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Does Providing Pre-Procedural Video Information Improve the Guardian's Experience for Patients Undergoing Full Mouth Dental Rehabilitation in the Operating Room?

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A thesis submitted in partial fulfillment of the requirements for the degree of Master of Science in Dentistry at Virginia Commonwealth University.

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Abstract

DOES PROVIDING PRE-PROCEDURAL VIDEO INFORMATION IMPROVE THE GUARDIAN'S EXPERIENCE FOR PATIENTS UNDERGOING FULL MOUTH DENTAL REHABILITATION IN THE OPERATING ROOM?

By: Jennifer Waters, DMD

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VCU Pediatric Dentistry

This purpose of this randomized controlled trial was to determine the effect of pre-procedural informational video for full mouth dental rehabilitation (FMDR) under general anesthesia (GA) on guardian knowledge, retention and anxiety. Guardians of patients presenting to Virginia Commonwealth University (VCU) School of Dentistry, Department of Pediatric Dentistry for consult appointments to receive FMDR under GA were randomly assigned to the experimental or control group. In the experimental group, subjects watched an informational video and received written and verbal instructions regarding the upcoming FMDR appointment. The control group received written and verbal instructions only. On the day of the surgery, guardians completed a questionnaire which assessed knowledge retention for the procedure at hand and pre-procedural instructions along with the anxiety level of the parents. The difference in the knowledge retention between the two groups was evaluated using Kruskal-Wallis test. Overall anxiety score was compared using Kruskal-Wallis test. A total of 73 guardians participated in the study, 66 English speaking and 7 Spanish speaking (control=32, 44%; experimental=41, 56%). The median number of correct responses was 12 (IQR: 11-13). There was a significant difference between the two groups (p-value=0.0467) with the video group scoring a median of 13 (IQR: 11-14) compared to 12 (IQR: 10.5-13) for the control group. The median score was 8 (IQR: 6-10) for the group who viewed the video and 7 (IQR: 5-10) for the control group. Overall, 20% of the guardians reported that they were "Very Anxious" and an additional 41% indicated "Slightly Anxious" on the day of the procedure. Self-reported anxiety did not differ significantly between

the two groups (p-value=0.6945). The video did influence guardian knowledge retention. Guardians have high levels of anxiety prior to their child's FMDR under GA.

Introduction

In the field of dentistry there is a significant association between a caregiver's oral health literacy and their child's oral health status.[1] Dental health literacy can be defined as the degree to which individuals have the capacity to obtain, process, and understand basic oral health information and services to make appropriate health decisions.[2] Individuals with limited oral health literacy were reported to be at higher risk for oral diseases and the problems related to those diseases.[3] Little research has been completed on the role of literacy in oral health for both adults and children, however.[4]

Approximately 80 million adults in the United States have low health literacy, which can be defined as the ability to understand basic health information and make informed decisions regarding one's health.[5] In other words, millions of adults in our country are merely unable to understand the information that is given to them during their medical appointments. An individual's health literacy capacity is mediated by education, and its adequacy is affected by culture, language, and the characteristics of health-related settings.[3] Often, few patients are willing to reveal that they have trouble understanding a professional's presentation or that they do not understand a term.[6] At times there is not enough time in one appointment for a patient to ask the questions that they may need answers to in order to understand the materials presented to them.

Furthermore, many of those who exhibit low health literacy do not perceive that they have a problem. [6]

The total number of adults who exhibit inadequate literacy skills to function in society increases by 2.25 million people annually.[7] Our population is increasingly becoming unable to make informed health decisions. This lack of understanding in turn leads to high rates of hospitalization and trips to the emergency room, as well as a lack of preventive health measures.[5] Adults who do not understand that immunizations can prevent disease or that well-checks can help screen for disorders do not seek the care that they need. This increase in morbidity from decreased health literacy puts a large burden on our already overrun health system.

For the subset of patients who are unable to understand their providers, poorer overall health status is noted, as well as an increase in morbidity and mortality.[5] Lower literacy has been linked to problems with the use of preventive services, delayed diagnoses of medical conditions, poor adherence to medical instructions, poor self-management skills, increased mortality risks, poor health outcomes, and higher health care costs.[3] These patients are unable to grasp the importance of preventive measures such as diagnostic imaging, for example, which can significantly alter the survival rate of an adult diagnosed with disease. According to Gong et al., patients who do not understand the material they are provided from their doctor are less likely to properly follow medication regimens and post-operative care instructions.[8] Patients who do not follow medical instructions are more likely to end up back in the hospital or physician's office. The cycle may very well continue until a change is made in the way in which patients are given health information. Doctors therefore have a duty to provide information that is understandable and allay fear and anxiety to patients.[9]

Not only can low health literacy impact adults themselves, but also the children of these adults are affected. It has been found that children in households where the parents have low health literacy are more likely to miss multiple days of school, have higher rates of emergency room visits and hospitalizations and exhibit poor oral health.[5] Again, the burden now relays from the parent to the child. There is a strong association between low parent health literacy and poor health status for both adults and their children.[5]

Low health literacy can have a significant impact on a child with simple or complex medical issues. Decreased perceptions of health, a decrease in the utilization of preventive services and a poor understanding of written and verbal instructions has been associated with low health literacy.[10] It has been shown that parents of low health literacy are less able to understand discharge instructions and follow medication regimens prescribed by a provider.[11] This can have significant implications in society. For example, a parent who does not understand how to follow prescription instructions may give their child a given medication, Amoxicillin, for example, for a longer than necessary period of time. This, in turn, can lead to an increase in antibiotic resistance among a population, which can significantly affect a population's ability to fight infection and disease. Parents of low health literacy are also more likely to exhibit negative habits that can affect their child, such as smoking, and are less likely to partake in activities that have a positive impact on their child, such as breastfeeding.[11]

The major reason that poor health literacy exists is that some parents are being given written or verbal health information from providers at a reading level in which they are unable to comprehend. Functional literacy, or a person's ability to understand written materials, has actually been declining in the United States.[12] In fact, one study found that an average patient has a 6^{th} grade reading level, yet most written materials from a medical provider requires an 11^{th} to 14^{th}

grade reading level.[11] Stossel et at., has stated that the average adult in the United States reads at an 8th grade reading level or below.[13] In medicine, many subspecialty fields utilize patient education materials that require a 9th to 12th grade reading level to read and understand the information.[13] In a study by Davis et al., it was noted that the federal act mandated that CDC vaccine pamphlets be given to parents and this act also states that these pamphlets must be understandable.[14] These pamphlets, however, were written at a level well above the reading level of two-thirds of the subjects in the study.[14]

A problem exists when parents are presented perioperative instructions and consent forms in a manner in which they cannot comprehend. Consent forms from a doctor's office usually require a college reading level to understand.[11] Across the country, it is perceivable that parents are consenting for their children to undergo procedures which they may not fully understand.

It has been found that lower health literacy impairs a parent's ability to act on behalf of their child.[15] Parental education is one of the primary predictors in child dental caries rates within the primary dentition.[10] Across the country, early childhood caries is an incredibly common, yet preventable disease in children. Education is indeed necessary by parents to understand and prevent childhood caries.

Due to a lack of understanding, many parents look to the internet for an explanation of information that they do not understand from their doctor.[16] In this manner, again many parents can become misguided from false reports on the internet. Information on the internet can lack accuracy and quality and is often presented in a highly technical language.[17] When parents do not understand both information given to them by their doctor in person and information they find on the internet, oftentimes they are unable to make informed decisions about their child's health.

Maintenance of good oral health is dependent on one's ability to understand written or verbal information from their child's dentist.[18] Bridges et al., has stated that there is a correlation between a caregiver's oral health literacy and their child's oral health status.[1] Many parents are unfamiliar with the damaging effects that early childhood caries can have on the primary dentition and therefore do not seek professional dental services for their child.[19] Furthermore, parents of low health literacy are more likely to put their child to sleep with a bottle and less likely to advocate daily brushing for their children.[19] It appears that oral health literacy among parents needs to increase for this cycle to be halted or at least slowed.

There are a variety of preventive techniques in pediatric dentistry, such as professional fluoride application, regular prophylaxis, proper oral hygiene and periodic examination, that can prevent several serious conditions a child may exhibit in terms of oral health. Many times, the parents are unaware of the steps that can be taken to prevent dental disease. The consequences of dental neglect, due often to misguidance by the caregiver, can be devastating for a child. Untreated dental caries can lead to problems with speaking, eating, attending school, learning, and overall health.[7] High caries levels may also lead to a higher risk of hospitalizations and emergency dental visits, and therefore dental pain can impact not only a child's educational development, but also the economy due to time taken off by parents to take children to the dentist.[20]

For a child with severe dental caries, pediatric dentists often perform full mouth dental rehabilitation (FMDR) under general anesthesia (GA). Patients undergo comprehensive dental care, including but not limited to simple and complex restorations, extractions, pulpal/nerve therapy and space maintenance, in one appointment under GA. This work is performed in the operating room by a team including a pediatric dentist, anesthesiologist, nurse and a dental

assistant. There are many important pre- and post-operative instructions that a pediatric dentist and his/her team must communicate with parents of their patients for a successful surgery.

Currently, most pediatric dentists communicate with parents of patients via verbal and written information. However, other avenues exist to educate and inform parents that may be more effective. Picard et al. has stated that parents of children who are educated with standardized and individualized illustrations are more likely to return for their child's operative visit compared to parents who received only verbal instructions.[21] Children of parents who were educated with illustrations are also more likely to show cooperative behaviors at the office and return for follow-up appointments.[21] This, in turn, can have a dramatically positive effect on a child's oral health status. In the study by Picard et al., the visual aid was an illustrative book which included pictograms, odontograms and oral health instructions.[21] Parents who were given visual aids at the dentist's office as tools for understanding oral health showed an increased interest in communicating with the dentist as well as more trust in the dentist.[21] Other aids, such as informative videos, may be helpful in this arena of parental oral health education as well.

There are a variety of educational modes to inform parents in regards to their child's health. In a study by Salzwedel et al., video-assisted patient education was used to inform patients regarding anesthesia risk and it was found that the informative video does not change patient anxiety levels but does increase understanding of the anesthesia risks and procedure.[22] A reduced state of anxiety in both patients and their parents can lead to more successful FMDR appointments and a positive association for a child with the concept of visiting the dentist. Factual knowledge of anesthesia has also proven to improve compliance with perioperative instructions and facilitate informed consent;[23] parents necessitate the time and tools to understand procedures that their child undergoes, such as FMDR under GA.

Most parents want information regarding premedication, the induction of anesthesia, anesthesia side effects, and pain management post-operatively.[24] Parents of children with less educational experience and who had not been exposed to pain management gained the most benefit from a video intervention.[23] Parents must understand how to prepare their child for the surgery mentally and physically and also parents must be aware of how to assist in their child's recovery from the procedure.

Bailey et al., found that many parents want to see pictures of the operating room, what anesthesia induction looks like on a child, and how they can help their child.[25] Occasionally, parents may become more stressed out after seeing visualizations of a child undergoing GA induction. However, it has been found that parents who were extremely nervous did not become more distressed as a result of receiving more detailed anesthesia information.[26] Often, parents find the anesthesia aspects of surgery the most anxiety provoking.[26] Thus, if parents are better able to understand these details, their level of anxiety and presumably their child's level of anxiety may both decrease.

While visualizations, such as a picture book discussed earlier may be helpful, an idea that has gained momentum in the medical field in regards to patient education is informational pre-operative videos. Chartrand et al., studied the impact that an educational pre-operative DVD had on parent's and children's outcomes after a same-day surgery.[27] They found that parents who watched the DVD acquired greater knowledge than those who did not.[27] In general, the greater the knowledge obtained by parents and the greater the participation that parents exhibit in a child's surgery, the better the outcome for the patient.

It has been found that parental involvement during surgery decreases children's postoperative pain, anesthesia-related side effects, anxiety, duration of recovery, parental anxiety

and also reduces operating costs of the surgery department.[27] In other words, a more involved and informed parent in their child's surgery equates to less post-operative healing time and less complications for children, while also benefiting the hospital financially.

Audiovisual aids have been found to keep patient attention better than other modalities in previous research.[11] However, many issues must be considered when employing these aids, such as patient comfort with technology and practice accessibility to the technological means to present the videos.[11] Therefore, some medical providers have considered a multimodal approach including verbal, written and video information.

Preoperative preparation has been proven to be most beneficial in reducing anxiety in both adults and children when implemented >5-7 days before surgery.[28] Parents who watch an educational pre-operative video at a consult appointment for surgery would therefore likely benefit significantly. Additionally, this may give the parent the time needed to review the information presented and ask the doctor any pertinent questions prior to surgery.

Not only can preoperative information be beneficial for parents prior to and following surgery, but also the information portrayed in educational videos at consult appointments can be useful for the patients themselves. After viewing informational videos and written material, it has been found that pediatric patients aged 5-15 years old exhibit increased recall of information.[29] Some patients undergoing full mouth dental rehabilitation present at an age where they are becoming able to help take care of themselves and maintain their own oral hygiene and preoperative videos may prove beneficial for both patients and their parents.

While multi-modal informational techniques may prove valuable in the delivery of pre-procedural information for parents, the language in which these videos are presented must also be

considered. Approximately 63 million Americans speak a language other than English at home, and more than 26 million have limited English proficiency (a self-reported ability to speak English less than very well).[30] In the United States, the Latino population is the fastest growing ethnic group.[11] In many pediatric dentistry practices, a significant language barrier exists when patients and their parents do not exhibit the same native language as the provider. This, in turn, leads to parents being unable to properly understand and consent for a procedure and an inability to comply with pre- and post-operative instructions. As stated previously, a lack of understanding and therefore compliance with pre- and post-operative instructions can lead to delayed healing time and peri-operative complications.

In a study by Rozier et al., it was found that all specialists, with the exception of pediatric dentists, used more communication techniques than did general dentists.[31] Thus, the current manner in which pediatric dentists are communicating with parents of patients may not be effective. There is a lack of research on the implications of the use of audio-visual aids to help convey information to parents in the pediatric dentistry setting. According to Zvara et al., no study has specifically evaluated the use of an instructional video about anesthesia as an educational tool for educating patients about their upcoming surgery with anesthesia and facilitating the anesthesiologist-patient relationship.[32]

It is the aim of this research project to determine the impact that a pre-procedural informative video will have on a guardian's experience for patients undergoing FMDR under GA. Secondarily, this study will investigate the effect that the pre-procedural video has on English-speaking guardians compared to Spanish-speaking guardians. As health literacy is often hindered by communication and translation issues for the Spanish-speaking population, it is of interest to determine if this population could benefit more significantly from the addition of a video in their

native language. Hopefully, a pre-procedural GA video concept, similar to those currently used in medicine, can be beneficial for pediatric dentistry patients undergoing FMDR under GA.

Methods

The design for the study was a randomized controlled trial and data was obtained via a questionnaire. Patients and their guardians presented to Virginia Commonwealth University (VCU) School of Dentistry, Department of Pediatric Dentistry, for consult appointments. At this appointment, if a patient was determined to be a candidate for FMDR with GA, first- and second-year pediatric dentistry residents and Spanish-speaking dental assistants or interpreters, briefly described the research study via verbal script to the guardians of the patients (potential subjects) and asked for their permission to participate in the study. This study was approved as an exempt study by the Institutional Review Board at Virginia Commonwealth University and the IRB Protocol Number for this study is HM20017908.

Subjects

Subjects for both the experimental and control group consisted of guardians of patients presenting to the VCU Pediatric Dentistry clinic for consult appointments to receive FMDR under GA. The target sample size was 100 subjects (approximately 50 experimental subjects and 50 control subjects), with an equal distribution of English- and Spanish-speaking participants in each group. The target sample size was later increased to a size of 120 subjects (approximately 60

experimental subjects and 60 control subjects) to account for attrition. Inclusion and exclusion criteria are listed below:

Inclusion criteria:

- Guardians of patients that are undergoing FMDR with GA through VCU Pediatric Dentistry
- Guardians speak either English or Spanish as their preferred language

Exclusion criteria:

- Guardians refusing to give informed consent
- Guardians that do not speak English or Spanish as their preferred language

Pre-procedural consult appointment

After consent was obtained, subjects were randomly assigned to the control or experimental group. In the experimental group, subjects watched an informational video and received written and verbal instructions and information regarding the upcoming FMDR appointment. In the control group, subjects received only the written and verbal instructions and information regarding the upcoming FMDR appointment. Both the control and experimental subjects received the exact same pre-procedural information (verbal and written instructions) – the only difference was that the experimental subjects saw the pre-procedural video, while the control subjects did not see this video. The verbal and written instructions and information for both the control and experimental groups were identical, as the residents read off of verbal scripts during the appointment for the verbal instructions. The consult appointments, including the video, written instructions, and verbal instructions, were conducted in either English or Spanish, depending on the subjects' preferred language.

Randomization

Concealed allocation was achieved for subjects by the resident selecting an envelope containing instructions for the subject (control vs experimental) without the resident knowing which instructions were in the envelope. The group to which a subject was randomized was only revealed after consenting to the study. A computer-generated stratified block randomization list was generated based on language to ensure equal allocation within each language. Blocks of size ten were used to ensure equal allocation for every ten subjects recruited within each language.

Pre-procedural Video

The video watched by the experimental subjects was developed and created by a pediatric dentist and resident and anesthesiologist. The video was filmed through the use of actors (child patient, two guardians, and various medical and dental providers) as a simulated patient experience in the pre-operative area, the operating room, and the post-operative area of the hospital. The video was set to a narration track that includes pre-operative and post-operative instructions, examples of dental treatment completed during the surgery and pictures of the various surgery locations. The narration also provided subtitles in the language of the video. In addition to the scenes of the actors, the video also included still images with specific information, like the example given in Figure 1. The English and Spanish versions of the video were both approximately nine minutes in length. Subjects in the experimental group watched this video at the VCU Pediatric Dentistry clinic during the consult appointment prior to the surgery date.

Figure 1: Sample of Still Image Presenting Information in Pre-Procedural Video

Questionnaire

During the surgery appointment at the hospital, subjects were asked to complete a questionnaire for this study. The questionnaire was identical for both control and experimental groups and measured how well subjects understood pre-procedural instructions and procedural information, and the level of subject anxiety peri-operatively. This questionnaire was in English or Spanish, depending on the subjects' preferred language. Anxiety questions were developed based on a literature review regarding physical symptoms of anxiety. Subjects from both groups (experimental and control) were compensated ten dollars after completion of the questionnaire at the surgery appointment. The study data was stored and managed using Research Electronic Data Capture (REDCap) electronic data capture tools hosted at Virginia Commonwealth University. REDCap (Research Electronic Data Capture) is a secure, web-based software platform designed to support data capture for research studies. [33,34]

Statistical Analysis

Based on extrapolating results from a previous study, a sample size of 50 in each group will have 84% power to detect a difference in mean number of questions answered correctly of 1.2

(assuming a control mean of 12 (81%) and a Video Group mean, 13.2 (88%)) assuming that the common standard deviation is 2 using a two group t-test with a 0.05 significance level.[22]

Statistical Methods

Results were summarized using descriptive statistics including counts and percentages for categorical variables and medians and interquartile range (IQR) for continuous measures which did not demonstrate a normal distribution. The difference in the knowledge retention between the two groups was evaluated using Kruskal-Wallis test. Differences in the rate of correct responses to the individual questions were compared between the two groups using Fisher's Exact test due to the high rate of correct responses. Spearman correlation was used to evaluate the association among the days between the consult visit (when pre-procedural information was provided and the video was viewed for the intervention group) and the knowledge retention score. Linear model was used to determine the overall effect of the lag time and group (video or control) on the knowledge retention score. Self-reported anxiety symptoms were compared between the two groups using Fisher's Exact test. Overall anxiety score was compared using Kruskal-Wallis test. Significance level was set at 0.05. SAS EG v.8.2 (SAS Institute, Cary, NC) was used for all analyses.

Results

A total of 73 guardians participated in the study; 66 were English-speaking and 7 were Spanish-speaking. Of those, 41 (56%) were randomized to see the video and 32 (44%) were controls. The median number of days between the consult appointment, when instructions were provided and the video was viewed for those randomized to the intervention, until surgery was 45 (IQR: 32-55) for the video group and 51.5 (IQR: 39-66) for the control group. This difference was not significantly different (p-value=0.1435). None of the patients in the study were rejected for surgery due to eating just prior to surgery (violating NPO guidelines).

Knowledge

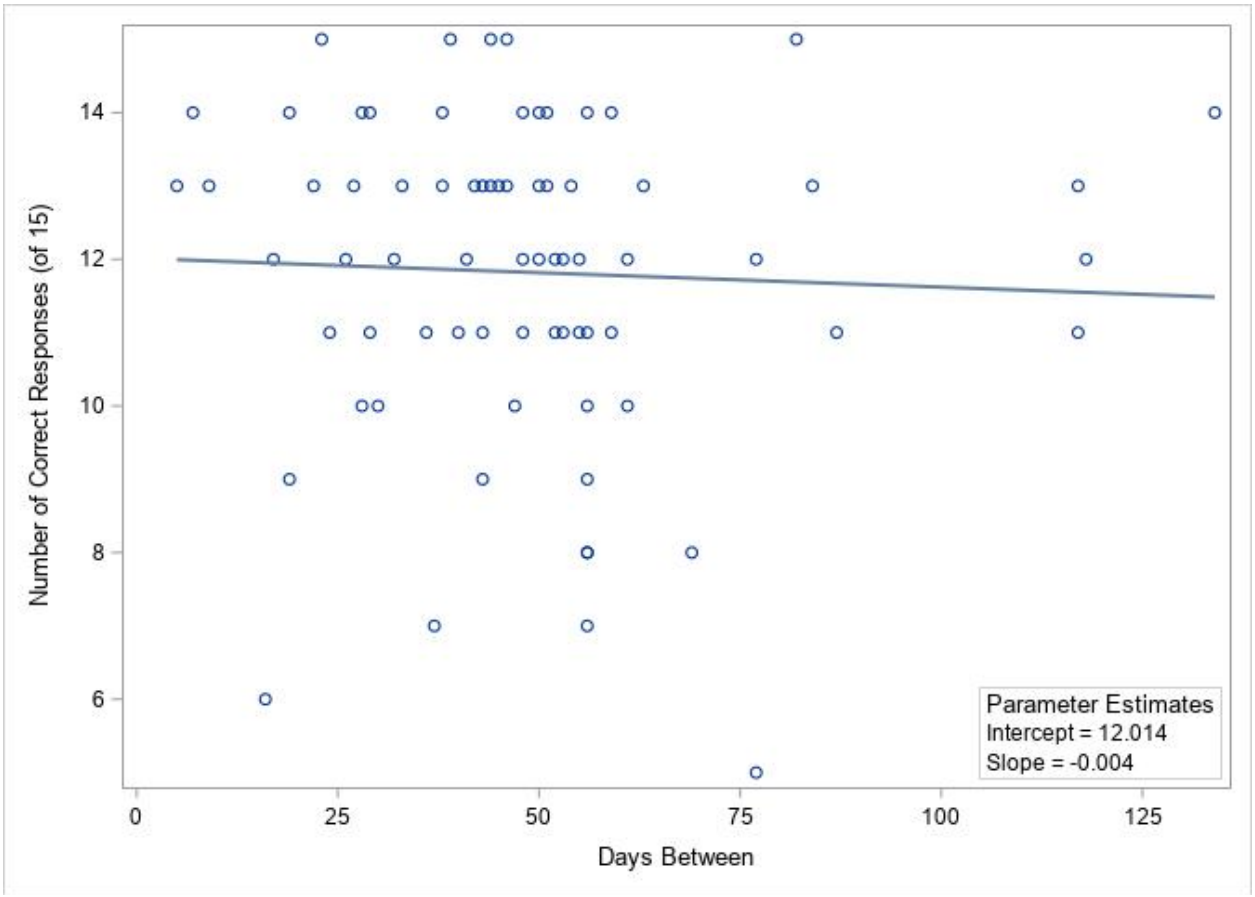
Of the 15 questions, the median number of correct responses was 12 (IQR: 11-13). There was a significant difference between the two groups (p-value=0.0467) with the video group scoring a median of 13 (IQR: 11-14) compared to 12 (IQR: 10.5-13) for the control group. Looking at the individual questions, the difference in the percent responding correctly wasn't significantly different between the two groups for any of the questions. There was a marginally significant difference in the rate of correct responses to the question regarding the first step when the patient is brought into the operating room favoring the video group (34% vs 13%, p-value=0.0540); that was also the question with the lowest rate of correct responses. Most other questions had at least 80% responding correctly. A complete summary of the individual

questions and total score is provided in Table 1. Since the time between the consult and general anesthesia appointment were not the same for all participants, the effect of the lag time was evaluated in terms of the knowledge retention. The total number of correct responses was weakly negatively correlated with the time between consult and surgery day but it was not statistically significant (r=-0.15, p-value=0.2180). The association between knowledge retention and lag time was not significantly dependent on the group (p-value=0.6689) nor was the effect of the lag time (p-value=0.8684). The correlation between lag time and the number of correct responses is represented visually in Figure 2.

Table 1: Knowledge Retention at Day of Surgery based on Group (n, %)

Question	Video	Control	P-value
Your child can have clear liquids up until two hours prior to arrival time on the day of surgery. Which of the following is considered clear liquids?	39, 95%	29, 91%	0.6480
Who will you have the opportunity to speak to prior to the start of the surgery?	35, 85%	28, 88%	1.0000
Where will the patient receive his/her IV?	39, 95%	30, 94%	1.0000
What is the first step that occurs when the patient is brought into the operating room?	14, 34%	4, 13%	0.0540
How will the anesthesiologist put your child to sleep in the operating room?	33, 80%	24, 75%	0.5836
Who should you contact if you have questions or concerns prior to the surgery date?	38, 93%	30, 94%	1.0000
Which of the following procedures are completed in the operating room?	34, 83%	25, 78%	0.7658
All of the following may be reasons that a surgery may be re-scheduled or cancelled EXCEPT	29, 71%	17, 53%	0.1473
Consent for the treatment will be signed:	35, 85%	24, 75%	0.3703
How will you be notified regarding the time and location of the patient's surgery?	28, 68%	22, 69%	1.0000
Who should be present the day of surgery with the patient?	24, 59%	15, 47%	0.3530
What should the patient wear the day of surgery?	37, 90%	24, 75%	0.1135
If the patient is sick a few days prior to the surgery, what should you do?	36, 88%	28, 88%	1.0000
What must you bring to hospital on the day of surgery?	39, 95%	32, 100%	0.5008
When should the patient stop eating foods prior to surgery?	40, 98%	31, 97%	1.0000
Overall Knowledge (out of 15) (Median, IQR)	**13 (11-14)**	**12 (10.5-13)**	**0.0467**

Figure 2: Correlation Between Lag Time and Number of Correct Responses



Anxiety

Overall, 20% of the guardians reported that they were “Very Anxious” and an additional 41% indicated “Slightly Anxious” on the day of the procedure. Self-reported anxiety did not differ significantly between the two groups (p-value=0.6945). Guardians also indicated their anxiety on a 0–10-point scale. The median score was 8 (IQR: 6-10) for the group who viewed the video and 7 (IQR: 5-10) for the control group; this difference was also not statistically significant (p-value=0.5231). Guardians also indicated their experiences with specific anxiety symptoms, which also did not differ significantly between the two groups for any of the symptoms included

in the questionnaire (Table 2). The most commonly reported symptoms were difficulty sleeping the prior evening (n=21, 29%), difficulty concentrating (n=20, 27%), and perceived fast heart rate (n=17, 23%).

Table 2: Self-Reported Anxiety Symptoms by Group (n, %)

	Video	Control	P-value
Anxiety Symptoms			
Fast Heart Rate	8, 20%	9, 28%	0.4161
Difficulty Concentrating	12, 29%	8, 25%	0.7938
Fast Breathing Rate	2, 5%	1, 3%	1.0000
Sweaty Palms	4, 10%	0, 0%	0.1261
Nausea/Upset Stomach	6, 15%	7, 22%	0.5408
Difficulty Sleeping last night	12, 32%	9, 29%	1.0000
Overall Anxiety			0.6945
Calm	15, 39%	12, 40%	
Slightly Anxious	17, 45%	11, 37%	
Very Anxious	6, 16%	7, 23%	
Anxious Rating (0-10) Median (IQR)	8 (6-10)	7 (5-10)	0.5231

Discussion

The aim of this study was to determine if video-formatted information regarding pre-procedural information is beneficial for guardians of children undergoing full mouth dental rehabilitation under general anesthesia. Oftentimes, guardians do not fully understand the verbal or written instructions and information presented to them prior to a surgical procedure. Although informative pre-procedural videos have been used in medicine for some time, there is limited literature available for this concept in dentistry, and specifically pediatric dentistry. Our goal was to determine, through a multiple-choice questionnaire, if a pre-procedural video benefited subjects in terms of how well they understood knowledge of the procedure and preoperative instructions. We also investigated the level of anxiety present for experimental and control subjects prior to the procedure.

Of the fifteen questions asked in the questionnaire, the median number of correct responses was 12. The video group correctly answered a median of 13 questions, while the control group correctly answered 12 questions. When looking at individual questions, the difference in the percent responding correctly was not significantly different between the two groups for any of the questions. However, there was a significant difference between the two groups with the video group scoring a median score of one question more correct compared to the control group. Overall, we were able to detect that subjects who watched the preoperative video were slightly better able

to answer questionnaire questions correctly, and thus better able to understand preoperative information and instructions. For pediatric surgery, compliance with preoperative instructions may be improved by adequate patient and family education.[35] Moreover, the overall cancellation rate can be improved by clarifying preoperative guidelines and instructions.[35] It is therefore imperative that we, as clinicians, are relaying information to guardians in ways that they can understand and retain the information presented. In this study, there were no cancellations due to inability to follow instructions in either group.

Among individual questions, there were four questions that stood out in regards to answers between the two groups. With respect to the question that asks the subject to select an example of a clear liquid (which the patient can consume until two hours prior to surgery), 95% of the video group and 91% of the control group correctly identified the answer. The majority of both groups were able to identify that apple juice qualified as a clear liquid that a subject can drink up until two hours prior to surgery. It is essential that subjects are able to recognize which beverages qualify as a clear liquid, as patients often have to be rescheduled due to drinking an unacceptable beverage just prior to surgery. Anesthesiologists impose preoperative fasting guidelines to prevent a patient from experiencing pulmonary aspiration and complications of aspiration such as aspiration pneumonia, respiratory compromise, and related morbidities.[36] Therefore, understanding these instructions can truly be crucial in the health of a given patient.

Although the video may not have made a large difference in who could correctly identify clear liquids acceptable prior to surgery, 71% of the video group and 53% of the control group correctly answered the question that acknowledges reasons that a surgery could be re-scheduled or cancelled. This question highlights reasons a surgery may not proceed: if a patient is sick the day of surgery, if a patient ate the day of surgery (one hour prior), or if the anesthesiologist deems

the surgery should not occur. It seems, based on the results of the survey, that this was a message clearly portrayed in the video, as a higher percentage of the video group subjects correctly answered this question, though not significantly different. It should be noted, however, that both groups seemed to understand that patients should stop eating at midnight, the night before the surgery, as this question was answered correctly by 98% of the video group subjects and 97% of the control group subjects. Within the study, no subjects had to be rescheduled due to eating outside of the required presurgical guidelines. Additionally, the same percentage (88%) of subjects correctly answered the question that relates to what the guardian should do if the patient is sick a few days prior to the surgery. A majority of both groups knew that they should call VCU Pediatric Dentistry, should this occur.

There was a marginally significant difference in the rate of correct responses to the question regarding the first step when the patient is brought into the operating room. The rate of correct responses favored the video group. However, we must here ask ourselves if this information is truly important in relation to the implications of surgery and guardian involvement. Will it make a difference if the guardian understands what the first step of surgery is? Perhaps this may serve to only heighten their anxiety. Or perhaps knowing that the patient is methodically taken care of in a humane and passionate manner, in which a time-out first occurs prior to sedative gas inhalation and IV insertion, may serve to appease the parent. The video group may have been more likely to correctly answer this question, as this topic is discussed and demonstrated in the video, but not generally covered in pre-operative written and verbal instructions, unless asked by a guardian. To be noted, this question was also the question with the lowest rate of correct responses. This information may simply not be applicable or notable for the guardian pre-operative information. Most other questions had at least 80% responding correctly.

The ability to correctly answer questions correctly could have been affected by the time that elapsed between the information being portrayed at the consult and the questionnaire completion at the surgery. The time between the consult and the general anesthesia appointment were not the same for all participants. The effect of the lag time was evaluated in terms of the knowledge retention. The total number of correct responses was weakly negatively correlated with the time between consult and surgery day but it was not statistically significant. The association between knowledge retention and lag time was not significantly dependent on the group. Although this difference was not significant, a shorter waiting time between these appointments may have resulted in a better retention of information presented at the consult.

The time between consult date and surgery is often out of our control due to insurance company limitations, pre-authorizations and constraints, a limitation to operating room time for providers, and a large waitlist for other patients anticipating surgery. Other constraints include patient transportation, patient health prior to surgery and legal constrictions (for patients who require guardianship paperwork or are residing in a group home, for example). If these restrictions could be managed more efficiently, perhaps the lag time between consult date and surgery date may decrease for patients. Although overall knowledge was still very high, if this lag time decreases, as noted in our study, guardians may be better able to recall information and instructions presented at the consult appointment.

The means to limit restrictions that increase lag time between consult date and surgery may include implementing deadlines for insurance companies to process requests for general anesthesia surgery coverage, establishing more surgery centers for patients in high caries risk populations, and increasing the number of providers specialized to treat pediatric dental patients (by increasing the number of pediatric dentistry residency programs). Patients would also benefit from increasing

access to patient transportation and increasing the number of staff trained in comprehending legal implications for pediatric patients without guardianship. In a study by Emhardt et. al, a statistically significant difference in failure rates was found between patients who traveled less than 60 miles and patients who traveled more than 60 miles.[37] Eliminating barriers to achieving access to care can truly make a difference in obtaining care needed for these patients.

After noting all of the stresses that may present to a guardian prior to their child's surgery, it is not a surprise that a majority (61%) of subjects reported some degree of anxiety. This number was slightly higher in the control group. Overall, 20% of the guardians reported that they were "Very Anxious" and an additional 41% indicated that they were "Slightly Anxious" on the day of the procedure. Self-reported anxiety did not differ significantly between the two groups. The median score for anxiety was 8 (on a scale of 1-10) for subjects who viewed the video, and 7 for the control group. Guardians also indicated their experiences with specific anxiety symptoms which also did not differ significantly between the two groups for any of the symptoms included on the questionnaire. The most commonly reported symptoms were difficulty sleeping the prior evening, difficulty concentrating, and perceived fast heart rate.

From the anxiety analysis, we can learn that, in this study, the pre-procedural video did not help dissipate anxiety. It seems that the guardian was stressed regardless of whether or not he or she watched the pre-procedural video. It is estimated that about 40% to 75% of children who undergo surgery experience fear and anxiety.[38] In our study, approximately 61% of guardians self-reported anxiety on the day of surgery. Since it has been found that parental anxiety can influence a child's level of fear, it can be expected that the majority of children are fearful prior to surgery as well. Preoperative anxiety is prognostic of negative clinical outcomes such as lengthy anesthesia induction, poor postoperative recuperation, and higher doses necessary for postoperative pain

control.[39] In addition, patients with preoperative anxiety are 3-4 times more likely to experience postoperative pain and are more likely to experience poor wound healing and a longer postoperative recovery.[39] Decreasing anxiety levels, by perhaps determining the ideal amount of information to portray to a guardian prior to surgery, can make a substantial difference for the health of a child perioperatively.

While anxiety was found among both groups regardless of watching the video prior to surgery, the pre-procedural video did help increase the amount of knowledge that the guardians understood regarding instructions and the surgery. Our study is in agreement with the study by Salzwedel et al., in which video-assisted patient education was used to inform patients regarding anesthesia risk.[22] Salzwedel et al. found that the informative video does not change patient anxiety levels, but does increase understanding of the anesthesia risks and procedure.[22] Our findings also agree with the study by Chartrand et al., who investigated the impact that an educational pre-operative DVD had on parent's and children's outcomes after a same-day surgery.[27] The study found that parents who watched an educational pre-operative DVD acquired greater knowledge than those who did not, similar to our findings.[27] For some guardians, seeing the pre-procedural video may increase anxiety instead of dissipating it, as they learn more information about what their child will experience. For others, more knowledge helps a guardian understand and thus be less overwhelmed. In our study, there was no correlation between anxiety and the amount of pre-procedural surgery knowledge understood.

The aforementioned study was not conducted without limitations. Although we aimed to have 100 subjects in the study, we collected only 73 returned questionnaires. Per the design of our study, 120 subjects were recruited. However, not all subjects have undergone surgery yet.

Additionally, some subjects underwent surgery, but questionnaires were not collected for various reasons.

In regards to participation, Spanish-speaking subjects were possibly less likely to participate in the study due to language barriers or a lack of comprehension about the study. Furthermore, communication barriers may have been a confounding variable within the study.[37] Approved interpreters were present at the consult appointment, but interpreters were not always present throughout the entire appointment for Spanish-speaking subjects, which could have limited their understanding of the study and information at hand. In the end, only 7 Spanish-speaking subjects participated in the study. Our ideal Spanish-speaking subject size was 50 subjects. Perhaps more time for recruitment and a larger study population may have increased this number.

For subjects in the study, a delay was present between the consult date and the surgery date. The median number of days between the consult appointment, when instructions were provided and the video was viewed for those randomized to the intervention, was 45 days for the video group and 51.5 days for the control group. This may have been due to complications with insurance approval, postponement due to COVID19 testing, restrictions, and results, and a lack of transportation among various other reasons. The inconsistent amount of time present between consult date (video date) and surgery date (questionnaire date) between the two groups may have altered the amount of information retained from the consult appointment to the surgery date by the subjects and thus skewed the results. It should be noted that the difference in lag time was not significant between the two groups.

COVID19 may have also affected how subjects answered one question in particular within the questionnaire. We asked subjects who should be present with the patient on the day of surgery. Prior to COVID19, the answer to this question should have been the patient's guardian and a

second adult. However, at the height of the COVID19 pandemic, while surgeries were still taking place, only one guardian was allowed to be present with the patient on the day of surgery (to limit exposure). Now, a guardian and a second adult may be present with the patient on the day of surgery. Depending on whether subjects had surgery prior to COVID19, during the height of COVID19, or after the height of COVID19, the answer to this question may have varied, and thus data could be skewed.

In regards to the anxiety portion of the questionnaire, confusion and varied results may have resulted from the question in which subjects were asked to rate their anxiety on a scale of 1-10. The question stated, "On a scale of 1-10, how anxious do you feel about your child's surgery?" Although we intended that 10 would rank as a high anxiety score, and 0 would rank as a low anxiety score, this was not defined in the question. Thus, responses may have varied in regards to this question depending on how subjects interpreted the question.

There is also a possibility that subjects used outside knowledge while completing the questionnaire, as they were not monitored while completing the questions. Likewise, subjects were not monitored while watching the video during the consult appointment. It is possible that subjects did not pay attention to the entire video during the consult appointment. We also did not exclude subjects who were guardians of patients that had previously had surgery before. These subjects may have had a better understanding of the questions asked on the questionnaire and/or less (or more) anxiety due to prior experiences. Additionally, these subjects may have understood preoperative instructions better due to prior surgery experiences.

It is also possible that the guardian that watched the video in the experimental group of the study may not have been the guardian present on the day of surgery who completed the questionnaire. We asked that the same guardian who watched the video complete the

questionnaire, but this may not have always been the case. If the guardian who watched the video was not the guardian who completed the questionnaire, results could have been skewed for the experimental subject. The same is true for the control group – the guardian present on the surgery day completing the questionnaire may not have been the same guardian who received the verbal and written instructions at the consult.

In the future, hopefully this study can be repeated on a larger scale. Perhaps more subjects can be recruited, to help increase the number of Spanish-speaking subjects in the study. This could help us determine if the video is truly more beneficial for Spanish-speaking subjects, compared to English-speaking subjects. Additionally, it could be valuable if this video format of information and pre-operative instructions were investigated in multiple settings. Perhaps this could include not only several dental specialties, but also specialties of medicine. Perhaps we could also delve into understanding the reasons for missed questions and misunderstandings regarding information and instructions prior to the surgery. Furthermore, it may be useful to repeat this study in multiple languages to further understand the depth of knowledge understood, ability to understand preoperative instructions, and anxiety levels for varying populations. The survey could also be implemented to adolescent patients after viewing the video to perceive the effect of a pre-operative video on the patient himself or herself. It would also be worthwhile to study the effect of lag time between consult date and surgery on guardian and patient anxiety. In addition, perhaps guardian vital signs could be recorded at the consult and surgery date to further evaluate anxiety levels.

Conclusion

The following conclusions can be drawn from this study:

1. Video-formatted preoperative information and instructions can positively influence a guardian's ability to understand and retain preoperative material.
2. Anxiety is experienced by the majority of guardians of children who undergo full mouth dental rehabilitation with general anesthesia.

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