Research Article

Creating and Validating Educational Material for Patients Undergoing Orthognathic Surgery

Cristina Silva Sousa, MSc, Ruth Natalia Teresa Turrini, PhD

Department of Medical-Surgical Nursing, School of Nursing, University of São Paulo, Brazil

ARTICLE INFO

Article history:
Received 22 April 2012
Received in revised form 11 October 2012
Accepted 18 October 2012

Keywords:
educational technology
health education
patient education handout
perioperative nursing
teaching materials

SUMMARY

Purpose: To create and validate educational material for patients undergoing orthognathic surgery.

Methods: The design included five phases: (a) a review of the literature regarding surgical complications; (b) gathering information on the needs of patients through blogs and virtual communities; (c) evaluating patient perceptions of the post-operative period through a focus group; (d) obtaining information through specialists using the Delphi technique and validation by judges; and (e) validation by patients in terms of understanding the exhibited material.

Results: The first three phases of the study and the first round of the Delphi technique assisted in generating the perioperative patient booklet. The following rounds of the Delphi technique introduced modifications to improve the material, with the judges agreeing on the final material to be validated by patients.

Conclusion: Creating a booklet involves more than simply writing summarized ideas on a paper and handing it to the patient. One must understand the population, involve the relevant professionals, and obtain high-quality graphic aids for this type of educational material.

ASIAN NURSING RESEARCH

In Texas, a randomized study (Achaval, Fraenkel, Volk, Cox, & Suarez-Almazor, 2012) evaluated a booklet created for patients to assist in making a surgical decision with three groups of participants (69 patients receiving a booklet, 70 patients receiving a booklet and DVD, 69 patients receiving professional guidance). It was noted that there was no statistically significant difference among the groups in terms of their preoperative decision. However, a better understanding surrounding the decision to perform surgery was perceived by the postoperative groups utilizing the DVD and booklet, and DVD and accompanying professional guidance (Achaval et al.).

A Chinese randomized study (Guo, East, & Arthur, 2011) evaluating preoperative interventions to reduce anxiety and promote recovery involving 135 patients (76 intervention and 77 control) compared the use of a booklet 2–3 days before surgery to an intervention lasting 5–10 minutes. Results were measured 7 days postoperatively. Levels of anxiety and depression were measured using the Hospital Anxiety and Depression Scale and pain levels were measured via the Brief Pain Inventory. Lower levels of anxiety and depression were noted in the patients who took part in the intervention, but there was no statistically significant difference in pain scores between the groups (Guo et al.).

In Israel, a multicenter randomized research study (Dankner et al., 2011) used a booklet for patient education to study the effect on preoperative patients undergoing myocardial

INTRODUCTION

The increasing use of educational materials as a resource in health education has created new possibilities for teaching and learning via interactions mediated by the health care professional (speaker), the patient and his or her family (reader) and the written educational material (speech object). However, these new possibilities have created challenges and demand a clear definition of educational goals for the target audience (Freitas & Cabral, 2008).

A randomized, controlled study performed in the United Kingdom compared the use of detailed educational materials regarding laparoscopy that included information about possible complications with another, more superficial, set of educational materials. This study demonstrated that when more details were provided, patients became more knowledgeable, showed increased satisfaction levels and minimized perioperative anxiety (Garrud, Wood, & Stainsby, 2001).
 chose as a topic for the creation of an educational booklet because it requires specific postoperative care. Patients may also become very anxious when signs and symptoms related to surgery persist for 6 months or more, particularly facial edema and paresthesias.

In the nursing field, the generation of specific educational materials has been increasing. Several studies in the literature report a variety of methods for generating, validating, and applying educational materials (Danker et al., 2001; Fonseca et al., 2004; Freitas et al., 2008; Gabrielloni et al., 2008; Guo & Arthur, 2011; Oliveira, 2006; Panobianco et al., 2009; Queiroz et al., 2008; Reberte et al., 2012; Zombini & Pelicioni, 2011). Nurses developing educational materials should have, in addition to a scientific background, knowledge of the feelings, needs, and wishes of patients under their care (Queiroz et al.). It should also be emphasized that the creation of quality material usually requires a combination of several types of knowledge: conceptual, educational, communication-related, artistic, and technical (Kaplún, 2008). Thus, the goal of the present study is the creation and validation of a booklet regarding the postoperative period for patients undergoing orthognathic surgery.

**Methods**

The present study concerns methods of educational material development. It focused on both the knowledge of the target audience and specialists, and on the validation of the educational materials by expert judges and patients.

The proposed method involved five phases: (a) a review of the literature regarding surgical complications; (b) gathering information on the needs of patients through blogs and virtual communities; (c) evaluating patient perceptions of the postoperative period through a focus group; (d) obtaining information from specialists using the Delphi technique to generate the booklet and validating the information obtained with expert judges; and (e) validation by patients through their understanding of the exhibited material.

The Ethics Committee of the São Paulo University School of Nursing (Protocol no. 972/2010/CEP-EUSP) approved this study.

**First phase: comprehensive review**

During a preliminary review of general aspects of orthognathic surgery, possible surgical complications drew the researcher’s attention. Thus, the literature regarding surgical complications...
published up to September 2010 and addressing the question “What are the surgical complications of orthognathic surgery?” were included; studies were selected mainly by virtue of their title and abstract. The inclusion criteria were studies found using the proposed search strategy that discussed the complications of the following surgical procedures: LeFort I, II and III; bilateral sagittal ramus osteotomy; maxillary segmental osteotomy; vertical osteotomy; and bimaxillary orthognathic surgery with or without mentoplasty. The exclusion criteria included the following: studies discussing surgical techniques, complications during orthognathic surgery related to anesthesia, surgical positioning, or any other complication not linked to the intra-operative procedure, case studies or studies performed on cadavers or animals (Sousa & Turrini, 2012).

Second phase: assessment of internet users’ needs

Interactions within virtual environments are common among people of all ages. By means of virtual communities, persons with similar medical problems can discuss their care or exchange information regarding surgery. This phase used data from virtual environments with the following inclusion criteria: virtual communities and blogs that were not administrated by surgeons or treatment centers/clinics and that were published in Portuguese.

The data was analyzed utilizing content analysis and three researchers studied the content concurrently (nursing student, practicing nurse and nursing professor). It began with the free reading of the text, from which the researchers highlighted snippets of interest and grouped them into categories.

Third phase: patient perceptions regarding the postoperative period of orthognathic surgery

It was important to consider the patients’ need for information stemming from their perceptions of the period following orthognathic surgery. A total of 33 patients were invited via telephone to participate in a focus group, but only 9 agreed to participate. At the set date and time, five patients attended the meeting, with an absenteeism rate of 44%. Despite meeting the requirement for the minimum number of participants, the group repeatedly relayed the same information, thus providing the researcher with an adequate knowledge of the patients’ information needs. Therefore, neither subsequent meetings nor the creation of another postoperative group was necessary. In terms of data analysis, three researchers jointly performed content analysis for the chosen studies. It began with the transcription of the audio recording of the focus group. Later, a free reading of the text was performed, highlighting snippets of interest which were then grouped into categories.

Fourth phase: generation of the booklet and judging panel validation

Specialists’ opinions regarding the content of the booklet were obtained by the Delphi technique, which allows researchers to query a group of experts about future events via a questionnaire, which is repeated until a convergence of responses is achieved, a consensus that represents the consolidation of the intuitive judgment of the group (Wright & Giovinazzo, 2000). The technique emerged in the 1950s, created by researchers at the Rand Corporation who sought a method of forecasting the future. When they discovered this method of feedback, they called it the Delphi method. It was based on the assumption that “two heads are better than one”, and worked on the premise that having more than one opinion about a subject would lead to better decision making (Dalkey, 1969).

Based on the results of the first three phases, and utilizing the Delphi technique, the booklet was generated and subsequently validated by a panel of judges who were knowledgeable regarding the care of patients undergoing orthognathic surgery. Ten specialists were selected, including four oral and maxillofacial surgeons, two nurses, two speech therapists and two nutritionists.

Three evaluation rounds using the Delphi technique were proposed. The first was a brainstorming question, “What is important for the guidance of the orthognathic surgery patient?” The second round included an evaluation of the generated booklet based on the information from the integrative review, blogs, the focus group, and the results from the first round of discussion. Evaluation in this round focused on the coherence/pertinence and adequacy/clarity of the informational booklet, as well as the quality of the illustrations. Finally, in the third round, a final evaluation of the booklet occurred after it was amended according to the suggestions made by the specialists during the second round.

The first round included only the open-ended question without a formal instrument. For the rounds that followed, a five-point Likert scale (totally disagree, partially disagree, neither agree nor disagree, partially agree and totally agree) was used to fill in the items comprising the design of the booklet (content with five subitems, language with three subitems, illustrations with four subitems, layout with six subitems, motivation with three subitems, and culture with two subitems) was created. The evaluation criteria of the booklet were divided into the following categories: purpose, organization, language, illustrations, motivation, and culture.

Evaluation in this round focused on the coherence/pertinence and adequacy/clarity of the informational booklet, as well as the quality of the illustrations. Finally, in the third round, a final evaluation of the booklet occurred after it was amended according to the suggestions made by the specialists during the second round.

Fifth phase: validation of the booklet among patients

After the judging panel validated the booklet, a reading comprehension assessment among patients was performed. The 20 patients who participated in this phase had undergone orthognathic surgery with follow up in the oral and maxillofacial surgery and trauma clinics.

This sample size was determined based on the fact that only a small number of surgeries occur in any given month (usually two or three), totaling 24 patients within 1 year, which was the time limit set for the present study. Because some patients quit the program, a 20–patient sample size was selected. All patients were recruited from the oral and maxillofacial surgery and trauma clinic, with their surgeries performed in either governmental or private hospitals.

An instrument adopted from a previous study by Oliveira (2006) was used for patient evaluation of the booklet. The instrument used was based on the Likert scale and contained five points (totally disagree, partially disagree, neither agree nor disagree, partially agree and totally agree). This instrument, containing 26 items, was divided into the following categories: purpose, organization, writing style, appearance, and motivation.

Likert scale data were summed by category and by the points of the scale and subjected to descriptive statistical analysis. If the item evaluated received scores below 70%, it was reviewed and subjected to reassessment.

Results

First Phase: comprehensive review

A total of 23 research articles met the inclusion criteria. The most common complications described included nerve lesions, infection, problems with fixation material, temporomandibular
dysfunction, iatrogenic fracture, delayed wound healing, hemor-
rhage, osteotomy, enhanced pain, condylar absorption, soft tissue
laceration, open-bite, surgical relapse, dental injury, nasal septal
deviation, and malocclusion (Sousa & Turrini, 2012).

The complications mentioned in the booklet included the follow-
ning: pain, a lack of bone fusion or fixation plate fracture, changes
in sensitivity, bruising and infection.

Second phase: assessment of internet users’ needs

Internet searches focused on six blogs and two virtual
communities, for a total of eight sites containing information
and discussions regarding orthognathic surgery, resulting in 1,328
comments from patients in the preoperative or postoperative
stages or who were otherwise interested in the surgical procedure.

After successive readings, 204 comments from the original set were
chosen and grouped.

Content analysis identified the following five categories:
- concerns during the perioperative period; fears arising during the
  perioperative period; postoperative recovery; changes in facial
  aesthetics; and regrets over having had the surgery. The content
  of the booklet contains answers to questions regarding kissing,
  attending parties and returning to daily activities after surgery.

Third phase: patient perceptions regarding the postoperative period
of orthognathic surgery

Comments of the patients during the focal group were recorded
and transcribed for content analysis. Six categories were identified:
topics addressed in the booklet; difficulties experienced by the
patients in the postoperative period; surgical recovery time and
self-image; aesthetic results from the surgical procedure; importance of the booklet; the best time to present the booklet to patients.

The data obtained in this phase of the study that were inserted into the booklet included changes in facial aesthetics following the surgery, common difficulties experienced in the postoperative period and instructions regarding the hospital routine.

**Fourth phase: generation of the booklet and judging panel validation**

In the first round of the Delphi technique, the following topics considered relevant to the booklet were discussed: oral hygiene, paresthesia, difficulties in breathing and chewing, changes in voice and postoperative muscular movements, liquid diet, the use of interocclusion elastic bands, the use of ice packs, the inherent risks of the procedure, possible sequelae and complications of the surgery, chewing and swallowing issues, alteration of the facial profile, bruising, pain, and difficulty opening the mouth. The data collected in the focus group, from the virtual environment and from the first round of the Delphi technique were included in the draft of the booklet.

The booklet contains 24 color pages and includes illustrated information regarding the following: what orthognathic surgery is, who typically requires the surgery, how the procedure is typically performed, preoperative preparation and routine hospital care until discharge, possible surgical complications and postoperative care (oral hygiene, diet, mouth opening, applying ice exercises, moistening the lips, sun exposure, bathing and dressing, pain, sleep), as well as the answers to some frequently asked questions (Figure 1). This booklet may clarify doubts and promote patient self-care after surgery. Initially, it was intended to supplement the verbal instructions provided by healthcare personnel.

In the second round, the responses of the judges tended to agree with the booklet content. Each response was counted as a point. Upon analysis of the items, the following results were obtained: neither agree nor disagree \((n = 1)\), agree \((n = 84)\), and fully agree \((n = 135)\). Disagreement was not expressed for any of the items.

An item-by-item analysis of the instrument revealed the following results: 64.0% strongly agreed with the content; 50.0% strongly agreed with the language; 62.5% strongly agreed with the illustrations; 61.7% strongly agreed with the displayed layout; 70.0% strongly agreed that the material was motivational; and 50.0% strongly agreed with the cultural appropriateness of the educational materials. The judges proposed some alterations, suggestions, and corrections to the material, which were performed according to their relevance.

In the third round, the judges continued to view the booklet favorably, with each response counting as a point by item, with an increase in the number of **fully agree** responses, as shown by the following data: neither agree nor disagree \((n = 1)\), agree \((n = 68)\), and fully agree \((n = 158)\). Again, disagreement was not expressed for any of the items.

An item-by-item instrument analysis produced the following results: 76.0% strongly agreed with the content; 56.6% strongly agreed with the language; 75.0% strongly agreed with the illustrations; 65.0% strongly agreed with the displayed layout; 70% strongly agreed that the material was motivational; and 60.0% strongly agreed with the cultural appropriateness of the educational materials. A comparison of the results of the two validation rounds is summarized in Table 1.

When the agree and strongly agree responses were combined, the minimum goal of 70.0% agreement for every dimension of the adopted evaluation instruments was achieved, both for the patient and professional judging panels.

**Fifth phase: validation of the booklet among patients**

There was a predominance of females \(65.0\%\;\(n = 13\)\) compared to males \(35.0\%\;\(n = 7\)\). The average age was 32.5 years; 11 patients stated they were single, 6 were married and 3 were divorced. The period extending from the time of orthodontic treatment for surgery to the time of the actual orthognathic surgery was 19–24 months for 40.0% \((n = 8)\) of the patients, followed by 13–18 months \((n = 5; 25.0\%)\), 7–12 months \((n = 5; 25.0\%)\), and 0–6 months \((n = 2; 10.0\%)\).

The patients tended to agree with the content, language and appearance of the booklet. Each patient response was counted as a point for each item. Analysis of the items resulted in points on the Likert scale: disagree \((n = 8)\), neither agree nor disagree \((n = 25)\), agree \((n = 176)\), and strongly agree \((n = 310)\). No instance of total disagreement occurred. In analyzing each category, the following percentages were obtained: 55.0% strongly agreed with the content; 57.8% strongly agreed with the organization; 68.3% strongly agreed with the writing style; and 55.8% strongly agreed with the motivation of the material.

For the researcher, the booklet met the patients’ general needs. Because of the lack of dissenting comments on any topic, no subsequent alterations could be made to the material. The patients clearly appeared to understand the booklet, achieving the goals of this phase of the study. After finalizing the booklet, Fundação da Biblioteca Nacional (Brazil’s National Library Foundation) was contacted to register the research and the ISBN code, as well as the author copyrights of this work.

**Discussion**

The contributions from patients on the internet and participants in the focus group raised some concerns that the professionals often considered too basic, but represented essential information from the patients’ point of view. In virtual communities, patients appeared to share their fears and doubts more readily. This may not occur during a medical appointment, as the patient may feel ashamed to ask a “silly” question. The search for a theoretical basis empowered the researchers, enabling them to coordinate ideas and assemble the first draft of the booklet, which also included contributions from patients (both from the online community and those present in person) as well as from the brainstorming session with the specialists. The specialists provided relevant information concerning the preoperative, intra-operative, and postoperative stages. The most frequently mentioned topics included the following: oral hygiene, paresthesias, facial edema, difficulty in chewing and breathing, voice changes, postoperative muscle movements and diet. In a study assessing hospital forms from the professional point of view, it became clear that the generation of educational materials is linked to the experience of the medical care providers, which in turn leads to addressing only the most common questions and doubts from the patients concerning the specific problems addressed in the materials. However, this can

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**Table 1** Comparison of Results Obtained on Second and Third Validation Rounds of Education Technology Using the Delphi Technique (2011)

<table>
<thead>
<tr>
<th>Items</th>
<th>Second round</th>
<th>Third round</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Agree</td>
<td>Strongly agree</td>
</tr>
<tr>
<td>Content</td>
<td>34.0%</td>
<td>64.0%</td>
</tr>
<tr>
<td>Language</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
<tr>
<td>Illustrations</td>
<td>37.5%</td>
<td>62.5%</td>
</tr>
<tr>
<td>Layout</td>
<td>38.3%</td>
<td>61.7%</td>
</tr>
<tr>
<td>Motivation</td>
<td>30.0%</td>
<td>70.0%</td>
</tr>
<tr>
<td>Culture</td>
<td>50.0%</td>
<td>50.0%</td>
</tr>
</tbody>
</table>
lead to oversimplification and generalizations regarding “what the patient wants” (Rozemberg, Silva, & Vasconcellos-Silva, 2002). Other patient preferences include the unanimous wish to receive the written information in a booklet or leaflet format, with text, figures, and color; there is also the expectation that the material can be kept reviewed at home and answer further questions (Fonseca et al., 2004; Queiroz et al., 2008; Toral, Conti, & Slater, 2009; Zombini & Pelicioni, 2011). These findings were also observed in the present study. In addition, studies in the field of education can increase patient involvement in the surgery decision-making process and the use of booklets can improve communication between the surgeon and the patient (Dimarco et al., 2006). The validation process was regarded similarly in different studies of educational materials (Fonseca et al.; Oliveira, 2006; Reberte et al., 2012), with evaluation coming from both professionals and patients. However, agreement between the two groups was not discussed in detail.

There was increasing agreement regarding the booklet content among the professionals in the present study between the second and third rounds of the Delphi technique. The Likert scale items “agree” and “strongly agree” showed values of 30.9% and 68.6%, respectively, in the third round. These values were not combined, as was done in another study regarding material generation for women undergoing mastectomy that grouped “agree” and “strongly agree” together (Oliveira 2006). However, if the same approach were used in the present study, 99.5% agreement would have been the outcome. Language, one of the evaluation dimensions for the judging panel, exhibited the lowest score among all the items according to the judges. However, according to patient evaluations, this was the highest scoring item, thus showing that the adopted language is readily understood and adequate for the target audience. During generation and validation of the booklet used in the present study, the main difficulties were related to the number of patients. The researcher needed a larger number of patients to increase knowledge of the population; however, this was impossible due to the high rate of absenteeism in the meetings. To travel somewhere to aid in research is not a common practice in the Brazilian population. Accordingly, a low number of participants were also found in other studies (Fonseca et al., 2004; Queiroz et al., 2008), ranging from four to six patients.

For the evaluation of booklets, previous studies (Gabrielloni, Bueno Gonçalves, & Barbieri, 2008; Oliveira, 2006; Reberte et al., 2012) used different instruments because there is no single Portuguese-language instrument to evaluate the appropriateness of educational material. In other studies (Queiroz et al., 2008; Zombini & Pelicioni, 2011), focus groups were emphasized for qualitative analysis of the material for patients.

Patient evaluation regarding the understanding of the written material showed an agreement rate of 33.8% and a total agreement rate of 59.6% (a combined rate of 93.4%). Choosing neither agree nor disagree might be related to a lack of correlation with the patient’s own experience in the postoperative period. Some patients, when reading and evaluating the material, performed a comparison with their own personal experience, although that was not the goal of the material, which consisted only of assessing the comprehension of the information given.

In a Brazilian study regarding the design of educational material for mothers of preterm infants preparing for hospital discharge, the nursing staff agreed that the material supports the guidelines given to mothers. As for the mothers’ opinions, the material standardizes information, thus relieving discontent due to contradictory information (Fonseca et al., 2004). Discontent arising from contradictory information was also reported in another study concerning educational material created for patients with renal disease. In this study, the patients mentioned that sometimes the educational material was insufficient to answer their concerns (Queiroz et al., 2008).

Patients share information about their care or experiences on the internet in the postoperative period. This information acts as an indicator of the possible weaknesses in the instructions provided by the health care professionals, suggesting that the patient either did not receive or did not understand the instructions provided. This can actually impair repair because the patient may receive inappropriate care or may not seek professional help early enough at the onset of any complication, thus potentially worsening complications. However, this lack of guidance can be remedied by the provision of educational material. One should not expect the patient to read all of the material at once, but should be encouraged to keep it on hand to review instructions, seek clarification, prevent complications and provide an uneventful recovery.

To assess the booklet, contributions from experts and patients are required. However, there is no standardized way of evaluating agreement during the judging panel validation process. Some studies use qualitative evaluation, while others choose a quantitative method with no defined standards. Considering that 70% or higher agreement rates were obtained in the present study, the results obtained by our methods can be considered satisfactory.

The present study was limited by the fact that it only included patients with health insurance coverage and with better access to information. In addition, the patients were recruited from a single orthognathic surgery clinic. This may particularly affect the evaluation of this educational material, as the opinions expressed about the educational material may reflect the social characteristics of the population seen in this clinic. It is likely that patients with a lower level of education would rate the language item lower than the participants in this study.

A larger sample size could be more beneficial in terms of comments and would be a better representation of the population undergoing orthognathic surgery. Furthermore, the use of different instruments for the professional and patient evaluations did not allow for the establishment of a relationship between the perceptions of both groups.

Conclusion

Throughout the present study, every agent involved in the perioperative process took part in generating the booklet, demonstrating the involvement of a multidisciplinary team in patient care. The material design and validation involved scientific knowledge, teamwork, and consideration of the patients receiving the material. The use of the Delphi technique to create the draft of the booklet, starting with the specialists and including the needs of patients undergoing orthognathic surgery, presented a satisfactory outcome.

The booklet created and validated in this study will assist healthcare personnel to improve the education of patients undergoing orthognathic surgery, and decrease the need for patients to use the internet to find answers to their questions, reducing their fear of a long and difficult recovery. Additionally, the method used to create and validate the booklet can be used by health care personnel to develop other educational materials and improve the practice of perioperative education of their patients.

Conflict of interest

The authors declare no conflict of interest.
References


