.

Once patients were enrolled, a random number generator in Excel (Microsoft Office) was used to randomize them into 1 of 2 groups. All participating surgeons were blinded to each patient’s allocation. The control group received routine education by the surgeon, office, and surgery center staff, whereas the study group received web-based education in addition to the routine education.

Routine education consisted of a preoperative visit, scheduled within 2 weeks from the date of the surgery with the attending surgeon. During this visit, the surgeon explained the procedure, outlined the potential risks and complications associated with the procedure, and detailed the recovery and rehabilitation involved. An orthopaedic sports medicine fellow who was present reiterated the information. This fellow also performed a history and physical examination and provided prescriptions. Next, the medical assistant or physician assistant working with the surgeon provided paperwork that summarized what was verbally explained by the surgeon. The night prior to the surgery, a member of the anesthesia team from the surgery center called the patient to give information and answer questions regarding the day of surgery. After the procedure, a recovery nurse provided verbal and written postoperative instructions. The day after surgery, a nurse from the surgery center called the patient to check how she or he was doing and to answer any questions. Within 2 weeks after the procedure, the patient saw the surgeon, fellow, and medical assistant for a postoperative visit to discuss the findings during surgery, recovery, and rehabilitation instructions. If indicated, physical therapy was started at this time point.

The web-based education was delivered through the cloud-based platform HealthLoop (https://app.healthloop.com/), which keeps doctors and patients connected between visits with clinical information delivered via the internet. This platform was chosen because it is provided to all physicians in the practice through the academic hospital affiliate. Custom care plans can be made by the surgeon to allow information to be sent to the patient in real time while tracking patient progress and monitoring clinical areas of concern. The web-based education contains preoperative instructions (ie, do not eat or drink after midnight, stop anti-inflammatory pain medication, what to expect in terms of pain), day-of-surgery expectations (ie, preparing for discharge home, what clothes to wear), and

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One or more of the authors declared the following potential conflict of interest or source of funding: M.B.B. is a paid consultant for Stryker. R.A.G. has stock/stock options in Johnson & Johnson, is a paid consultant for Smith & Nephew, is a paid presenter/speaker for Smith & Nephew, and receives research support from Smith & Nephew.

Ethical approval for this study was obtained from Cedars-Sinai (PRO00042142).
postoperative instructions (ie, monitoring for signs of infection, reminders to perform exercises to prevent deep venous thrombosis, tips for pain control). In addition, the web-based education dashboard can contain links to videos demonstrating an example of the surgery that the patient is to undergo. To assess the effectiveness of adding a video, only some of the patients were randomly selected to view it (see Supplemental Videos 1-3). The time frame for the instructions was from 14 days before until 14 days after the surgery. The HealthLoop website allows the surgeon to see if patients viewed the provided instructions.

At the first postoperative visit, all study and control patients were asked to complete the OAS CAHPS survey. This time point was chosen to avoid recall bias, as the web-based instructions ended 2 weeks after the procedure date. The survey consists of 24 questions divided into 5 core care measures: preoperative education, facility and staff, communication, recovery, and overall experience. In addition, it allows for certain demographic variables to be recorded, such as age, sex, overall and emotional health, education level, race and ethnicity, and English proficiency. Survey scores were normalized to a 100-point scale. In addition, whether the injury was workers’ compensation related or not was recorded.

Statistical Analysis

Descriptive statistics, including mean, range, and standard deviation, were calculated for all continuous variables. Ratios and percentages were calculated for the nominal variables.

Baseline differences between the study group and the control group were determined with an independent t test for the continuous variables and chi-square test or Fisher exact test for the nominal variables.

Differences in patient satisfaction scores between the study and control groups were calculated with an independent t test. This was done for the total score on the OAS CAHPS as well as the 5 core care measures individually: preoperative education, facility and staff, communication, recovery, and overall experience. Last, analysis of variance with a post hoc Tukey test was used to determine the effect of age, sex, race, workers’ compensation status, education level, overall health, emotional health, procedure type and complexity, and the addition of a video on patient satisfaction scores. The P level for statistical significance was set at .05.

Based on the data of a pilot study focusing solely on simple knee arthroscopy, an a priori sample size calculation was performed, and sample size was determined to be 30 patients per group, for a total of 60 patients. All analyses were performed with SPSS (v 20; IBM Corp).

RESULTS

A total of 210 patients were reviewed for eligibility, of which 33 were excluded because they did not meet the inclusion criteria. Reasons for exclusion included insufficient comprehension of English language (n = 1), refusal to participate (n = 1), revision procedure (n = 14), ineligible procedure (n = 11), and age <18 or >65 years (n = 6). This left 177 patients for participation in this study, 104 (59%) of whom were men. The mean age was 42 ± 14 years. Twenty-four patients (14%) had surgery related to a workers’ compensation case. The procedure type was classified as simple (knee arthroscopy with meniscal or chondral surgery) for 104 patients (59%) and complex (ACL reconstruction or rotator cuff repair) for the remaining 73 patients (41%). Eighty-seven patients (49%) were randomly assigned to receive additional web-based education, and of those, 59 (68%) were invited to watch a short video (Supplemental Videos 1-3) about their procedure as well (Figure 1).

There were no baseline demographic differences between the study and control groups (Table 1). The total patient satisfaction score was significantly higher in the study group as compared with the control group (Table 2). When analyzing the 5 core measures individually, there were statistically higher satisfaction scores for the “recovery” core measure (Table 2). Age, sex, race, workers’ compensation status, education level, overall health, emotional health, procedure type or complexity, and addition of a video did not influence total patient satisfaction scores (Table 3).

DISCUSSION

The most important finding of the present study was that interactive web-based education improves patient satisfaction scores after outpatient orthopaedic surgery. This was specifically true for the OAS CAHPS core measure “recovery.” Questions in this section of the survey specifically assess the level of satisfaction attained by the patient with regard to the postoperative instructions provided and expectations set by the surgeon, facility, and anesthesiologist (see the Appendix). Although all of these items were also addressed in the routine perioperative
instructions, they were emphasized in real time in the web-based education tool. It is likely that the effects from the surgery (pain, nausea, etc) were equally common in the web-educated patients but that they felt more informed about it and therefore more satisfied. This finding is consistent with existing literature showing that better communication by physicians and nursing staff influenced patient outcomes for the better.21,22,24 Yin et al27 evaluated the effect of a web-based patient education tool on the periparative experience of patients undergoing first-time knee arthroscopy for a meniscal tear. Patients in that study were randomized to receive standard preoperative counseling or in conjunction with web-based education. When all patients were tested on their knowledge of the surgery, the group that received additional web-based education was significantly more informed. Indeed, other authors have highlighted the growing interest in various types of media as a platform for information surrounding orthopaedic procedures.20 In a study on patients undergoing total hip and total knee arthroplasty, patients posted experiences on the social media site Instagram within a week after surgery. The shared topics included rehabilitation, wound healing, and difficulties with activities of daily living.20 In other fields, use of an educational video was linked to improved knowledge, self-efficacy in recognizing certain symptoms, and patient satisfaction.8 However, other types of educational material, such as handouts and brochures, may have a similar benefit and might be more easily accessible to patients who do not own a computer or have access to the internet. In the present study, adding a video to the instructions did not make a significant difference in patient satisfaction.

The improvement in overall OAS CAHPS score was statistically significant with the use of web-based education. This was largely attributable to the “recovery” items. It is difficult to discern whether these small statistical differences are clinically significant. There are currently no criteria for what constitutes a clinical meaningful difference in OAS CAHPS score. The 2 senior authors thought that implementation of this education program into their private practice was easy and did not negatively affect the flow of their practice. A small improvement in patient satisfaction may provide a competitive advantage for a practice in a saturated area.

Another finding of this study was that age, workers’ compensation status, and overall health did not influence total patient satisfaction scores. This is not consistent with the findings from Tashjian et al,22 who showed that after rotator cuff surgery, satisfaction was significantly correlated with overall health status. They also showed that married nondisabled patients who were employed at the time of surgery had greater satisfaction.22 It is possible that this was not captured in the present study, as it was conducted in an outpatient surgery center where patients with significant medical comorbidities were referred to institutions that were able to deliver the required inpatient care. A study by Abtahi et al1 showed that older patients and those who lived farther away from the facility had higher satisfaction scores in the authors’ outpatient orthopaedic clinic. Specifically, they found that the odds ratio of satisfaction for patient age of 18 to 29 years versus >80 years was 2.78. A strength of the present study is that it is one of the first to measure patient satisfaction after outpatient surgery with a tool designed for this goal. Although the OAS CAHPS is rather new, it is a carefully designed, nationally standardized survey that will become increasingly important in the health care world to allow for comparisons among hospitals and to comply with the CMS. This study does have limitations. Included patients were not blinded to whether they belonged to the test or control group. Although it was possible to see the compliance rate of patients viewing the instructions, it was not possible to determine if they actually followed them and how much time they spent doing so. A variety of procedures was included to determine the effect to procedure type on the effectiveness of the web-based education; however, this could also be a cause of heterogeneity. The survey was administered within 2 weeks after the procedure, and longer follow-up to evaluate the clinical outcome of the

**TABLE 1**

Demographic Data of Study and Control Groups

| HealthLoop (n = 87) | Control (n = 90) | P Value |
|---------------------|-----------------|---------|
| Age, y              |                 |         |
| 43 ± 13             | 42 ± 15         | .578    |
| Sex: male           |                 |         |
| 48 (55)             | 56 (62)         | .341    |
| Overall health: excellent | 19 (22)      | .588    |
| Emotional health: excellent | 22 (25)      | .124    |
| Education level: >college | 46 (53)     | .092    |
| Race: white         |                 |         |
| 37 (43)             | 37 (41)         | .408    |
| Procedure: simple   |                 |         |
| 47 (54)             | 57 (63)         | .225    |

**TABLE 2**

Difference in Patient Satisfaction Scores Between the Study and Control Groups

| OAS CAHPS Survey Score, Mean ± SD |
|-----------------------------------|
| Total                             |
| Preoperative Education            |
| Facility and Staff                |
| Communication                     |
| Recovery                          |
| Overall Experience                |
| HealthLoop (n = 87)               |
| 97 ± 5                            |
| 98 ± 8                            |
| 99 ± 5                            |
| 98 ± 8                            |
| 92 ± 13                           |
| 98 ± 5                            |
| Control (n = 90)                  |
| 94 ± 8                            |
| 97 ± 10                           |
| 98 ± 7                            |
| 96 ± 10                           |
| 82 ± 23                           |
| 98 ± 5                            |
| P value                           |
| .019 b                           |
| .586                            |
| .410                            |
| .392                            |
| .001 b                           |
| .903                            |

aOAS CAHPS, Outpatient and Ambulatory Surgery Consumer Assessment of Healthcare Providers and Systems.
bSignificant difference between groups, P < .05.
procedure was not performed. We decided to administer the survey at that time out of concern for recall bias, because the web-based education protocol that was tested provided instructions from only 2 weeks before until 2 weeks after the surgery. It is our intent to implement a web-based education program that runs longer and to evaluate the long-term effect on patient satisfaction. In addition, improved patient satisfaction does not necessarily imply improved clinical outcomes. It is a goal to see if web-based education positively affects clinical outcomes and if it can play a role in the prevention of complications. Last, this study was conducted in an outpatient surgery center that performs many of the same types of procedures. Therefore, the ancillary staff is very familiar with the perioperative care; thus, a consistent message is delivered by multiple members of the care team. As a small but statistically significant improvement was seen in this setting, this may be even more pronounced in larger-scale facilities with more diverse procedures and turnover in staff and less continuity of care.

The findings of the present study are clinically relevant, as they show that supplemental education tools may improve patient satisfaction after outpatient surgery and patient understanding of the postoperative instructions. Patient satisfaction rates of facilities may become publicly reported, as the CMS plans to use these data for reimbursement. This is a high-yield topic in the medical field today, with the need to decrease health care costs while maintaining a high standard of care.

CONCLUSION

The results of this study indicate that supplemental web-based patient education prior to outpatient orthopaedic surgery can enhance patient satisfaction scores.

ACKNOWLEDGMENT

The authors acknowledge Thelma Hambrick, MA, and Adam Cady, MHS, ATC, CSCS, PA-C, without whose efforts in patient recruitment and survey administration this study would not have been possible.

TABLE 3

| Influence of Several Demographic Factors on Total Patient Satisfaction Score | P Value |
| --- | --- |
| Age | .271 |
| Sex | .067 |
| Race | .709 |
| Workers’ compensation status | .628 |
| Education level | .342 |
| Overall health | .243 |
| Emotional health | .137 |
| Complexity of procedure | .270 |
| Adding a video | .881 |

A Video Supplement for this article is available at http://journals.sagepub.com/doi/suppl/10.1177/2325967117751418.

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Consumer Assessment of Healthcare Providers and Systems Outpatient and Ambulatory Surgery Survey

(OAS CAHPS®)

A PATIENT EXPERIENCE OF CARE SURVEY ABOUT OUTPATIENT AND AMBULATORY SURGERIES

AND PROCEDURES

2016

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SURVEY INSTRUCTIONS

Answer all the questions by checking the box to the left of your answer.

You are sometimes told to skip over some questions in this survey. When this happens you will see an arrow with a note that tells you what question to answer next, like this:

☑️ Yes
☐ No

If No, go to #1

This survey asks about your experience at the facility named in the cover letter. For this survey, we use the term “procedure” for diagnostic, surgical or other procedures. We refer to “facility” as the place where you had your procedure.

Please answer these questions only for the procedure(s) you had on the date included in the cover letter. Do not include any other procedures in your answers.

I. BEFORE YOUR PROCEDURE

The first few questions are about getting ready for your procedure. Include any information you received before and on the day of your procedure.

1. Before your procedure, did your doctor or anyone from the facility give you all the information you needed about your procedure?
   1. Yes, definitely
   2. Yes, somewhat
   3. No

II. ABOUT THE FACILITY AND STAFF

The next questions ask about the day of your procedure.

3. Did the check-in process run smoothly?
   1. Yes, definitely
   2. Yes, somewhat
   3. No

4. Was the facility clean?
   1. Yes, definitely
   2. Yes, somewhat
   3. No

5. Were the clerks and receptionists at the facility as helpful as you thought they should be?
   1. Yes, definitely
   2. Yes, somewhat
   3. No

(continued)
|   |   |   |
|---|---|---|
| 1 | Yes, definitely |   |
| 2 | Yes, somewhat |   |
| 3 | No |   |

**III. COMMUNICATIONS ABOUT YOUR PROCEDURE**

As a reminder, please include any information you received before and on the day of the procedure.

9. Did the doctors and nurses explain your procedure in a way that was easy to understand?

1. Yes, definitely
2. Yes, somewhat
3. No

10. Anesthesia is something that would make you feel sleepy or go to sleep during your procedure. Were you given anesthesia?

   1. Yes
   2. No ➔ If No, go to #13

11. Did your doctor or anyone from the facility explain the process of giving anesthesia in a way that was easy to understand?

   1. Yes, definitely
   2. Yes, somewhat
   3. No

12. Did your doctor or anyone from the facility explain the possible side effects of the anesthesia in a way that was easy to understand?

   1. Yes, definitely
   2. Yes, somewhat
   3. No

13. Discharge instructions include things like symptoms you should watch for after your procedure, instructions about medicines, and home care. Before you left the facility, did you get written discharge instructions?

   1. Yes
   2. No

(continued)
IV. YOUR RECOVERY

14. Did your doctor or anyone from the facility prepare you for what to expect during your recovery?
   1  Yes, definitely
   2  Yes, somewhat
   3  No

15. Some ways to control pain include prescription medicine, over-the-counter pain relievers or ice packs. Did your doctor or anyone from the facility give you information about what to do if you had pain as a result of your procedure?
   1  Yes, definitely
   2  Yes, somewhat
   3  No

16. At any time after leaving the facility, did you have pain as a result of your procedure?
   1  Yes
   2  No

17. Before you left the facility, did your doctor or anyone from the facility give you information about what to do if you had nausea or vomiting?
   1  Yes, definitely
   2  Yes, somewhat
   3  No

18. At any time after leaving the facility, did you have nausea or vomiting as a result of either your procedure or the anesthesia?
   1  Yes
   2  No

(continued)
19. Before you left the facility, did your doctor or anyone from the facility give you information about what to do if you had bleeding as a result of your procedure?
   1 □ Yes, definitely
   2 □ Yes, somewhat
   3 □ No

20. At any time after leaving the facility, did you have bleeding as a result of your procedure?
   1 □ Yes
   2 □ No

21. Possible signs of infection include fever, swelling, heat, drainage or redness. Before you left the facility, did your doctor or anyone from the facility give you information about what to do if you had possible signs of infection?
   1 □ Yes, definitely
   2 □ Yes, somewhat
   3 □ No

22. At any time after leaving the facility, did you have any signs of infection?
   1 □ Yes
   2 □ No

V. YOUR OVERALL EXPERIENCE

23. Using any number from 0 to 10, where 0 is the worst facility possible and 10 is the best facility possible, what number would you use to rate this facility?
   - □ 0 Worst facility possible
   - □ 1
   - □ 2
   - □ 3
   - □ 4
   - □ 5
   - □ 6
   - □ 7
   - □ 8
   - □ 9
   - □ 10 Best facility possible

24. Would you recommend this facility to your friends and family?
   - □ Definitely no
   - □ Probably no
   - □ Probably yes
   - □ Definitely yes

(continued)
### VI. ABOUT YOU

25. In general, how would you rate your overall health?
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor

26. In general, how would you rate your overall mental or emotional health?
   - [ ] Excellent
   - [ ] Very good
   - [ ] Good
   - [ ] Fair
   - [ ] Poor

27. What is your age?
   - [ ] 18 to 24
   - [ ] 25 to 34
   - [ ] 35 to 44
   - [ ] 45 to 54
   - [ ] 55 to 64
   - [ ] 65 to 74
   - [ ] 75 to 79
   - [ ] 80 to 84
   - [ ] 85 or older

28. Are you male or female?
   - [ ] Male
   - [ ] Female

29. What is the highest grade or level of school that you have completed?
   - [ ] 8th grade or less
   - [ ] Some high school, but did not graduate
   - [ ] High school graduate or GED
   - [ ] Some college or 2-year degree
   - [ ] 4-year college graduate
   - [ ] More than 4-year college degree

30. Are you of Hispanic, Latino, or Spanish origin?
   - [ ] Yes, Hispanic, Latino, or Spanish
   - [ ] No, not Hispanic, Latino, or Spanish → If No, go to #32

31. Which group best describes you?
   - [ ] Mexican, Mexican American, Chicano
   - [ ] Puerto Rican
   - [ ] Cuban
   - [ ] Another Hispanic, Latino, or Spanish origin

(continued)
32. What is your race? You may select one or more categories.

1  White
2  Black or African American
3  American Indian or Alaska Native
4  Asian Indian
5  Chinese
6  Filipino
7  Japanese
8  Korean
9  Vietnamese
10 Other Asian
11 Native Hawaiian
12 Guamanian or Chamorro
13 Samoan
14 Other Pacific Islander

33. How well do you speak English?

1  Very well
2  Well
3  Not well
4  Not at all

34. Do you speak a language other than English at home?

1  Yes
2  No ➔ If No, go to #36

35. What is that language?

1  Spanish

2  Other Language (PLEASE SPECIFY):

(Please print.)

36. Did someone help you complete this survey?

1  Yes
2  No ➔ If No, go to END.

37. How did that person help you? Check all that apply.

1  Read the questions to me
2  Wrote down the answers I gave
3  Answered the questions for me
4  Translated the questions into my language
5  Helped in some other way: (EXPLAIN):

(Please print.)

6  No one helped me complete this survey

END