Supermarket Tour: The Effect of Presentation Mode on Nutrition Knowledge and Attitudes

Ronald F. Kahn, MD; Patricia O'Sullivan, EdD; Patricia M. Vannatta, MSPH

**Background and Objectives** A supermarket tour is an interactive experience in which students learn nutrient composition of common foods, requirements for various nutrients, issues related to eating behaviors, diseases associated with nutrient intake, and how food marketing, labeling, and regulation influence what people choose to eat. This study determined if presentation mode of a supermarket tour influenced medical students’ nutrition knowledge and attitudes. **Methods** Senior medical students received nutrition instruction in one of four presentation modes: live (n=11), small-group 2-hour virtual (n=8), large-group 2-hour virtual (n=69), and large-group virtual in four half-hour sessions across 4 days (n=37). The same instructor gave all tours. Students completed pre- and post-course evaluations and knowledge tests. **Results:** After the intervention, students participating in live and single-session groups had greater nutrition knowledge than the students participating in the extended course. Students in small groups also had higher confidence in giving nutrition advice. There was no difference among the four groups for enthusiasm. Students gave a higher recommendation to the live mode than to the extended version. **Conclusions:** The virtual tour is effective at improving knowledge, engaging, and provides information that students may use for themselves and their patients. Single-session live teaching is most well received.

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Medical students traditionally receive little education about nutrition. Despite recommendations from numerous authorities, medical schools have been slow to incorporate nutrition education into their curricula. According to the Association of American Medical Colleges (AAMC), senior medical students consistently report inadequate nutrition education. In 2001, 64% of students responded that time devoted to nutrition was inadequate. Nonetheless, nutrition advice and dietary modifications are a major component of the guidelines of several organizations (eg, American Diabetes Association, National Heart, Lung, and Blood Institute). Physicians need adequate nutrition knowledge, therefore, to help patients prevent and treat numerous conditions, including obesity, diabetes, and hypertension. Given the obesity epidemic and high prevalence of other nutrition-related chronic diseases in the United States, physicians increasingly must address nutrition with patients. Barriers to nutrition education in medical school include limited class time in the crowded schedule and limited faculty time to develop and deliver nutrition information. Recognizing the difficulty of integrating nutrition education into medical school curricula and the lack of novel educational approaches, the National Institutes of Health awarded Nutrition Academic Awards (NAA) to 21 medical schools to develop and disseminate innovative nutrition curricula. The NAA program emphasizes teaching nutrition principles and clinical practice skills to medical students, house staff, practicing physicians, and other health care students. The dissemination of nutrition educational modules, guides, and other materials is an expected outcome of the program and one that will help other schools unable to allocate resources to curricular development.

For the past 15 years, the University of Arkansas for Medical Sciences (UAMS) has successfully used a live supermarket tour for teaching nutrition. As part of regular teaching assignments, one faculty member has conducted the live tour in a supermarket for family practice residents and small groups of medical students during the family medicine clerkship and during elective rotations in clinical nutrition. While the supermarket
tour has the advantage of being interactive, there are practical limitations to a live supermarket tour. One faculty member can only take a few students at a time through a supermarket. When groups are large, students may have difficulty hearing the instructor. Students in large groups also interfere with store traffic. Even if it were feasible to schedule all students in small groups for tours, the demand on faculty time would be prohibitive. Therefore, alternate ways are needed to provide students with a supermarket tour that maintains the engaging and interactive qualities of the live tour. This study determined if alternate modes could be used to present a supermarket tour and if these methods influenced medical students’ nutrition knowledge and attitudes.

Methods
Design and Sample
This study was a quasi-experimental pre/post study of four presentation modes of a supermarket tour. Fourth-year medical students completed the supermarket tour in either live, small-group virtual, large-group single-session virtual, or large-group extended virtual presentations.

Due to logistical concerns, two entire classes of fourth-year medical students were necessary to evaluate four presentation modes. These students were attending a required senior nutrition course and had never participated in a supermarket tour as part of their curriculum. In 1 year, students participated in a single-session virtual tour of a supermarket. In the other year, students were randomly assigned to one of the remaining three presentation modes: live tour, small-group virtual tour, or large-group extended virtual tour. Since the live tour and small virtual tour had space restrictions, two random samples of 16 students each were selected from the entire fourth-year class of 138 to fill these two groups. From these 32 students, we contacted individuals and asked them to participate until we filled 10 slots in the live tour and 10 slots in the small-group virtual tour. Most who declined had scheduling conflicts. The live tour was larger than optimal to provide a sufficient sample for this study. The small-group virtual session was designed to allow comparison on group size. The remaining students participated in the large-group extended tour. All students had pre and post measures of knowledge and attitude.

Intervention
The goals of the supermarket tour were for students to learn (1) nutrient composition of common foods, (2) the requirement for various macro and micro nutrients, (3) diseases associated with excess or deficient intake of various foods and nutrients, and (4) how food marketing, labeling, and regulation influence what people choose to eat.

A faculty member (guide) directed the tour. The guide moved from one section of the grocery store to another reviewing different foods and relating those foods to the four goals listed above. For many foods, the students examined food labels and answered questions about information on the label. During the tour, the guide directed students’ attention to various marketing strategies used for food labeling and placement to encourage customers to purchase.

Live Tour. The live supermarket tour lasted approximately 2 hours, during which students received a guided tour of the grocery store as described above. The tour is characterized by high interaction between the students and the instructor.

Virtual Tours. Photographs from the supermarket were incorporated into a 2-hour PowerPoint presentation presented with the same commentary used during the live tour. In this format, questions appeared on the PowerPoint slide similar to those asked during a live tour with students using an audience response system to choose the correct answer. Their responses provided an opportunity for interaction. In one mode, the instructor presented the virtual tour to a small group of students during a 2-hour session. In a second mode, a large group of students received the content in a single 2-hour session. Finally, another large group participated in half-hour sessions across 4 consecutive days.

Measures
Knowledge Measure. A seven-item knowledge test was developed by the research team to reflect the objectives of the tour. Since students took the pretest and posttest within a short period of time, the tests were constructed with different items covering the same objectives. The tests were brief so that class time could focus on instruction. The test had a reliability value of .38. While low, this is an expected value for such a short assessment instrument.

Attitude Measure. The attitude measure consisted of 10 items rated on a 5-point Likert scale from strongly disagree (1) to strongly agree (5). Items were factor analyzed using principal components factor analysis. The resulting two factors accounted for 61% of the variance and were labeled “confidence in ability” and “enthusiasm for nutrition.” The reliabilities for the two factors were .81 for confidence and .88 for enthusiasm. The confidence factor had six items, such as the ability to advise patients about “how to lower fat in their diet” and “understand food labels.” The enthusiasm factor had four items such as “improving my own diet” and “learning more about nutrition.” Items were summed for each factor obtaining two attitude scores.

Procedures
The same tour guide conducted all tours in April of consecutive years. The students were attending a required week of nutrition education as part of the last
month of their fourth-year medical school curriculum. Students randomized to the small groups were contacted in advance to obtain their agreement to participate. Small-group size was limited to 10 based on previous experience with students in the supermarket. Students completed the pretest prior to the tour (live or virtual). Immediately following the tour, students completed the posttest. On the posttest, the students indicated whether they would recommend to others learning nutrition in this format (using the strongly disagree to strongly agree scale). The students wrote comments in response to the following two questions: “What in this experience positively enhanced your perspective about the importance of nutrition?” and “What in this experience detracted from your learning about nutrition?” Students in all but the large-group extended virtual tour provided pretest and posttest data on the same day. Students in the extended group completed the pre and post assessments 4 days apart.

Analysis

An analysis of covariance (ANCOVA) was performed to determine if there was a difference among the four groups for posttest knowledge and attitude scores. The pretest scores served as covariates to adjust for group differences at the beginning of the study. The independent variable was the mode of supermarket tour instruction. The level of significance was set at .05 for each statistical analysis. The small sample size in two of the groups precluded the use of multivariate analysis simultaneously analyzing knowledge and attitudes. Significant ANCOVA results were followed with Tukey post hoc tests to determine the groups that differed significantly from each other as a result of the intervention. Differences among the four groups were assessed with a Kruskal-Wallis analysis for the single item concerning their recommendation of the mode of presentation. SPSS Version 11.0® was used for all analyses.

Results

The live group had one more participant than planned when a student who was randomized to the tour but not confirmed appeared at the supermarket. Pre- and post-course evaluations were available for all students. Two of 10 scheduled students failed to attend the small virtual group, yielding eight sets of pre- and post-course data. For the large single-session tour, pre and post data could be matched for 69 students. For the extended large-group virtual tour, matched data were available for 37 students. Nearly two thirds of these students attended all four supermarket sessions (61.5%).

For the entire sample in this study, students knew 3.7 (standard deviation [SD]=1.4) nutrition items at baseline, and that increased modestly to 4.4 (SD=1.4) at posttest. They were initially confident (mean=3.7, SD=.6) and enthusiastic (mean=4.0, SD=.6) and sustained those levels post intervention (confidence: mean=4.2, SD=.5; enthusiasm: mean=4.2, SD=.6). Table 1 summarizes the knowledge and attitude results by the four groups.

<table>
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<tr>
<th><strong>Table 1</strong></th>
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<tr>
<td>Knowledge and Attitude Scores by Presentation Mode</td>
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<td><strong>Group</strong></td>
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<tr>
<td>Small live</td>
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<td>Small single-session virtual</td>
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<tr>
<td>Large single-session virtual</td>
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<tr>
<td>Large extended virtual</td>
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<th><strong>Group</strong></th>
<th><strong>PRE</strong></th>
<th><strong>POST</strong></th>
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<tbody>
<tr>
<td>Small live</td>
<td>11</td>
<td>5.55a</td>
</tr>
<tr>
<td>Small single-session virtual</td>
<td>8</td>
<td>5.38a</td>
</tr>
<tr>
<td>Large single-session virtual</td>
<td>69</td>
<td>4.61ab</td>
</tr>
<tr>
<td>Large extended virtual</td>
<td>37</td>
<td>3.35b</td>
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</tbody>
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| **P Value** | <.001 | <.001 | .054 |

*P values are for the analysis of covariance for between-group differences in the posttest
*a and b—groups with different letters differed on the Tukey post-hoc tests.

**Mean number of correct answers out of 7 possible correct answers

***Mean score on a 5-point Likert scale, with a 5 indicating maximum confidence

****Mean scores on a 5-point Likert scale, with 5 indicating maximum enthusiasm

SD—standard deviation

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At the end of the intervention, there were significant differences based on the ANCOVA among the four groups for knowledge and confidence. The live and both single-session virtual tours had greater knowledge at the end of the intervention compared to the virtual extended tour ($P<.001$). Small groups—live and single-session virtual—had significantly higher confidence than the large virtual extended tour but not significantly higher than the large single-session virtual tour. The difference among the four groups was not significant for enthusiasm ($P=.054$).

There was a significant difference among the tours in their recommendation for learning nutrition based on the mode they experienced ($P=.06$; see Table 2). The live tour gave the strongest endorsement as shown by the highest mean rank; 82% of students in the live group gave a highest rating.

Students also wrote comments on their post-assessment about the supermarket tour. All groups identified positive themes. The students liked specific content such as learning about labeling and marketing. They also enjoyed interacting, whether it was the hands-on experience in the actual supermarket or using the audience response system. Finally, all groups reported an appreciation for the applicability of the information to both patients and themselves. Two negative themes were identified. Students reported that the content should be given earlier than the fourth year. Secondly, distraction was reported from shoppers during the live tour and long periods of sitting during the virtual tours.

Discussion

Overall, this study indicates that the supermarket tour is effective for improving medical student nutrition knowledge and attitudes and that the virtual tour is effective if given in a single session. The virtual tour, as an alternative to a live tour, is engaging and provides information that students can use for themselves and their patients. Students started out fairly enthusiastic about nutrition and maintained that enthusiasm. The presentation mode did not differentially affect enthusiasm. These findings indicate that virtual tours delivered to large classrooms of students can be an efficient way to provide nutrition education.

The lack of the success of the extended format is noteworthy. We included the extended format to evaluate an alternative to 2 hours of continuous sitting. However, we perceived that students found it difficult to reengage each day and that shorter sessions disrupted the natural flow of the tour.

Students identified reasons why the supermarket tour, even the virtual tour, was effective. First, students enjoyed the interactivity and felt involved with the content. The students reported that interacting with real situations or active participation in class kept them engaged. Second, students valued specific content. Even what appeared to be a relatively simple task of reading a food label required explanation and practice, and students appreciated this opportunity. Finally, the students reported that using a real-life context was helpful for them and their patients.

The findings of the study agree with previous research indicating that medical students value interactive educational experiences that enable them to explore their own nutrition. Additionally, learning is enhanced when the learner has the opportunity to translate concepts into very practical, personal, and professional applications in an environment with “activity, instant feedback, and positivity.” The supermarket tour engages the learner’s interest and personalizes the message. Such concepts are key to influencing the individual’s knowledge and ability to apply the information to patient care.

Limitations

This study has several limitations. They include group size and composition, attrition, tour guide, use of two different classes of students, and reliability of the knowledge test. Live tour groups have to be small for logistical reasons. The study could have been improved with multiple small live tour groups, but within the time frame available, our guide was able to conduct only one live tour. The small groups, while selected from a random sample, may have been biased because students were willing to come to sessions at a time other than what was already scheduled. We could not match some student data during the extended tour. While the course was required, students had to attend only 80% of the sessions. Many who were there the last day did not have a pre-measure. Having the same tour guide enhances the internal validity of the study but limits the generalizability of our results. The effectiveness of the tour with other guides should be explored. Within the schedule of this course, it was not possible to split the class into two large groups, single and extended; therefore, we used two different senior classes. While the knowledge score reliability is low, this would normally decrease statistical significance by increasing the standard error. Therefore, the significance would likely be sustained with an improved measure.

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<th>Table 2</th>
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<td><strong>Recommendation to Others As a Way to Learn Nutrition</strong></td>
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<table>
<thead>
<tr>
<th>Group</th>
<th>N</th>
<th>Median</th>
<th>Mean Rank</th>
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<tbody>
<tr>
<td>Small live</td>
<td>11</td>
<td>5</td>
<td>85.14</td>
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<tr>
<td>Small single-session virtual</td>
<td>7</td>
<td>5</td>
<td>75.71</td>
</tr>
<tr>
<td>Large single-session virtual</td>
<td>65</td>
<td>4</td>
<td>60.72</td>
</tr>
<tr>
<td>Large extended virtual</td>
<td>37</td>
<td>4</td>
<td>49.92</td>
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$P=.006$ for Kruskall-Wallis analysis
Conclusions

We plan to present the virtual tour to first-year medical students to compare the effectiveness of the experience with that of fourth-year students. We have used the live tour with first-year family practice residents during their orientation and with third-year medical students in the family medicine clerkship and are in the process of evaluating these experiences. Despite the limitations of this study, we conclude that the virtual supermarket tour is an efficient, effective, and engaging way to present nutrition education in medical school and a good alternative when group size is too large for a live tour.

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References