The Effects of Distraction on Preoperative Anxiety in Preschool and School-Age Children: A Literature Review

The aim of this integrative literature review was to identify the effectiveness of distraction interventions in reducing preoperative anxiety in children. We examined the various distraction interventions employed, and different methodological approaches utilized to evaluate the effects of those interventions, and the effects of the distraction interventions on levels of anxiety in preoperative children, compared to pharmacological interventions in the surgical setting. A systematic search was conducted for peer-reviewed articles published in academic journals on the topic of distraction as an intervention to reduce preoperative anxiety in children between the ages of three and 12 years. Children high levels of preoperative anxiety before surgery. Preoperative anxiety interferes with anesthesia induction compliance and is associated with many short and long-term postoperative complications. This integrative evaluate the impact of distraction methods on preoperative anxiety in preschool and school-age children compared to standard of care or conventional methods. A systematic search of literature was conducted using PubMed and CINHAL databases. We found 15 full-text articles in English published, between the years 2015-2019 on preschool and school-age children on PubMed, CINHAL, and keyword search according to inclusion criteria. The tools used to measure the children’s anxiety included a personal information from, separation scoring, index of clinical stress score, modified Yale preoperative assessment scale, the state-trait anxiety inventory for children, post hospitalization behavior questionnaire, Hamilton anxiety rating scale, and vital signs. Medical clowns, integrated art therapy, therapeutic play, ‘Play-doh’, computer games, books, and music, video games, toys, music, books, virtual reality, smartphone, relaxation-guided imagery, and iPads were used for creating distraction to reduce anxiety levels during parental separation and the preoperative period. Distraction is a safe, timely, and cost-effective non-pharmacological anxiolytic intervention that can be performed by nurses.

Keywords: distraction, therapy, art, anxiety, play, surgery

Background

More than five million children living in the United States (U.S.) undergo surgical procedures each year, according to Perry, Hooper, & Masiongale (as cited by Goldshmidt & Woolley, 2017, p.1). Surgery invokes varied emotions in children and their caretakers. Emotions evoked in the preoperative period can be carried over into the postoperative period to several days after the procedure. These emotions can lead to disturbances in eating and sleeping patterns. For caretakers, the primary concern anxiety triggers can be the unfamiliarity of the environment and role expectations. Parental anxiety can further heighten or cause anxiety in children.

Preoperative anxiety in children is crucial as it is a predictor for postoperative issues. Surgical anxiety can elevate levels of blood cortisol because of the stress response, which may increase the risk of infection and delay healing postoperatively (Draskovic, Stanic, Uram-Benka, & Fabri, 2014).
Also, children and adolescents who have a higher level of anxiety, experience higher levels of postoperative pain (Bringuier et al., 2009; Crandall, Lammers, Senders & Braun, 2009; Kain et al., 2006).

Currently, many pediatric patients receive medications to reduce their anxiety before surgery. These medications can have adverse side effects and not only prolong recovery time but harm patients as well (Chee, 2011). There is a need to identify other nonpharmacologic methods of anxiety relief in this population.

A number of pharmacologic and nonpharmacological interventions have been evaluated for their efficacy to overcome the potential consequences of preoperative anxiety. Several studies have explored different distraction techniques in controlling preoperative anxiety in children, recently.

Review and synthesis of the literature on these distraction approaches is inevitable to identify their effects on pediatric preoperative anxiety and any need for improvement in the use of distraction for reducing children's anxiety.

Methods

The Preferred Reporting Item for Systematic reviews and Meta-analysis statement (PRISMA) flow diagram describes the article selection process (see Figure 1). The Participants, Interventions, Comparison, Outcome (PICO) model was used to formulate the research question for the current review and was used to identify the eligible articles

Information Source and Search

A systematic search was conducted in the databases PubMed and CINAHL from September 13 to September 30, 2019, following the Preferred Reporting Items for Systematic Review and Meta-analysis (PRISMA) guideline (see Figure 1). In PubMed, various combinations of Medical Subject Heading (MeSH) terms and keywords were used with Boolean operators to exclude and truncation to retrieve the most appropriate articles for the topic from academic journals (see Database Search Table). The search on PubMed with the phrase 'preoperative anxiety in children and nursing' returned 156 articles.

In CINAHL, the subject headings and keywords were used similarly (see Database Search Table). The search was further limited to articles available in full text published between January 1, 2015, to December 31, 2019, written in English, peer-reviewed, and with studies conducted on children 3 to 12 years of age and published in academic journals. The search with these limiters returned 32 articles.
Number of Articles

The initial search of PubMed and CINAHL databases yielded 188 articles. Nine more records were identified through other sources. One hundred, thirty-four articles remained after removing duplicates. One hundred and sixteen articles were removed based on inclusion/exclusion criteria by reviewing titles and abstracts, after which 18 remained. After screening these full-text articles, three articles were further removed because one was an editorial, and two presented educational strategies only. A total of 15 articles were included in the analysis.

Results

Evidence Level of the Studies

The strength and quality of the literature were rated using the American Association of Critical Care Nurses (AACN) levels of evidence. Twelve of the studies were rated as having a level of A. One of the studies were rated as having an evidence level of B. Two studies were rated at an evidence level of C.

Overview of the Studies

Studies from diverse countries were included in this literature review, including one study done in the US (Stewart, Cazzell, & Pearcy, 2019). One study was done in Iran (Dehghan, Jalali, & Bashiri, 2019). Two studies were done in Turkey, (Bumin Aydin et al., 2017; Aytekin, Doru, & Kucukoglu, 2016). Two studies were done in Brazil (Cumino et al., 2017; Franzoi, Goulart, Lara, & Martins, 2016). Two studies were done in Italy (Vagnoli, Bettini, Amore, De Masi, & Messeri, 2019; Dionigi, & Gremigni, 2017). One study was done in France (Marechal et al., 2017). One study was done in Egypt (Abd-Elshafy et al., 2015). A multi-site study was done in Jordan and United Arab Emirates (UAE) (Al-Yateem, Brenner, Shorrab, & Docherty, 2016), and two studies were done in India (Noronha, & Shanthi, 2015; Kumar et al., 2019). Two studies were done in South Korea (Kim, Jung, Yu, & Park, 2015; Ryu et al., 2018). None of the studies were found to be based on a theoretical model.

Data was collected on a wide variety of distraction techniques and different measures of anxiety levels. Fourteen studies focused on distraction techniques initiated in a hospital surgical unit, while only one, Bumin Aydin et al. (2017) was done at a clinic site. There were two multi-site studies. One was conducted both in two hospitals, one in Jordan and the other in UAE (Al-Yateem et al., 2016), and one was done in selected hospitals in Mangalore, India (Noronha et al., 2019).
Study Design

Twelve studies were randomized controlled trials (RCT) (Vagnoli et al., 2019; Franzoi et al., 2016; Marechal et al., 2017; Kim et al., 2018; Stewart et al., 2019; Aytekin et al., 2016; Bumin Aydin et al., 2017; Abd-Elshafy et al., 2015; Cumino et al., 2017; Kumar et al., 2019; Dehghan et al., 2019; Ryu et al., 2018). One study was a random controlled non-inferiority trial (Al-Yateem et al., 2016). One study was a quasi-experimental pre-test post-test control group experimental design (Noronha et al., 2015). One was an observational study (Dionigi et al., 2017).

Sample

All studies used a convenience sample of patients signed up for surgery at the selected site/sites. All studies recruited pre-school and school-age pediatric patients. The age of the children ranged from three to twelve years. The total sample size ranged from 30 to 168. The size of the study groups and control groups ranged between 15 to 84. Parental anxiety was also assessed in some studies (Stewart et al., 2019; Kim, et al., 2015; Franzoi et al., 2016; Kumar et al., 2019; Marechal et al., 2017).

Pediatric Anxiety Measurements

The primary outcome examined across the studies was, the preoperative anxiety of children. Anxiety was measured using various instruments, including the state-trait anxiety inventory for children (STAI-C) completed by parents (Al-Yateem et al., 2016; Aytekin et al., 2016; Kumar et al., 2019), and the modified yale preoperative assessment scale (m-YPAS) completed by an observer (usually a researcher or psychologist) (Al-Yateem et al., 2016; Dionigi et al., 2017; Franzoi et al., 2016). Furthermore, Al-Yateem et al. (2016) measured the vital signs of children during each surgery phase. Kumar et al. (2019) measured the stress of children using the index of clinical stress (ICS4) and the Ottawa mood scale7.

Other tools utilized include the Wong-Baker faces pain scale8 for self-reporting pain (Franzoi et al., 2016), the faces, legs, activity, cry, consolability pain scale (FLACC) for observational assessment of pain (Vagnoli et al., 2019), and the measurement of serum cortisol as a stress marker (Kim et al., 2015; Kumar et al., 2019; Abd-Elshafy et al., 2015).

The children were assessed at different points of time during the perioperative period, which corresponded with identified periods of high anxiety. The initial assessment of anxiety was usually performed before separation, either in the waiting area or the anesthesia holding area; the second point of assessment was right after separation from parents; and the third point was at mask induction (Stewart et al., 2019). Some studies assessed the patient after emerging from anesthesia (Marechal et al., 2017; Abd-Elshafy et al.,
2015). Some followed up with post-hospital behaviors (Stewart et al., 2019). Not all studies measured anxiety at all the identified points in time.

**Distraction Techniques**

Various distraction techniques were explored to alleviate children's anxiety before surgery. The distraction techniques used with children in the experimental group included the following: A medical clown intervention and integrated art therapy (Dionigi et al., 2017); The parent narrated a custom-made ‘Adam Goes to Surgery’ story while the child colored in coloring book related to the topic (Al-Yateem et al., 2016); The child played with 'play-doh' for six minutes in the preoperative area (Bumin Aydın et al., 2017); The child was offered a choice of computer games, books, or music for preoperative distraction (Aytekin et al., 2016); One group of children was distracted by watching cartoon videos, the other by parental presence, and a third by watching videos while parents were present (Kim et al., 2015); Children watched funny videos and played common games during their stay in the preoperative area (Kumar et al., 2019); Children listened to four preselected pieces of instrumental music that were non-lyrical, with 60-80 beats per minute, with sound level 6db, in low tones, performed on string instruments with minimal percussion (Franzoi et al., 2016); Children listened to taped popular songs selected by the child (Abd-Elshafy et al., 2015); Children were given picture books that contained preoperative, intraoperative and post-operative interventions (Noronha et al., 2015); virtual reality (Ryu et al., 2018), a 5 minute virtual reality exposure to the operating room (Dehghan et al., 2019); Children played with a smartphone in the preoperative holding area (Cumino et al., 2017); Children received relaxation-guided imagery from a psychologist (Vagnoli et al., 2019); Children played age appropriate tablet game apps on an iPad during induction of anesthesia (Marechal et al., 2017; Stewart et al., 2019).

**Effects of Distraction Techniques**

Regardless of the distraction method utilized, the majority of studies showed lower anxiety scores in the experimental group when distraction interventions were used compared to the controlled group. Three of the 15 studies (Bumin Aydın et al., 2017; Abd-Elshafy et al., 2015; Kumar et al., 2019) used distraction as an adjunct to medication.

Al-Yateem et al. (2016) discovered significantly less stress, anxiety, and pain and improved mood when a coloring book was utilized for distraction compared with no distraction. Vagnoli et al. (2019) similarly found a decrease in anxiety and pain post-surgery with the use of toys and video games as distraction methods.

Kumar et al. (2019) and Abd-Elshafy et al. (2015) found patients in the post-intervention experimental group who had watched funny videos and
played common games had significantly lower levels of serum cortisol during surgery, as compared to the control group.

Cumino et al. (2017) scored four groups of children on the m-YPAS pre and post-intervention. The control group’s parents were given only verbal education of the anesthetic procedure. The informed group parents also received an information booklet. The smartphone group parent received verbal education and the child received a smartphone to play within the holding area. The smartphone and informed group parent also received a booklet, and the child could play with a smartphone in the holding area. It was found that though pre-intervention anxiety levels were similar between the four groups, post-intervention anxiety in the control group was higher compared to all other groups (p=0.001).

Dehghan et al. (2019) exposed the experimental group to a 5-minute virtual reality tour of the operating room and scored the pre and post-intervention activity, vocalization, emotional expressivity, and state of apparent arousal of the control and experimental group. It was found that while only pre-intervention vocalization differed (p-value = 0.019), there was a significant difference between the pre and post-intervention scores in all subscales (p-value <0.05), except for the state of apparent arousal.

Ryu et al. (2018) found that the baseline m-YPAS scores for the experimental and control group were similar, the post-intervention score for the experimental group, which was distracted with the use of virtual reality, was 28.3, while the score for the control group was 46.7, which was a significant difference.

Kim et al. (2015) found that there was no significant difference between the post-intervention anxiety scores of three groups of children aged 2-7-year-old, that received video distraction only, parental presence only, and both video distraction and parental presence.

Franzoi et al. (2016) found that there was a significant difference between the baseline and post-intervention anxiety level of the experimental group (p-value = 0.0132) that listened to music for 15 minutes, as compared to that of the control group (p-value = 0.8877) that did not listen to any music.

Aytekin et al. (2016) studied several distraction strategies against a control group that received no anxiolytic intervention and found that the experimental group had a mean separation score of 1.45, while the control group’s separation score was 2.02. The STAI-C State score of the experimental group was 53.95, while that of the control group was 56.37. This signified the experimental group had lower anxiety on both tests as compared to the control group.

Noronha et al. (2015) studied distraction vs. unspecified routine care and found that during the pretest period, 80% of the experimental group experienced severe anxiety, while 60% of the control group experienced moderate to severe anxiety. In the post-test period, after the experimental group was exposed to picture books, only 53.33% of the experimental group had mild to moderate anxiety. The mean post-test anxiety score of the experimental group, (24.8+2.09) was lower than the mean post-test anxiety score of the control group (30.7+2.96).
Marechal et al. (2017) exposed the experimental group to tablet game apps on an iPad and found that m-YPAS and STAI-C were similar for both the study group and the control group at all 4 points of measurement.

Discussion

The traditional practice to prevent pre-operative anxiety has been the preoperative administration of anxiolytics and parental presence. Alternative and complementary use of distraction and other techniques has also been studied and found effective in the prevention of pre-operative anxiety (Dionigi et al., 2017). The focus of this review was on distraction techniques that can be incorporated into a nursing care plan.

Data extracted from the reviewed studies indicated that children experience high anxiety in the preoperative period. Children were assessed at different points of time during the perioperative period, which corresponded with identified periods of high anxiety. The first assessment was usually performed before separation from parents, either in the waiting area or the anesthesia holding area. The second point of assessment was right after separation from parents and the third point was at mask induction. Some studies assessed the patient after emerging from anesthesia and some followed up at home.

In the comparison of the effects of the distraction in the intervention group, many studies indicated control groups. However, there was no agreement on what was 'standard care' or 'routine care'. Some studies indicated standard or routine care consisted of medication only, some indicated preoperative education, some a combination of both, and some even included toys. It is not possible to generalize results in the absence of a standardized variable.

Three of the 15 studies used distraction as an adjunct to medication (Bumin Aydin et al., 2017; Abd-Elshafy et al., 2015; Kumar et al., 2019). Five studies combined distraction with education (Aytekin et al., 2016; Cumino et al., 2017; Kumar et al., 2019; Noronha et al., 2015; Ryu et al., 2018). Two studies combined distraction with parental presence (Kim et al., 2015; Vagnoli et al., 2019). Four studies combined various distraction strategies (Aytekin et al., 2016; Dionigi et al., 2017; Kumar et al., 2019; Cumino et al., 2017). In some studies, routine care also included providing children with books and toys. All these additional variables might have confounded the influence of each distraction strategy and routine care on preoperative anxiety.

In some studies, parents, doctors, nurses, and in-serviced hospital staff rated anxiety on standardized scales, while other studies employed trained psychologists to do the rating. The degree of proficiency of the rater could have influenced the results.

Most studies excluded children with mental disabilities, emotional problems, and those with a history of previous surgery. Currently, there is no or very little data available for these groups.
Five out of the fifteen articles were not generalizable due to the small number of the study sample (Abd-Elshafy et al., 2015; Cumino et al., 2017; Dehghan et al., 2019; Franzoi et al. 2016; Vagnoli et al., 2019).

Since surgery requires an extremely controlled environment, all studies were limited to the use of convenience samples which were facility-based. This also limited sample characteristics by specialty. Most patients were male, outpatient, elective surgery cases that were healthy. Only two studies were conducted on children undergoing heart surgery. There is a need to conduct studies focusing on female patients and those with high acuity.

The studies were conducted in countries that were diverse by geography, culture, and language (as explained in the overview of studies). Most researchers reported using translations of standardized instruments in local languages. There is a possibility of some interrater reliability having been lost across cultures and languages. There was, however, no study conducted in the Spanish language which is a major language spoken in the Americas. There is a need to conduct studies in the Spanish language to create data relevant to Spanish speaking children.

There was only one study carried out inside the United States (Stewart et al., 2019). There is a need for more studies to be carried out in the United States to incorporate the diverse cultural and linguistic needs of pediatric patients in this country.

Implications for Nursing Practice

Distractions strategies come to fit all budgets, situations, and levels of care. They can be modified according to the age, physical and cognitive ability of the patient. They can be adapted for the requirements of the perioperative environment. Researchers have tried active distraction strategies like ‘play-doh’, coloring books, and interactive video games that involve eye-hand coordination by the patient to passive strategies like listening to music, watching videos, listening to stories, watching medical clowns, and virtual reality.

All nurses in the perioperative can be trained to implement distraction-based interventions to minimize or eliminate the negative sequelae of anxiety as well as the use of anxiolytic medications.

Nursing intervention is crucial for reducing anxiety in surgical patients and their parents. The non-pharmacological intervention is more effective than pharmacological intervention in alleviating anxiety. All nurses in the perioperative environment where children can become anxious should be trained to implement distraction-based interventions to minimize or eliminate the negative sequelae of anxiety as well as the use of anxiolytic medications.

Future research should.
Limitations

After searching for three major databases and online resources, only fifteen articles met the inclusion and exclusion criteria and were included in this literature review. There is a risk that some studies were missed due to the selected databases and search items.

Conclusion

The findings from this literature review have revealed that distraction techniques can effectively decrease preoperative anxiety levels in pre-school and school-age children. Healthcare providers must incorporate the concept of distraction in their care of pediatric surgery patients. Further research with larger samples in various settings will help identify the best distraction techniques and, also to recognize whether these techniques have a positive outcome on postoperative care.

References


Footnotes

1. State-trait anxiety inventory for children (STAI-C) measures feeling, mood, anger, worry, and stress. The STAI-C state subscale's Chronbach alpha for reliability has been reported to range between 0.71-0.76. The trait subscale ranges 0.82-0.89 which indicates high reliability. High concurrent validity has been reported with other valid tests, such as the children’s manifest anxiety scale, (Kirisic, Clark, & Moss, 1997).

2. Modified Yale preoperative anxiety assessment scale (m-YPAS) is a 27 item checklist divided into 5 categories; Activity, emotional expressivity, state of arousal, vocalization, and use of parents. The total score can range 23.33-100 (a cut-off point of 30 refers to high anxiety). The checklist is appropriate for use with the intra-observer weighted kappa 0.63 –0.9 which is high (Jenkins et al., 2014).

3. Post hospitalization behavior questionnaire (PHBQ) has 27 items concerning general anxiety and regression, separation anxiety, eating disturbance, aggression, apathy/withdrawal, and anxiety about sleep. Parents compare pre-hospitalization to the post-hospitalization status of each item on a scale of 1-5. Reliability was high as measured by a Chronbach alpha of 0.92. Validity has been tested against an individual assessment by a psychiatrist with no significant difference (Karling, Stenlund, & Hägglöf, 2006).

4. Index of clinical stress (ICS) is a standardized, 25 item self-report questionnaire that is administered to children of 12 years or older or young adults. It measures the degree of magnitude of the client’s perception of stress. The reliability Chronbach alpha is 0.90 which indicates internal consistency. The standard error of measurement is 5.02 which indicates relative accuracy (Hudson, MacNeil, & Dierks, 1997, as cited by Walmyr Publishing Company, n.d.).

5. Hamilton anxiety rating (HAM-A). is one of the oldest developed anxiety rating scales still in use. It uses 14 items that are scored 0-4, 0 = Not present; 4 = Severe, with Total = 0-56, where <17 indicates mild severity, 18-24 indicates moderate severity, and 25-30 moderate to severe. The scale has poor discriminatory ability between anxiety and other conditions and does not consist of standardized probe questions. It still has acceptable reported IRR levels (University of Florida, 2011).

6. Faces, legs, activity, cry, consolability pain scale (FLACC) is an observational instrument for reporting pain on children 2 months to 7 yr old, or for those who cannot report pain. There are five categories face, legs, activity, cry, consolability scale. Scored 0-2. It translates into 0-10. IRR is 0.52-0.66 which is good. Merkel et al. (as cited by Vagnoli et al., 2019)

7. Ottawa-Georgia mood scale by Cheng & Ward (Weng, M., 2011) measures feeling, mood, anger, worry and stress, and Ottawa stress scales. The child self-rates each feeling by choosing a face denoting the emotional state on a scale. Reliability and validity are unknown.
8. Wong-Baker faces pain scale by Wong & Baker, 2001 (as cited by Kumar et al., 2019). This is a self-reporting scale in which the child rates their pain on a scale of 0-5. It has established validity.

9. Separation Scoring was observational scoring performed by a researcher and a psychologist before the patient was separated from parents. It was rated as 1 (very good, calm, ready to cooperate); 2 (good, anxious but easily persuadable); and 3 (bad, anxious but peevish, weepy). Reliability and validity are unknown.

Appendix A

Information Source and Search

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<tr>
<th>Databases</th>
<th>Search Terms</th>
<th>Search Results</th>
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<tr>
<td>CINAHL</td>
<td>(MH &quot;Surgery, Operative+&quot;) AND ((MH &quot;Anxiety&quot;) OR &quot;anxiety&quot;) AND ((MH &quot;Relaxation Techniques+&quot;) OR (AB distract* OR AB alternative OR AB non-pharmacological OR AB complementary OR AB integrative)) MH &quot;Surgery, Operative+&quot;) AND ((MH &quot;Anxiety&quot;) OR &quot;anxiety&quot;) AND ((MH &quot;Relaxation Techniques+&quot;) OR (AB distract* OR AB alternative OR AB non-pharmacological OR AB complementary OR AB integrative)) Full Text; Published Date: 20150101-20191231; English Language; Peer-Reviewed, All child.</td>
<td>32</td>
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Appendix B

Records identified through database searching (n = 188)  
Additional records identified through other sources (n = 9)

Records after duplicates removed (n = 134)

Records screened (n = 134)  
Records excluded (n = 116)

Full-text articles assessed for eligibility (n = 18)

Studies included in the qualitative synthesis (n = 1)  
Studies included in quantitative synthesis (meta-analysis) (n = 14)

Prisma Flow Diagram

Figure 1. PRISMA Prisma Flow Diagram (Moher, Liberati, Tetzlaff, & Altman, 2009)