Since the 1980s, dramatic changes have taken place in the delivery of health care in the United States. One major change has been the shift from inpatient to outpatient surgery for children. This change has occurred in response to advances in surgical technology, improvement in anesthetic agents, and the need to cut medical costs.1,2

Historically, surgery necessitated lengthy hospitalization. Now, children often are admitted one to two hours before surgery and are discharged within four to six hours after surgery. For the child, outpatient surgery offers several advantages that help to reduce the psychological stress of surgery. These include a shorter stay in the health care setting, decreased separation from family, and less disruption in daily routine.3 Furthermore, outpatient surgery has been found to decrease the risk of health care-associated infections, be more cost effective, and reduce the number of health care professionals needed per patient.4 Although there are many benefits of outpatient surgery for children, more responsibility has been placed on parents for presurgery preparation and postoperative care at home.5

**LITERATURE REVIEW**

This study focuses on presurgical preparation of adolescents who will undergo tonsillectomy. A literature search was conducted using the terms **tonsillectomy** and **presurgical preparation**.

**Tonsillectomy.** According to Lalakea et al,6 the shift to outpatient surgery for tonsillectomy began as a result of a 1968 retrospective case review of 40,000 outpatient tonsillectomy procedures conducted by Chiang et al.7 These researchers found few resultant complications and no deaths from the outpatient procedures.7 Continued research in the United States and worldwide revealed outpatient tonsillectomies to be a safe procedure for children when performed with strict selection criteria and competent care.8-12

Although tonsillectomy with or without adenoidectomy has been one of the most common surgeries for children,13,14 no research has been published regarding the preparation needs of adolescents undergoing outpatient tonsillectomy. Arguably, “the success of the outpatient experience depends on adequate preparation.”4(p21)

**Presurgical preparation.** During the past five decades, research has indicated that presurgical preparation benefits children by preventing or reducing their negative responses to surgery. In 1952, a study involving 200 children...
examined the effects of psychological preparation and parental involvement for the experimental group (n = 100) compared to routine care for the control group (n = 100). Postdischarge negative reactions such as sleep disturbance, tantrums, separation anxiety, and aggressive behavior were seen in 92% of the control group compared to 68% of the experimental group.

In the 1960s, most presurgery preparation programs provided basic information about surgery and encouraged the expression of emotions. The classic studies in 1975 by Visintainer and Wolfer examined the effects of presurgery preparation on the stress response of child patients and their parents, along with adjustment after hospitalization.

Since the mid 1970s, preparation programs using coping models, procedural and sensory information, and medical play have resulted in less anxiety, increased knowledge, and enhanced coping skills in children undergoing surgery. Further research has indicated that preparation programs need to be designed to meet the needs of the child’s coping style, cognitive and developmental level, and past experience with health care. Although some researchers have indicated that it is cost-effective to prepare only those children at high risk for anxiety, most professionals in fields related to the psychosocial care of children, such as nursing, child life, and social work, agree that all children should receive preoperative care.

Results of an integrative review examining preparation of children for surgery revealed that a majority of the studies involved preparation strategies developed for preschool and school-aged children undergoing inpatient surgery. Few studies addressed presurgery preparation considering the developmental needs of adolescents between the ages of 10 and 16 years, such as their developing mental awareness, ability to process information, focus on body image, and desire for privacy and self-control.

Although many preparation strategies have been shown to be effective in reducing anxiety for inpatients, few strategies solicit information about patient and parent satisfaction with the method of preparation or use a means to evaluate the effectiveness of the method, especially in outpatient populations. Results of the integrative review confirmed the advantages of preparation before inpatient surgery but revealed a gap in the research addressing the methods of preparation for outpatient surgery in general and for adolescents in particular. The experimental study described in this article was designed to address this gap.

**Conceptual Model of Preparation and Study Purpose**

A model of preparation was developed by the investigator to identify and better understand the variables, processes, interventions, and outcomes involved in preparation of adolescents and their parents before outpatient surgery. The model encompasses the child variables identified in the research literature as affecting preparation, including developmental level, anxiety, past experience, fear, and timing of the preparation. This is combined with the parent variables identified as affecting preparation, including anxiety and past health care experiences.

This model served as a guiding framework for the study and is depicted in Figure 1. The purpose of this study was to compare the effectiveness of two methods of preoperative preparation of adolescent patients who were scheduled to undergo tonsillectomy with or without adenoidectomy.
The following research questions were asked:

- What are the effects on an adolescent’s level of anxiety, knowledge acquisition, pain intensity, and satisfaction with the method of preparation when he or she has been prepared for outpatient tonsillectomy surgery through one of the following methods:
  - an Internet preparation program or
  - the standard preparation program in the hospital setting before the day of surgery?
- What are the effects on parental level of anxiety and parental satisfaction with method of preparation when their adolescent has been prepared for outpatient tonsillectomy surgery through one of the following methods:
  - an Internet preparation program or
  - the standard preparation program in the hospital setting before the day of surgery?

**METHOD**

Approval to conduct this research was obtained from the Institutional Review Board (IRB) of the university in which the investigator was enrolled as a doctoral candidate; the IRB of the health care organization in which the study was conducted; and the pediatric ear, nose and throat (ENT) physicians who have surgical privileges at the study health care organization. All potential adolescent patients and their parents received a written invitation to participate, which included a description of the study, its purpose, and the study procedure. Participants were informed that the study would not interfere with or change the plan of care, participation was voluntary, and they could withdraw from the program at any time. Written assent was obtained from the adolescent, and written informed consent was obtained from the parents. Anonymity was maintained in the study by using a numeric code for each participant.

**STUDY SETTING.** The study was conducted at a children’s health care organization in the Midwest. This independent, not-for-profit health care system has 326 beds. Both inpatient and outpatient surgery is performed in this facility. A total of 4,346 inpatient procedures and 15,607 outpatient procedures were performed in this facility in 2006. Of the total number of children undergoing surgery in 2006, 7.5% attended a presurgery preparation program provided at the hospital.28

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**Figure 1 • A conceptual model of preparation for the adolescent undergoing outpatient surgery.**
STUDY SAMPLE. Inclusion criteria for the adolescent patients were
- age 10 to 16 years;
- scheduled for an elective tonsillectomy with or without adenoidectomy;
- ability to read, speak, and write English;
- possession of computer skills and access to the Internet either at home, school, or in a public library; and
- ability to give assent to participate in the study.

Exclusion criteria were
- history of cognitive impairment that potentially could inhibit the ability to participate in the study,
- history of an underlying acute or chronic medical problem that could inhibit the ability to participate,
- inability to read and complete the study questionnaires, and
- parents who chose not to participate in the study.

To determine sample size, the following factors were estimated: the level of significance (ie, alpha) generally acceptable at .05; power, or the probability of rejecting the null hypothesis, with conventional standard at .80; and the population effect size (ie, gamma). For this study, it was determined that the inclusion of 33 participants per group would ensure 80% power for determination of differences between the groups; thus, recruitment continued until 66 adolescents had completed the study.

All adolescents (ie, 100%) and their parents who were invited to participate in the study agreed to participate. A total of 69 adolescents and their parents enrolled in the study and were assigned randomly to one of two methods of preparation. Thirty-five adolescents were assigned to the Internet preparation program and 34 adolescents were assigned to the standard preparation program. Two adolescents were excluded because of missing data and one adolescent underwent surgery ahead of schedule because of a cancellation. These three adolescents had been assigned to the Internet preparation program. Therefore, 66 adolescents were included in the study sample.

THE INTERNET METHOD OF PREPARATION

The Internet preparation program was designed by the investigator. Titled Tonsils! Who Needs ‘em? (Figure 2), the program content was presented in a conversational format (ie, peers teaching peers). The program included developmentally appropriate sensory and procedural information about outpatient surgery. The program consisted of a description of the routines during outpatient surgery, both photographs and explanations of the medical equipment and personnel involved in the surgical experience, and advice for home care after surgery. The last two pages on the Internet program were designed to be printed by the adolescents for their parents and included recommendations for home care such as diet, pain assessment and management, referral telephone numbers, and available resources.

This Internet preparation program was field tested for the first time during this study. To determine the program’s content accuracy and the validity of the information provided, five adult experts who work with adolescents reviewed the script. The experts consisted of a master’s-prepared clinical nurse specialist with 25 years of...
experience in surgery, two child life specialists, a patient and parent education specialist, and a middle-school teacher with 20 years of teaching experience. In addition, 40 healthy adolescents 10 to 16 years of age reviewed the script to determine readability and age appropriateness.

After creation of the beta version of the Internet program, the investigator conducted two focus groups of adolescents ages 10 to 16 years who had undergone tonsillectomy. The first focus group was held at a private church-affiliated suburban school with six participants, three male and three female. The second focus group was held at an inner-city public school with five participants, two male and three female. Each focus group was held in the facility’s computer room with a middle school teacher and the investigator in attendance. The teacher instructed the participants to log on and view the Internet program, and complete an evaluation of the program. After completing the evaluation, the participants met in a group to discuss their experiences with tonsillectomy and their view of the Internet program. Suggestions made by the focus group participants were incorporated into the Internet program before its use in this study.

**The Standard Hospital Preparation Program**

The standard preparation program is offered in the hospital setting on a weekly basis in the evening. An RN and a child life specialist present developmentally appropriate sensory and procedural information about the routines during surgery. They use photographs and medical equipment as teaching tools and describe the personnel involved in the surgical experience. A tour is offered for the adolescent and his or her parents, along with recommendations for home care such as diet, pain assessment and management, referral telephone numbers, and available resources.

**Measurement Tools**

Several instruments were used in this study. These included the State-Trait Anxiety Inventory for Children (STAIC), the State-Trait Anxiety Inventory (STAI), the Knowledge Questionnaire, a pain intensity scale, and the Adolescent and Parent Satisfaction Questionnaire.

**Anxiety Inventory for Children.** The STAIC is a widely used research tool for the study of anxiety in children, and it has been adapted in 13 languages for cross-cultural research. The tool consists of two self-reporting scales for measuring two distinct anxiety concepts: state anxiety (ie, A-State) and trait anxiety (ie, A-Trait). The A-State scale comprises 20 statements that ask children how they feel during a specific moment in time.

The A-State scale is designed to measure transitory anxiety states, that is, subjective, consciously perceived feelings of apprehension, tension, and worry that vary in intensity and fluctuate over time.

The A-Trait scale comprises 20 statements that ask children how they usually feel.

The A-Trait scale measures relatively stable individual differences in anxiety proneness, that is, differences between children in the tendency to experience anxiety state.

Children higher in A-Trait scores perceive stressful situations as more threatening when they feel that they cannot be successful or if they feel personally inadequate to deal with a situation. Most important, the degree to which a stressful situation is viewed as threatening is “greatly influenced by the child’s past experience.”

Children complete the STAIC by selecting one of three choices for each of the 40 statements (ie, 20 questions for A-State, 20 questions for A-Trait). Each item has a 3-point rating scale with values of 1, 2, or 3. Total scores for each scale range from 20 to 60, with a higher score indicating higher anxiety.

Concurrent validity was determined for the A-Trait scale by Spielberger using correlations for each item with the Children’s Manifest Anxiety Scale and the General Anxiety Scale for Children. From a sample of 75 girls and boys, the A-Trait scale correlated .75 with the Child¬ren’s Manifest Scale and .63 with the General Anxiety Scale for Children.

To determine construct validity, Spielberger gave a sample of 913 students in 4th, 5th, and 6th grades the A-State scale with standard instructions (ie, in a normal condition) and then
asked them to complete the scale as if it was before a final examination (ie, in a test condition). The mean scores in the test condition were considerably higher than in the normal condition.

Furthermore, each individual item significantly discriminated between the norm and test conditions for both males and females.29(p9)

Spielberger based test/retest reliability coefficients for the STAIC on 246 children who were retested by eight weeks after completing the STAIC. The correlations for the A-Trait were considered moderate at 0.65 for boys and 0.71 for girls. For the A-State scale, low test/retest correlations were expected because this scale reflects the situational stress at the time of testing. These correlations were 0.31 for boys and 0.47 for girls.29 Considering the preoperative and postoperative state anxiety figures published by La-Montagne et al25 in a study of 90 surgical patients ages eight to 17 years, the researchers established coefficient alphas at .92 and .93 for preoperative and postoperative anxiety.

**ANXIETY INVENTORY FOR ADULTS.** The STAI originally was developed by Spielberger as a research tool for the study of anxiety in adults.32 The STAI has been used extensively in research and practice, and it has been adapted in more than 30 languages for cross-cultural research.33 The STAI has separate self-reporting scales for measuring state and trait anxiety. The S-Anxiety scale comprises 20 statements that examine how the adult feels “right now” and the T-Anxiety scale comprises 20 statements that examine how the adult “generally” feels. Each item is scored on a four-point scale ranging from 1 (ie, not at all) to 4 (ie, very much so) with a total score range of 20 to 80; higher scores indicate higher anxiety.33

Spielberger examined construct validity of the S-Anxiety scale by comparing the mean scores of military recruits undergoing stressful training programs with college students of the same age during relaxation periods. As expected, the S-Anxiety scores of the recruits were much higher than those of the college students.33

Spielberger based the test/retest reliability for the STAI scales on two groups of high school students and three groups of college students. The students completed the STAI, followed by an hour that included relaxation training, a difficult intelligence test, and a film about a serious car accident before retaking the STAI. Test/retest correlations for T-Anxiety were high for the college students, ranging from 0.73 to 0.86; the correlations for the high school students ranged from 0.65 to 0.75.33

Spielberger’s research on the emotional reaction to surgery demonstrated the sensitivity of the S-Anxiety scale.

Typically, S-Anxiety scores rise immediately prior to surgery and decline as patients recuperate. In contrast, trait anxiety scores are essentially the same before and after surgery and do not appear to be influenced by the stress of the surgical procedure.33(p48)

**THE KNOWLEDGE QUESTIONNAIRE.** The Knowledge Questionnaire is used to assess a child’s understanding of the health care environment by examining his or her ability to correctly name and explain medical equipment and attire.34 This questionnaire was developed by two master’s-prepared pediatric nurses and a doctorally prepared developmental psychologist at a university hospital. The Knowledge Questionnaire consists of 20 questions, and scores for each question range from zero (ie, “I don’t know” or a response that is incorrect) to 2 (ie, a complete answer). The total possible scores range from zero to 40.34 After developing the Knowledge Questionnaire, Siaw et al34 administered it, along with the Fear Survey Schedule Medical Fears Subscale (FSS)35 and the Hospital Fears Questionnaire (HFQ)36 to 30 surgery patients between the ages of four and 12 years. Pearson correlations between age, FSS, HFQ, and the Knowledge Questionnaire revealed significant negative correlations between the FSS and the Knowledge Questionnaire ($r = -0.32$, $P < .04$), and the HFQ and the Knowledge Questionnaire ($r = -0.30$, $P < .05$), suggesting that the child patients who had the best understanding of the medical instruments were the least anxious.34

During the process of data collection, interrater agreement was assessed for the Knowledge Questionnaire. Ten adolescents in the study were scored by two raters (ie, the investigator and a research assistant), and percent
agreement was calculated across each of the 10 questionnaires. The first five assessments were completed during the first month of data collection, the next two assessments were completed at the midpoint, and the last three assessments were completed with the final adolescent participants. The total percent agreement within each of the 10 questionnaires ranged from 90% to 100%, with an average of 96% agreement across all questionnaires.

**Pain intensity scale.** The subjective nature of pain creates measurement issues that are particularly challenging in research and practice. “Self-report is the most reliable indicator of the existence and intensity of pain.”37(p37) The adolescents in this study used a zero to 10 numeric pain intensity scale. According to two separate groups of researchers, a numeric pain rating scale should be easy to administer and score, and it should be explained before the patient has pain.38,39 The rating of zero was explained as “no pain” and a rating of 10 was explained as “the worst possible pain.” Since adolescents are at a cognitive stage of formal operations and are capable of abstract thinking without props, a numeric pain rating scale can be verbally administered when visual contact cannot be made (eg, during a follow-up telephone call). Paice and Cohen,40 using convergence methods to examine the validity of the verbally administered numeric pain intensity scale compared to a simple descriptor scale and a visual analog scale, found the correlation between the visual analog scale and the numeric rating scale to be strong and statistically significant ($r = 0.847, P < .001$). This finding supports the validity of the verbally administered numeric pain intensity scale.

**The Adolescent and Parent Satisfaction Questionnaire.** A reliable and valid measurement tool to examine the satisfaction of adolescents and parents with methods of preparation for outpatient surgery was not found. In this study, adolescents and parents were asked to rate their satisfaction with the method of preparation using a questionnaire developed by the investigator titled The Adolescent and Parent Satisfaction Questionnaire. The questionnaire consisted of five questions. Using a 5-point Likert scale, the first question asked how satisfied the patient and his or her parents were with the assigned method of getting ready for surgery. Answer categories ranged from “very satisfied” to “very dissatisfied.” The other four questions on the questionnaire included the following:

- What was most helpful about the assigned method of getting ready for surgery?
- What was not helpful about the assigned method of getting ready for surgery?
- Did you receive the information needed to feel ready for surgery? If not, what information would have been helpful?
- Do you have suggestions for improvement of the assigned method of getting ready for surgery?

A panel of three experts evaluated the questionnaire for face validity. Adolescent and parent satisfaction scores were obtained by telephone interviews 24 hours after surgery.

**Procedure**

Before the start of data collection, the investigator met with the two research assistants for a comprehensive orientation. Both research assistants are RNs. One of the assistants holds a master’s degree in maternal-child health and has 20 years of experience in nursing. The other research assistant holds a baccalaureate degree in nursing and has two years of experience in surgical intensive care. After orientation, each research assistant observed the investigator during the data collection process with three different participants. This was followed by the investigator observing each of the research assistants during the data collection process with two additional participants.

**Recruitment of participants.** Potential participants were identified by the outpatient surgical scheduler. If the adolescent and parents agreed to participate, demographic data were collected including age, gender, and previous experiences with surgery. The method of preoperative preparation was randomly assigned at this time using a table of random numbers. If the adolescent was assigned to the Internet preparation program, an instruction sheet was sent to the adolescent and his or her parents that listed the Internet web site address and directions for use. A reminder telephone call was made to the
adolescents and their parents 72 hours before the scheduled procedure. If an adolescent was assigned to the standard preparation program, the patient and his or her parents were informed of the date, time, and location of the next available preparation program.

All adolescents in the study received the routine preparation provided by their ENT clinic and the nurses, physicians, and child life specialists on the day of surgery. All surgical staff members were blinded to the adolescents’ assigned method of preparation.

DATA COLLECTION SCHEDULE. On the day of the outpatient surgical procedure, the investigator or one of the research assistants met with the adolescent and his or her parents in the surgical waiting area before surgery. After the staff nurse completed the initial vital signs and presurgery assessment, the investigator or research assistant reviewed the consent and assent forms and provided time for questions regarding the study. Next, the adolescent completed the STAIC and the parents completed the STAI. The adolescent then orally responded to the 20-question Knowledge Questionnaire. Lastly, the adolescent was instructed on the use of the pain intensity scale.

Two hours after leaving the postanesthesia care unit (PACU), the adolescent was asked to rate his or her pain using the pain intensity scale. Before being discharged to home, the adolescent and the parents were given a copy of the Adolescent and Parent Satisfaction Questionnaire and the pain intensity scale. The adolescent and parents were reminded that a research assistant would make a follow-up telephone call 24 hours after surgery.

During the next day’s telephone interview with the adolescent and the parents, the research assistant used a prepared script. The adolescent was asked to provide his or her pain intensity rating using the zero to 10 scale. The parent was asked to provide the time that the last analgesic had been given to the adolescent and the name and dose of the medication. Finally, each adolescent and parent was asked to rate his or her satisfaction with the method of preoperative preparation.

DATA ANALYSIS. Data were managed and analyzed using SPSS version 11 for Windows.41 Extreme departures from normality were observed in the data, so nonparametric methods were used for the statistical analyses in this study. An appropriate method in such cases is the Kruskal-Wallis distribution-free procedure, which was used to test the hypothesis that all the compared populations in the study are identical.42

RESULTS

A total of 66 adolescents participated in this study; 32 adolescents were assigned to the Internet preparation program and 34 adolescents were assigned to the standard preparation program. After collection of the data, a third group of adolescents was identified as the nontreatment group because they were unable to complete either of the assigned preparation programs. The final number and percentage of adolescents in each group are presented in Table 1.

INTERNET PREPARATION PROGRAM GROUP. Thirty-two adolescents were randomly assigned to the Internet preparation program. Twenty-six adolescents viewed the Internet program at home and two viewed the program at a public library. Four of the 32 adolescents did not view the program. The majority of adolescents who viewed the Internet preparation program indicated that they viewed the program multiple times (ie, two to three times) before the day of surgery. Explanations offered by adolescents who did not view the Internet program included that

- there was no computer at home and the child was too busy at school to view the program,
- there was no computer at home and the child could not view the program at the public library as planned because of a blizzard,

<table>
<thead>
<tr>
<th>Description of adolescent group</th>
<th>n</th>
<th>Percent*</th>
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<tbody>
<tr>
<td>Internet preparation program</td>
<td>28</td>
<td>42%</td>
</tr>
<tr>
<td>Standard preparation program</td>
<td>14</td>
<td>21%</td>
</tr>
<tr>
<td>Nontreatment</td>
<td>24</td>
<td>36%</td>
</tr>
<tr>
<td>Total</td>
<td>66</td>
<td>99%</td>
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* Totals do not equal 100% because of rounding.
there was no computer at home and the child was too frightened to discuss the surgery, and
the child’s mother decided not to allow the child to view the program.

**Standard preparation program group.** Thirty-four participants were assigned to attend the standard preparation program offered at the hospital prior to the day of surgery. Fourteen adolescents attended the standard preparation program and 20 of the 34 chose not to attend the program. Sixty-four percent of the 14 adolescents (n = 9) who participated in the standard preparation program attended the program within a week before their scheduled surgical procedure. Thirty-six percent (n = 5) attended the program eight or more days before the day of their scheduled surgical procedure. The 20 adolescents in the standard preparation program who did not participate in the program offered a variety of reasons to explain why they were unable to attend (Table 2).

**Nontreatment group.** The nontreatment group comprised those adolescents who were assigned to the Internet preparation program and did not view the program (n = 4) and those adolescents who were assigned to the standard preparation program and did not attend the program (n = 20). This group received only the routine preparation provided by their ENT clinic and the nurses, physicians, and child life specialists on the day of surgery. A total of 24 adolescents were included in the nontreatment group.

**Demographic characteristics.** Patient demographic data were gathered, including gender, race, age, surgical procedure, admitting diagnosis, previous experience with surgery and the parents’ previous experience with surgery. Of the 66 adolescents in the study, 38% (n = 25) were male and 62% (n = 41) were female. Eighty-nine percent (n = 59) of the adolescents were Caucasian, 6% (n = 4) were African-American, 2% (n = 1) were Native American, and 3% (n = 2) were identified as “other.” The ages of the adolescent participants ranged from 10 to 16 years and are presented in Table 3. Seventy percent (n = 46) were early adolescents (ie, ages 10 to 12 years) and 30% (n = 20) were middle adolescents (ie, ages 13 to 16 years).

The majority of the adolescents (ie, 73%) underwent tonsillectomy with adenoidectomy (n = 48), and 27% (n = 18) underwent tonsillectomy without adenoidectomy. The admitting diagnoses included tonsillar hypertrophy

<table>
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<th>Table 2</th>
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<tbody>
<tr>
<td><strong>Reasons for Nonattendance at the Standard Preparation Program</strong></td>
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<tr>
<td>Reason</td>
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<tr>
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<tr>
<td>Too busy to go to the hospital for the program</td>
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<tr>
<td>Issues with child care for siblings</td>
</tr>
<tr>
<td>On vacation with family</td>
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<tr>
<td>No concerns, no fears</td>
</tr>
<tr>
<td>Swim practice at school</td>
</tr>
<tr>
<td>Play practice at school</td>
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<tr>
<td>Attending brother’s wedding</td>
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<tr>
<td>Basketball practice at school</td>
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<tr>
<td>Mother decided the adolescent was “an old pro”</td>
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<tr>
<td>Blizzard</td>
</tr>
<tr>
<td>Total</td>
</tr>
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<th>Table 3</th>
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<tr>
<td><strong>Breakdown By Age and Type of Preparation</strong></td>
</tr>
<tr>
<td>Age (years)</td>
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<tr>
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</tr>
<tr>
<td>10</td>
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<tr>
<td>11</td>
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<td>12</td>
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<td>13</td>
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<td>14</td>
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<tr>
<td>15</td>
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<tr>
<td>16</td>
</tr>
<tr>
<td>Totals:</td>
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(n = 30), recurrent tonsillitis (n = 28), and sleep apnea (n = 8). Regarding previous experience with surgery, 70% (n = 46) of the adolescents had no previous experience with surgery, and 36% (n = 24) of the parents had no previous experience with surgery.

**Analysis of demographic characteristics.** Cross tabulation tables were created and statistical tests of significance were conducted to ensure that there were no potential biases or confounding factors in the comparison of treatment groups resulting from differences in demographic characteristics among the three groups. No significant differences were found among the three groups for the adolescents for age, race, gender, type of surgery, admission diagnosis, or the adolescents’ or parents’ previous experience with surgery.

**Study hypotheses**

Six hypotheses were identified to compare the effectiveness of two methods of preparation offered to early and middle adolescents undergoing tonsillectomy in the outpatient setting. Because 24 of the 66 adolescents (36%) did not complete their assigned method of preparation, a nontreatment group was included in the analysis of these hypotheses.

**Hypothesis 1.** There is no difference in the preoperative anxiety scores for adolescents undergoing tonsillectomy when prepared by viewing an Internet preparation program or attending the standard preparation program (N = 66). With regard to the first hypothesis, the Kruskal-Wallis chi-square analysis was not significant ($\chi^2 = 2.285, P = .319$) for state anxiety and not significant ($\chi^2 = 0.917, P = .632$) for trait anxiety. Table 4 presents the mean and standard deviation for each group. This study hypothesis was accepted.

**Hypothesis 2.** There is no difference in knowledge acquisition scores for adolescents undergoing tonsillectomy when prepared by viewing an Internet preparation program or attending the standard preparation program (N = 66). With regard to the second hypothesis, the Kruskal-Wallis chi-square test was significant ($\chi^2 = 43.923, P = .001$). Table 5 presents the means and standard deviations for each group. This study hypothesis was rejected.

**Hypothesis 3.** There is no difference in postoperative pain scores two hours after leaving the PACU while at the hospital and 24 hours after surgery while at home for adolescents undergoing tonsillectomy when prepared by viewing an Internet preparation program or attending the standard preparation program (N = 66). With regard to postoperative pain scores two hours after leaving the PACU, the Kruskal-Wallis chi-square test indicated no significant differences ($\chi^2 = 1.07, P = .586$) among the three groups.

With regard to the postoperative pain scores 24 hours after surgery, the Kruskal-Wallis chi-square test was not significant ($\chi^2 = 5.77, P = .056$). The results, however, do show a strong trend of higher pain scores across the groups,

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**Table 4**

<table>
<thead>
<tr>
<th>Group</th>
<th>State anxiety</th>
<th>Trait anxiety</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet preparation (n = 28)</td>
<td>34.54</td>
<td>32.36</td>
</tr>
<tr>
<td>Mean (M)</td>
<td>7.37</td>
<td>6.82</td>
</tr>
<tr>
<td>Standard deviation (SD)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Standard preparation (n = 14)</td>
<td>33.57</td>
<td>33.29</td>
</tr>
<tr>
<td>M</td>
<td>6.42</td>
<td>7.16</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nontreatment (n = 24)</td>
<td>37.38</td>
<td>34.33</td>
</tr>
<tr>
<td>M</td>
<td>8.60</td>
<td>8.23</td>
</tr>
</tbody>
</table>

**Table 5**

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean</th>
<th>Standard deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet preparation (n = 28)</td>
<td>34.64</td>
<td>4.42</td>
</tr>
<tr>
<td>Standard preparation (n = 14)</td>
<td>29.00</td>
<td>7.03</td>
</tr>
<tr>
<td>Nontreatment (n = 24)</td>
<td>13.67</td>
<td>5.90</td>
</tr>
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</table>
with the Internet group having the lowest pain score and the nontreatment group having the highest pain score. Table 6 presents the mean and standard deviation for each group. This study hypothesis was accepted.

**Hypothesis 4.** There is no difference in satisfaction with method of preparation scores for the adolescent undergoing tonsillectomy when prepared by viewing an Internet preparation program or attending the standard preparation program (n = 42). A chi-square was computed to test whether there was a difference in adolescent satisfaction between the two treatment groups. Adolescents in the nontreatment group did not complete a satisfaction questionnaire. This chi-square test indicated a statistically significant difference between the two treatment groups ($\chi^2 = 8.12, P = .004$) with the Internet preparation group demonstrating a higher level of satisfaction than the standard group. Results are presented in Table 7. This study hypothesis was rejected.

**Hypothesis 5.** There is no difference in preoperative anxiety for the parents of an adolescent who is undergoing outpatient surgery for tonsillectomy and who received preoperative preparation by viewing an Internet preparation program or attending the standard preparation program. A total of 70 parents (ie, 62 mothers and eight fathers) completed the STAI. For mothers (n = 62), state anxiety scores ($\chi^2 = 3.236, P = .198$) and trait anxiety scores ($\chi^2 = 3.736, P = .154$) were not significant. For fathers (n = 8), state anxiety scores ($\chi^2 = 0.747, P = .688$) and trait anxiety scores ($\chi^2 = 1.867, P = .393$) were not significant. This study hypothesis was accepted.

**Hypothesis 6.** There is no difference in satisfaction with method of preparation scores for the parent whose adolescent is undergoing outpatient surgery for tonsillectomy and has been prepared by viewing an Internet preparation program or attending the standard preparation program (n = 42). The chi-square test indicated a significant difference ($\chi^2 = 8.12, P = .004$) between the two treatment groups of parents, with the parents whose adolescents participated in the Internet preparation group demonstrating a higher level of satisfaction with the method of preparation for surgery. This study hypothesis was rejected.

**DISCUSSION**

The purpose of this study was to compare the effectiveness of two methods of preparation for adolescents between the ages of 10 and 16 who underwent tonsillectomy. The two methods comprised an Internet preparation program created by the investigator and the standard preparation program offered at the hospital. The first research question examined the effects of viewing the Internet program or attending a standard preparation program on the adolescent’s level of anxiety, knowledge acquisition, pain intensity, and satisfaction with method of preparation.

**Anxiety.** The results of data analysis revealed no statistically significant differences between the three groups (ie, the Internet preparation

<table>
<thead>
<tr>
<th>Group</th>
<th>First pain score</th>
<th>Second pain score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet preparation (n = 28)</td>
<td>Mean (M) 4.18</td>
<td>Standard deviation (SD) 2.02</td>
</tr>
<tr>
<td></td>
<td>4.24</td>
<td>2.30</td>
</tr>
<tr>
<td>Standard preparation (n = 14)</td>
<td>M 4.71</td>
<td>SD 1.86</td>
</tr>
<tr>
<td></td>
<td>5.14</td>
<td>1.83</td>
</tr>
<tr>
<td>Nontreatment (n = 24)</td>
<td>M 4.71</td>
<td>SD 2.77</td>
</tr>
<tr>
<td></td>
<td>6.09</td>
<td>3.06</td>
</tr>
</tbody>
</table>

* Two hours after release from the postanesthesia care unit.
** Reported 24 hours postsurgery.

<table>
<thead>
<tr>
<th>Group</th>
<th>Satisfied</th>
<th>Very satisfied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internet preparation (n = 28)</td>
<td>11 (39%)</td>
<td>17 (61%)</td>
</tr>
<tr>
<td>Standard preparation (n = 14)</td>
<td>12 (86%)</td>
<td>2 (14%)</td>
</tr>
<tr>
<td>Total (N = 42):</td>
<td>23 (55%)</td>
<td>19 (45%)</td>
</tr>
</tbody>
</table>
group, the standard preparation group, the nontreatment group). Anxiety has been reported as the most common emotional response for children undergoing inpatient surgery. Contrary to research examining the impact of preparation for surgery on anxiety, there were no differences in state or trait anxiety for the adolescents in this study. Although there is no direct explanation for these results, the calm, cooperative behavior of the adolescents may reflect that they are more knowledgeable about health care because of the impact of their academic education or the media. Likewise, the child-friendly atmosphere and presence of caring personnel and the research assistants may have influenced the adolescents’ anxiety levels. An important factor to consider is that the adolescents’ trait anxiety ranged from a mean of 32.36 to 34.33, which is below the normative range of 36 to 38. As a whole, these adolescents may be less prone to respond to situations perceived as threatening compared to adolescents with high trait anxiety.

Knowledge Acquisition. The results of data analysis revealed a significant difference between the adolescent groups in terms of knowledge acquisition. This study confirms the efficacy of this Internet program, as adolescents using the program had the highest score on the Knowledge Questionnaire. This score reflected their understanding of the health care environment, equipment, and personnel. Internet-based presurgery preparation and other forms of health care education are particularly relevant for the adolescent population because of the unique characteristics associated with this stage of growth and development.

As adolescents mature, their cognitive abilities transition from concrete operational thought to formal operations. During this period, adolescents develop the ability to consider a variety of possibilities in a given situation; analyze the situation; and, using abstract thought, consider what might occur. Moreover, adolescents are concerned with body image, privacy, and the desire to be independent.

The adolescents in this study reported the value of being able to view the Internet program in private, at their own pace, and more than one time. The future of this method of health care education is promising, as access to computers and the Internet has increased dramatically in recent years. Internet preparation programs also are more accessible and less expensive than many current presurgical preparation programs. It is imperative, however, that future Internet-based educational programs be developed using a methodological, evidence-based approach with an evaluation component.

Pain Intensity. The results of data analysis revealed no significant differences between the three groups at two hours after leaving the PACU or at 24 hours after the surgery. The subjective nature of pain assessment presents measurement issues that are particularly challenging in research. Although self-report is considered the gold standard of pain assessment, it presents methodological issues in the collection of postoperative pain scores.

The most significant issue was the influence of analgesics on postoperative pain scores. Because most of the patients undergoing outpatient tonsillectomy are discharged to home within two to three hours after leaving the PACU, the initial pain score was collected two hours after discharge from the PACU. The mean pain scores for all three groups ranged from 4.18 for the Internet group to 4.71 for the other two groups. A factor influencing this pain score was the pharmacologic agents used in the OR, PACU, and during phase two recovery. In addition, the nurses’ attitudes and beliefs about pain and their knowledge and experience of pain assessment and management with adolescents could have played a role in these pain scores.

Equally important, several factors may have influenced the pain scores collected at 24 hours after surgery. A primary factor was the time when the pain score was assessed. Since the majority of adolescents underwent surgery in the morning, they were called at home upon waking up and had not taken an analgesic for hours. Another critical factor was adherence to the recommended pain management routine at home. Eight of the parents reported not using the prescribed analgesic because of their child’s complaints of nausea and vomiting. In these situations, no analgesic or a less-effective analgesic was administered. These adolescents also were receiving an oral antibiotic that has the common
side effect of nausea and vomiting. Although not statistically significant, the pain intensity scores obtained at 24 hours are clinically significant, especially those scores reported to be greater than 5 on the 10-point scale.

A trend in increased pain scores was found in the nontreatment group, which had the highest mean score of 6.09 compared with a mean score of 4.25 for the Internet group. This trend has serious implications in terms of the undertreatment of pain, which can have a negative effect on postoperative recovery and lead to readmission to the hospital. These observations suggest the vital need for thorough home care instructions, including pain assessment and management, because pain management often depends on the parents’ ability to recognize their child’s pain, along with their beliefs and possible misconceptions about pain.47

When providing home care instructions regarding pain assessment, the developmental and cognitive level of the patient also must be considered. Some adolescents do not demonstrate overt distress; instead, they manage acute pain experiences by using “active internal control, not easily observed by others.”48(p112) Although outpatient tonsillectomy is common, it is associated with moderate to severe pain that can last one week or longer.49 Future research should be conducted to monitor patients’ pain levels beyond the first postoperative week.

**Satisfaction with method of preparation.** Results of a chi-square analysis indicated a significant difference between the two treatment groups, with the Internet group demonstrating a higher level of satisfaction than the group who attended the standard preparation program. Sixty-one percent of the Internet group (n = 17) reported that they were “very satisfied” and 39% (n = 11) reported that they were “satisfied” with their preoperative preparation. Several adolescents commented that the Internet program was user-friendly and convenient, and they indicated that they received the information needed to prepare for surgery.

**Parental responses.** The second research question examined the parents’ level of anxiety and satisfaction with the method of presurgery preparation for their adolescent. Regarding parental anxiety, there were no significant differences between parents whose adolescents viewed the Internet program or the standard program or those whose adolescents were in the nontreatment group. The calm and friendly atmosphere and personnel, presence of the research assistants, and the positive influence of health care information available in the media may have influenced the parents’ situational anxiety. Important to consider is that the parents’ mean trait anxiety scores ranged from 30.35 to 34.57 for mothers and 27.00 to 33.50 for fathers. These scores fall below the normative trait scores of 34.79 for women and 34.89 for men. According to Spielberger, the higher the trait anxiety score, the more probable that the person will have intense elevations in state anxiety during a threatening event.33

Along with adolescents’ satisfaction with their method of preparation, parental satisfaction of their adolescents’ method of preparation was obtained 24 hours after surgery. There was a significant difference between the two preparation groups, with parents of adolescents in the Internet preparation group demonstrating a higher level of satisfaction.

Furthermore, it must be noted that all parental satisfaction scores were identical to the scores given by their adolescent children. The research assistant noted that she could hear the adolescent and the parent discussing the questions on the Satisfaction with Method of Preparation Questionnaire during the telephone interview. Although the adolescent and
parent were instructed to report their own individual ratings, they came to a consensus and reported their level of satisfaction together. Parents of the adolescents who viewed the Internet program shared the value of having the home care instructions in advance of the day of surgery to allow time to prepare for home care. Other comments included the benefit of having the opportunity to discuss the surgical experience with their adolescent.

Considering the competitive climate in the health care industry, satisfied parents can make an impact on image and market share. Satisfied patients and parents share their positive health care experiences with friends and family members, which translates into potential revenue for the institution. Thus, Internet preparation has the potential to positively affect patient satisfaction, which is a key outcome of health care delivery.

**STUDY LIMITATIONS**

Several limitations of the study were noted. These included the following issues:

- measurement reliability,
- generalizability,
- evaluation apprehension, and
- access to presurgery preparation methods.

**MEASUREMENT RELIABILITY.** The author did not calculate measurement reliability and validity estimates for use of these instruments in this study with this sample. Before undergoing surgery, adolescent participants in this study were asked to identify any medical fears or concerns that they had about their surgery. These data are not reported in this article.

**GENERALIZABILITY.** Data were collected from one health care organization in one geographic location. Participants were recruited from a convenience sample of adolescents scheduled for outpatient tonsillectomy, and participation was voluntary. Eighty-nine percent of the adolescents were Caucasian, creating a predominantly homogenous sample.

**EVALUATION APPREHENSION.** The investigator and research assistants, all RNs, were responsible for data collection. The issue of evaluation apprehension (ie, the desire of the participant to be viewed in a positive manner) may have influenced the responses of the adolescents and of the parents.

**ACCESS TO PRESURGERY PREPARATION METHODS.** Many of the adolescents who were assigned to the standard presurgery preparation group were unable to attend their session because of school conflicts or parental time constraints. The class is offered only one evening each week, and because a majority of the adolescents tested were unable to drive, they were reliant on their parents in order to attend. Additionally, some of the adolescents assigned to the Internet group did not have access to the Internet at home, school, or a public library.

**CLINICAL PRACTICE RECOMMENDATIONS**

The results of this study revealed the importance of presurgical preparation of adolescent tonsillectomy patients in terms of knowledge acquisition and satisfaction with the method of preparation. Along with advances in medical technology and concerns for health care cost containment, it is likely that the rate of outpatient surgery will continue to increase. Although the benefits of outpatient surgery include a decreased risk of health care-associated infection and decreased separation from family, school, and friends, the shortened timeframe for preoperative preparation often does not allow time for the perioperative nurse to fully assess the informational needs of the adolescent and his or her family members in order to individualize the education that is provided before the procedure. Individualized education that is based on assessment data is required to be compliant with the Joint Commission's hospital accreditation standards. As stated in Standard PC.6.30,

> The patient receives education specific to the patient's abilities as appropriate to the care, treatment, and services provided by the hospital. Learning styles vary, and the ability to learn can be affected by many factors including the individual learning preferences and readiness to learn. Educational activities must be tailored to meet the patient's needs and abilities.  

Preparation of adolescent patients for surgery can be a challenge for perioperative nurses because of the "wide diversity in adolescents'
age and physical, cognitive, and psychological maturation.\textsuperscript{45} To prepare an adolescent adequately for outpatient surgery, the process of preparation must begin as soon as the need for surgery has been established. This is a critical time for the nurse to assess the patient’s past health care and surgical experiences, medical fears, coping style, and learning needs; however, “perioperative nurses have limited contact with patients before surgery, which may lead to an increased risk for adverse patient outcomes.”\textsuperscript{51(p227)} Consequently, in accordance with AORN’s “Guidance statement on preoperative patient care in the ambulatory surgery setting,” the professional RN completes a preadmission assessment either by telephone or in a face-to-face interview before the surgical procedure.\textsuperscript{51}

“Performing preoperative assessments and providing individualized care is especially important for pediatric patients.”\textsuperscript{52(p786)} Key assessment criteria include cultural, emotional, and socioeconomic assessment, and preoperative patient teaching for the adolescent and the members of his or her family. Based on this assessment, the nurse can refer the patient and family members to an Internet program specific to their educational needs.

Availability of an Internet teaching program allows the patient the freedom to review the program before the day of surgery. Adolescents in this study

- reported their familiarity with this method of education;
- described viewing the Internet program several times at their convenience before the surgical procedure;
- liked the accessibility of the Internet program, which increased their control over the information they viewed and the timing and processing of information relevant to their surgery.

Findings in this study confirm “the growing acceptance of computers in all aspects of life.”\textsuperscript{53}

In addition to an Internet program, perioperative nurses still could refer adolescent patients and their and family members to a presurgery program provided by the facility, if one is available. Adolescent patients also can receive individualized preparation from a child life specialist. Without preparation, however, adolescents may experience increased preoperative anxiety because of their developing cognitive ability to process and interpret information.\textsuperscript{54}

### Future Research

Based on the study results, research should be carried out to address the use of technology in developing innovative methods of presurgery preparation for adolescents. These methods need to address the developmental characteristics of adolescents including their possible fears and concerns related to surgery. Researchers need to examine not only the effect of technology on preoperative outcomes but also the effect it has on postoperative outcomes such as pain and analgesic use. Use of the Internet offers a variety of advantages over printed materials, and for many, it is replacing television and books as the primary source of information.\textsuperscript{56} Materials made available on the Internet also are convenient to update and individualize, and they can be developed with interactive capabilities. For patients and their family members, an Internet-based preparation program offers the ability to review information at their own pace and in the privacy of the home.\textsuperscript{56}

Although there is increasing information about the use of Internet-based education for adults, there is a paucity of research on Internet health education for children and adolescents.\textsuperscript{57} Studies have examined the use of electronic diaries for children with gastrointestinal problems or chronic pain;\textsuperscript{58,59} however, these studies did not formally evaluate the technology. Further methodological studies are needed to evaluate the efficacy of Internet presurgery preparation for other outpatient surgical procedures with adolescent patients from wider cultural and ethnic backgrounds. Finally, it is imperative that nurses continue to contribute to this body of knowledge through further examination of presurgery preparation methods.\textsuperscript{23}

### Conclusion

This study contributes to the body of research addressing the effectiveness of presurgery preparation for adolescents undergoing tonsillectomy. The findings provide information for perioperative nurses who care for adolescent patients and may contribute to nurses’ ability to understand developmental and learning needs of adolescents. It is vitally important that adolescents
be offered educational resources and methods of presurgery preparation that are effective, inviting, and meet their unique needs. —

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