Outcomes Analysis of Case-based Education in a Multidisciplinary, Multiple Format Setting

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BACKGROUND

Target Audience
This series of courses was designed to benefit anesthesiologists and other health care professionals involved in the prevention and treatment of postoperative nausea and vomiting (PONV).

Needs Assessment/Program Rationale
Despite major advances in antiemetic drug therapy and a better understanding of the risks of PONV, the problem has not been adequately resolved—even the 5-HT3 receptor antagonists, when used alone, offer only about a 30% reduction in PONV. There remains a need for new antiemetic therapies with new and novel mechanisms that have the potential to offer broad-spectrum coverage against PONV, thus offering anesthesiologists another viable option for optimizing outcomes in the surgical setting.

An education series was designed to review the issues in PONV management, discuss the current treatment options including newer therapies, and review the most recent consensus panel guidelines. New classes of agents, such as the NK1 receptor antagonists, were to be reviewed for their broad spectrum of activity and for the benefits of oral administration.

The aims of the series were to provide attendees with cutting-edge information and new ways of thinking about the management of PONV and to assist them in making the most informed decisions for their surgical patients.

WORK DONE

Outcomes Measurement and Peer Review
Educational Measures (EM) is a Colorado-based company specializing in the evaluation and outcomes assessment of educational activities using innovative technology such as EducationalTrak™. EM was contracted to develop an online database for the evaluation and analysis of outcomes data generated during this series.

Results
Where appropriate, data from multiple meetings were grouped together to maximize statistical validity. Sub-analyses were then made to elucidate any possible trends within the combined analyses.

Program Attendance
Two hundred eighty-nine attendees (89 at the first program [ASPS] and 200 at the remaining 12 dinner meetings) participated in the Outcomes evaluation, where a specialty was also given. The demographic makeup of participants at all programs (combined data) is
shown in Table 1. The highest proportion was for nurses and physician’s assistants (46.4%). Anesthesiologists made up 28% of attendees, and surgeons made up 18% of attendees.

CASE QUESTIONS

Case Study #1

A non-smoking woman aged 28 years presents for abdominoplasty and ventral hernia repair under general anesthesia. The patient gives a history of motion sickness and problems with nausea and vomiting after a previous gynecologic procedure. Desflurane is used as the anesthetic agent, and fentanyl (100 μg) is given intravenously peri-induction. In the PACU, she is given hydrocodone with a drink of water for pain.

Question 1

How many risk factors for PONV are mentioned in this case study?

The correct answer was “at least 4.” Before the meeting, 69% of the audience gave the correct answer; 96.2% knew the answer post-meeting, and 96.9% knew the answer at up to 12 weeks post-meeting, indicating good knowledge retention. The difference between pre-meeting knowledge levels and all 3 post-meeting timepoints was highly statistically significant (P < .001). Anesthesiologists and surgeons answered correctly most often pre-meeting, but all groups had improved knowledge (up to 100% correct) by the end of the program.

Question 2

Which of the following is not associated with an increased risk of PONV?

The correct answer is “history of smoking.” Immediately after the meeting, a highly statistically significant change in knowledge occurred (P < .001). By 6 weeks after the meeting, the difference was still significant, but less so (P < .01), and at 12 weeks the difference was just statistically significant (P = .07). Interestingly, 31% of participants were unaware of this information before the meeting, and these were mostly anesthesiologists. Even so, 94% of participants had learned the correct information post-meeting, and this stabilized with

Table 1. Specialty

<table>
<thead>
<tr>
<th>Answer</th>
<th>Total</th>
<th>%</th>
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<tbody>
<tr>
<td>Nursing</td>
<td>99</td>
<td>34.26%</td>
</tr>
<tr>
<td>Surgery</td>
<td>51</td>
<td>17.65%</td>
</tr>
<tr>
<td>Anesthesiology</td>
<td>80</td>
<td>27.68%</td>
</tr>
<tr>
<td>Physicians Assistant</td>
<td>25</td>
<td>8.65%</td>
</tr>
<tr>
<td>Nurse Practitioner</td>
<td>10</td>
<td>3.46%</td>
</tr>
<tr>
<td>Other</td>
<td>24</td>
<td>8.3%</td>
</tr>
</tbody>
</table>

Figure 1. Results from case study 1, question 1: How many risk factors for PONV are mentioned in this case study?

Figure 2. Results from case study 1, question 2: Which of the following is not associated with an increased risk of PONV?

Figure 3. Results from case study 1, question 3: This patient’s overall level of risk for PONV is . . . ?

Figure 4. Results from case study 1, question 4: Which of the following actions would not help reduce this patient’s risk of experiencing PONV?
approximately 83% of participants retaining the knowledge 12 weeks after the program.

Question 3
This patient's overall level of risk for PONV is . . . ?
The correct answer is “high risk.” Knowledge change and retention was highly statistically significant at all 3 timepoints ($P < .001$). The highest proportion of wrong answers (29% of participants) were given mostly by nurses or anesthesiologists. Knowledge retention was good, with 97% of participants giving the correct answer at the 12-week follow-up.

Question 4
Which of the following actions would not help reduce this patient's risk of experiencing PONV?
The correct answer was that to encourage post-operative intake of oral fluids does not reduce the risk of PONV.

This question elicited the lowest level of correct responses pre-meeting (42%). Unfortunately, the required information was not provided clearly enough to the audience: only 62% of participants gave the correct response post-meeting, and this level had fallen to 47% at the 12-week follow-up assessment. While the increase in knowledge was highly statistically significant immediately after the meeting, the level of significance reduced over time, with $P < .01$ at 6 weeks, but not significant at 12 weeks ($P < 1$).

Case Study #2
Ms. Smith, a 38-year-old non-smoking woman, is scheduled for facelift surgery as ambulatory procedure. She has a previous history of PONV when she had a gynecological laparoscopy and a history of motion sickness.

Question 1
Which of the following antiemetic regimens would not be appropriate for the prevention of PONV in this patient?
The correct answer is metoclopramide. Although post-meeting response rates were good, there was a marked decline in knowledge retention by the 12-week assessment, suggesting that reinforcement should be applied. Knowledge gain and retention was highly statistically significant post-meeting and at 6 weeks ($P < .001$), but not significant at 12 weeks ($P < 1$). Though just over half of participants provided the correct answer pre-meeting, almost one-fifth believed triple prophylaxis to be inappropriate for prevention of PONV. Again, the majority of those giving triple therapy as the answer (19% of the total) were nurses.

Question 2
If antiemetic therapy fails in this patient, which of the following would be the best treatment?
The correct answer is to give 5-HT3 plus droperidol, if not given prophylactically. Only 47% of participants provided the correct response before the meeting, and only 80% were correct post-meeting, showing a possible lack of communication from the speaker. This difference was statistically significant immediately post-meeting and at 6 weeks after the meeting ($P < .001$ and $P < .01$, respectively). Knowledge retention at 12 weeks remained unsatisfactory (change from pre-meeting not significant, $P < 1$). Of those who initially gave the correct response (47%), most were anesthesiologists.
Question 3
Which agent was found to provide greater emesis protection than ondansetron 48 hours post-surgery?

The correct answer is aprepitant. Only 27% of participants were aware of this before the meeting. The differences between pre-meeting and all 3 post-meeting evaluations were highly statistically significant \((P < .001)\), but the level of significance reduced with time. There was no general agreement pre-meeting on which agent provides greater emesis protection, with all 4 choices receiving 20% to 30% of the vote. Despite the participants learning during the meetings that aprepitant was the better agent, this knowledge was not retained well during the follow-up period. In the case of granisetron, almost the same proportion of responders believed it to be the best agent at 12 weeks as believed so pre-meeting. On the positive side, metoclopramide was rarely cited as the best agent post-meeting. Looking at the data by demographic group, results suggest that anesthesiologists favor droperidol and granisetron, and other specialties are more mixed in their responses (and hence, potentially, their level of relevant education).

EVALUATION

Commitment to Change
Participants were asked, “Do you intend to make changes or apply what you’ve learned to your practice as a result of attending this activity?”

Table 2 indicates sixty-six percent of participants stated a commitment to change; by activity, a statistically significant proportion of participants stated a commitment to change at 8 of the 13 programs.

Conclusions
For this activity format and this type of audience mix, case questions provided relevant education and retention of that information. Analysis of demographic data showed clear differences in responses to case questions.

Table 2. Commitment to Change

<table>
<thead>
<tr>
<th>Answer</th>
<th>Total</th>
<th>%</th>
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<tbody>
<tr>
<td>Yes</td>
<td>186</td>
<td>65.96%</td>
</tr>
<tr>
<td>No, I already practice this</td>
<td>48</td>
<td>17.02%</td>
</tr>
<tr>
<td>No, the material does not apply to my practice</td>
<td>20</td>
<td>7.09%</td>
</tr>
<tr>
<td>Not sure yet, still considering</td>
<td>28</td>
<td>9.93%</td>
</tr>
<tr>
<td>Total</td>
<td>282</td>
<td></td>
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Some case questions provided only marginal improvement in knowledge level and retention, and may need re-working to maximize their effectiveness. The reduction in knowledge improvement over time suggests that further intervention may be needed between 6 and 12 weeks post-program. In most cases, a commitment to change was declared as a result of attending one of these educational programs.

Take-Home Messages
- Case-based education can give sustained and statistically significant improvements in practical learning over time for a variety of specialties.
- Reinforcement of key learnings should be used during the follow-up period to maintain levels of improvement.
- Case-based education results in a significant commitment to change.
- Consideration of demographic group via rigorous needs assessment is important in planning cases and questions because there are clear differences in overall attitude and response to questions according to demographic group.
- Despite good case construction that results in significant improvements in learning and retention of that learning, ambiguous wording of specific questions can confuse the participants and impair this process.