Published in final edited form as:
Anesthesiology. 2011 July ; 115(1): 18–27. doi:10.1097/ALN.0b013e3182207bf5.

Changing Healthcare Providers' Behavior during Pediatric Inductions with an Empirically-based Intervention

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Abstract

Background—Each year over 4 million children experience significant levels of preoperative anxiety, which has been linked to poor recovery outcomes. Healthcare providers (HCP) and parents represent key resources for children to help them manage their preoperative anxiety. The present study reports on the development and preliminary feasibility testing of a new intervention designed to change HCP and parent perioperative behaviors that have been previously reported to be associated with children's coping and stress behaviors before surgery.

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Methods—An empirically-derived intervention, Provider-Tailored Intervention for Perioperative Stress, was developed to train HCPs to increase behaviors that promote children's coping and decrease behaviors that may exacerbate children's distress. Rates of HCP behaviors were coded and compared between pre-intervention and post-intervention. Additionally, rates of parents' behaviors were compared between those that interacted with HCPs before training to those interacting with HCPs post-intervention.

Results—Effect sizes indicated that HCPs that underwent training demonstrated increases in rates of desired behaviors (range: 0.22 to 1.49) and decreases in rates of undesired behaviors (range: 0.15 to 2.15). Additionally, parents, who were indirectly trained, also demonstrated changes to their rates of desired (range: 0.30 to 0.60) and undesired behaviors (range: 0.16 to 0.61).

Conclusions—The intervention successfully modified HCP and parent behaviors. It represents a potentially new clinical way to decrease anxiety in children. A recently National Institute of Child Health and Development funded multi-site randomized control trial will examine the efficacy of this intervention in reducing children's preoperative anxiety and improving children's postoperative recovery is about to start.

Introduction

Each year approximately 4 million children in the United States experience a significant level of preoperative anxiety and distress[1-3]. High preoperative anxiety can have adverse physical and psychological ramifications during and beyond the hospital stay, including a greater likelihood of emergence delirium, increased postoperative pain and maladaptive postoperative behavioral changes [4-6]. Conversely, reduced anxiety in children is related to decreased need for postoperative analgesics, faster discharge from the recovery unit and lower rates of maladaptive behavioral changes[7].

Traditionally, sedatives have been used to alleviate anxiety in children prior to surgery. However, use of sedatives has been linked to increased emergence delirium, potential longer stay in the postanesthesia care unit and increased operational costs[8-10]. As an alternative to sedatives, many anesthesiologists allow parents to be present during induction of anesthesia PPIA. Unfortunately, results have been equivocal as to the effectiveness of parental presence during induction of anesthesia in reducing children's preoperative anxiety[11-15]. As such, the search for a cost effective intervention aimed at child's anxiety before surgery continues[16].

Studies conducted in the area of pediatric invasive medical procedures have repeatedly shown that parents' and medical staffs' use of distraction, nonprocedure related talk, and humor is related to lower levels of distress[17-20]. Conversely, when adults use reassuring comments, apologies, criticism, empathic comments, or give the child too much control over the medical procedure, children evidence higher levels of distress[17, 21-22]. These two clusters of adult behaviors have opposite effects on children's anxiety, and are called coping promoting and distress promoting behaviors [23].

Recent research by our laboratory that was conducted in the perioperative environment supported the findings of the aforementioned investigations on the influence of adult behaviors on children's distress, and the temporal nature of these interactions [24-25]. Consistent with other invasive procedures, distracting talk by adults was related to more coping from children and adult reassurance was related to more distress. A behavior not previously described in invasive procedures, medical reinterpretation (*i.e.*, reframing medical equipment and procedures as nonthreatening) showed interesting temporal differences. This behavior was a coping promoting behavior when it was used to reference equipment and procedures within children's immediate environment (*i.e.*, those that they

could currently see, touch, and smell). Conversely, when used to reference objects that were not in the child's immediate environment (*i.e*., reinterpreting the mask when the child was in the holding area) this behavior leads to increased distress [24]. These relationships between adult behaviors and children's distress and coping indicate that adults can influence children's preoperative anxiety. As such, we submit that changing HCPs' and parents' behaviors represents an alternative way of managing children's perioperative anxiety. The next step in this line of investigations was to develop an intervention that targets HCP and parents' behaviors. This Provider Tailored Intervention for Perioperative Stress (P-TIPS) is based on the findings from our previous research described above [24-27].

Despite the promise of affecting children's anxiety *via* adult behavior, previous studies examining the malleability of HCP behavior have indicated that while HCPs are open to behavior change, their behaviors are not readily modified[28-32]. The purpose of this report, therefore, is to outline the development of P-TIPS and describe a pilot study examining the ability of this intervention to change behaviors of HCPs and parents in the perioperative environment. Once we have demonstrated that this intervention is capable of changing the behavior of HCPs and parent behaviors, we plan to proceed with a multi-center randomized controlled trial funded by the National Institutes of Health (2R01HD048935-06) to demonstrate the efficacy of the intervention in decreasing the anxiety and distress of children undergoing surgery and its potential impact on postoperative outcomes such as analgesics requirements and discharge time from the postanesthesia care unit.

Materials and Methods

The Institutional Review Boards at both participating sites (University of California, Irvine, Irvine, California and University of California, Los Angeles, Los Angeles, California) has approved all research procedures. Written informed consent was obtained from all parents and HCPs and verbal assent from obtained from the children.

Intervention Development

P-TIPS represents the synthesis of a 5 yr National Institutes of Health funded study (5R01HD048935) examining HCP-child and parent-child interactions in the perioperative setting. It was developed in three phases. First, a compilation of target HCP and parent behavior was defined. Second, our laboratory conducted several planning meetings with a team of experts in the field. And finally, the proposed intervention was tested in a multisite pilot study, the results of which are the presented in this report.

Identification of target behaviors—Target behaviors for the intervention were identified based on findings from the aforementioned National Institutes of Health funded study[24-26]. Briefly, over a period of 4 yr a total of about 300 dyads of parent-child and HCPs were videotaped in the perioperative settings. Cutting edge statistical methods such as sequential analysis were used to identify a subset of adult behaviors that were related to children's coping (*i.e*., desired behaviors) and children's distress (*i.e*., undesired behaviors). In addition to support from these analyses, behaviors selected were further reviewed by the multidisciplinary team for face validity. For details we refer the readers to previous publications[24-26].

Desirable adult behaviors included nonprocedural talk (*e.g*., talk about friends, toys, movies, favorite games, *etc*.), humor, medical reinterpretation (*i.e*., reframing medical procedures and equipment as something fun and positive), and providing developmentally appropriate procedural information[17, 24, 33]. These behaviors serve to distract children from their emotions and/or help to reframe a new, potentially frightening environment to something that is manageable and understandable, such that it is related to lower anxiety levels and

increased coping behavior by children. Undesirable behaviors included reassuring statements, empathizing, and apologizing. These behaviors focus children on their emotions and may increase distress [17, 24, 33]. Implying control over situations that the child did not actually control was also identified as undesirable (*e.g.*, "Are you ready to go?" "Do you want to put this mask on?"). Giving a child implied control over a situation they have no actual control over undermines their sense of efficacy. These undesirable behaviors have been previously associated with higher levels of distress. Appendix 1 lists the desirable and undesirable behaviors.

Task force meetings—To ensure the effectiveness and clinical feasibility of this intervention, several planning meetings were conducted with a team of collaborators including a pediatric anesthesiologist, pediatric psychologists, a clinical methodologist, a biostatistician, and research associates. This task force reviewed the desired and undesired behaviors that were identified in the previous study and developed an intervention for the implementation of these behaviors. In addition to task force meetings, the intervention was presented to other pediatric anesthesiologists, pediatric nurses, psychologists, and anesthesia residents. Initial feedback included shortening the training presentation and adding video examples of the desired adult behavior, implementing in-person coaching for HCPs following didactic training, and creating parent pamphlets for the nurses and/or doctors' offices to distribute prior to surgery. The intervention was modified accordingly.

Description of P-TIPS—P-TIPS is a multimodal training program that consisted of specialized training seminars for anesthesiologists and nurses. P-TIPS included didactic information on the previously identified desired and undesired behaviors, video modeling of effective and ineffective use of these behaviors, and *in vivo* coaching and feedback sessions. In all, HCPs attended one training session, lasting for no more than two hours, and at least one *in vivo* coaching session. Anesthesiologists (attending and residents) were trained in modifying their own behavior during interactions with children and families. Nurses were also trained to modify their own behavioral interactions, but were additionally trained in providing information to parents (*i.e.*, "train the trainer approach"). Our findings that parents required prompting to exhibit desired behaviors led to the conclusion that it would be more effective to train the HCPs and allow them to model and prompt parents for the desired behaviors. As such, because nurses were included in the intervention and have the most contact with parents prior to surgery, they were charged with educating and training parents on specific behaviors and how to be responsive to cues from anesthesiologists for how to interact with the child on the day of surgery. Therefore, in addition to modifying their own behaviors, the nurses' role was to train and educate the parents. In this regard, parents were indirectly targeted via the intervention, both as a result of training by nurses and through behavioral cues from the anesthesiologists for how to interact with their child. The P-TIPS research involved 4 phases: baseline, training, post-training, and booster sessions (see appendix 2).

Intervention Pilot Testing

As displayed in figure 1, this pilot study consisted of three phases: baseline assessment, intervention training, and post-intervention assessment. HCPs and families were recruited from the outpatient surgery centers at the medical centers at the University of California, Los Angeles and the University of California, Irvine.

Participants

Families—Children at both sites were 2-14 yr of age undergoing outpatient elective surgery (average age in baseline group: 5.7 yr, *SD*=2.6 yr; postintervention group: 5.5 yr, *SD* = 2.8 yr). Children who did not speak English or who had an American Society of

Anesthesiologists status of III or IV were excluded from this study. Eligible parents were fluent in English and age 18 yr or older. As displayed in figure 2, of the potentially eligible families, 77.5% consented and participated in the baseline phase; and, 97.6% of the eligible families consented and participated in the postintervention assessment.

Healthcare providers—HCPs who were directly involved with care of children on the day of surgery (day surgery and operating room (OR) nurses, attending and resident anesthesiologists) were recruited to participate; all HCPs who were approached at both sites provided consent to participate. University of California, Los Angeles participants included attending faculty pediatric anesthesiologists and preoperative admitting nurses ($n = 4$; $n = 5$, respectively). University of California, Irvine participants included first year resident anesthesiologists and preoperative admitting nurses ($n = 7$; $n = 5$, respectively).

Pilot study measures

Anesthesia Care Providers Behavior Frequency Measure—HCP and parent behaviors were captured and coded using an adapted form of the Revised-Perioperative Child-Adult Medical Procedure Interaction Scale (R-PCAMPIS)[24-25, 34]. Operational definitions of the 11 targeted behaviors were extracted from the larger observational scale. The R-PCAMPIS has been previously demonstrated to have excellent reliability and validity [24-25, 34]. Modifications to the original PCAMPIS were made to facilitate the interface between the coding system and the Observer software (Noldus Inc., Wageningen, The Netherlands). Specifically, the original PCAMPIS was modified to differentiate between state codes (*i.e.*, codes representing behaviors with meaningful durations) and event codes (*i.e.*, codes representing behaviors with meaningful frequencies, such as reassuring comments). This observational measure was used to record the frequency of how often HCPs and parents displayed desired (nonprocedural talk, humor, giving actual control, and current medical reinterpretation) and undesired (reassurance, empathy, apology, giving implied control, medical talk, and future medical reinterpretation) behaviors. The frequency of each behavior was recorded during distinct phases for anesthesiologists and parents: Preoperative Holding, Walk to the OR, Entrance to the OR, Anesthesia Mask Placement, and during Induction of Anesthesia. Nurses' interactions with children were limited to the holding room, so their behaviors were only recorded during the holding phase. To account for the varying amounts of time HCPs and parents were present at each of these phases, behavior frequencies were converted to rates of desired and undesired behaviors (total number of desired or undesired behaviors/total time present).

Educating parents on their roles—Nurses ability to convey to parents what was going to occur, when it would occur, what parents were expected to do, and ability to ask and answer questions from children and parents was rated on a scale of 0 (poor quality) to 2 (high quality). A score of 0 (poor quality) was given for brief explanations that did not include all relevant information, failure to explain parents' roles, and not asking questions from both children and parents; whereas, a score of 2 (high quality) was given for detailed explanations that included all relevant information about what to expect in the different parts of the perioperative environment, and consistently asking and addressing questions from parents and children. Nurses received a score for educating parents on their role in each of the following time periods: holding, walk to the OR, and in the OR. Scores for each of the three phases were summed together to create an overall quality score that ranged from 0 (low quality) to 6 (high quality).

Educating parents on behaviors—A checklist of 10 dichotomous (yes/no) questions indicated whether nurses had properly defined and explained the desired and undesired behaviors to parents. Scores ranged from 0 (no behaviors) to 10 (all behaviors).

Quality of interactions—Observers rated the overall quality of the nurses' interactions with the children and parents. Nurses were rated on a scale of 0 (low quality) to 2 (high quality). Low quality interactions were marked by an in ability for nurses to adjust and adapt the training and examples to the children's interests, inability to use developmentally appropriate language, and gives inappropriate examples of behaviors; whereas, a high quality interaction is marked by their ability to incorporate children's and parents' interests and input and use developmentally appropriate language.

Child distress - Yale preoperative anxiety scale, modified (m-YPAS)—The m-YPAS[35] is a structured observational measure of preoperative anxiety in children consists of 27 items in five domains of behavior indicating anxiety in young children (Activity, Emotional expressivity, State of arousal, Vocalization and Use of parents). M-YPAS domains have good to excellent inter- and intraobserver reliability, and demonstrates construct validity with other global behavioral measures of anxiety. The adjusted m-YPAS total score ranges from 0 to 100 with higher scores indicating greater anxiety.

Pilot Study Procedures

HCPs were informed of the study before study initiation and provided informed written consent. HCPs were assured that participation in this study was completely voluntary. Parents/Guardians of potential child participants were notified about the study up to 2 weeks before their surgery either over the phone or in person on the day of surgery. On the day of the surgery, researchers reviewed the consent and assent forms with parents and children. Parents and children over 6 yr of age completed consent/assent and health insurance portability and accountability act forms. A research associate videotaped the HCP interactions with children and parents from the time they entered the holding room until the induction of anesthesia. Children's anxiety was observed and measured using the m-YPAS. One parent accompanied the child into the OR and left after the induction of anesthesia. Children who participated in this study did not receive sedative premedication (midazolam). Anesthesia was induced in a standardized manner; upon arrival in the OR, a saturation of peripheral oxygen probe was placed on the child's finger and a scented anesthesia mask was presented to the child. The facemask was scented based on the child's request. Nitrous oxide-oxygen was introduced in a ration of 3/7 L flow for 2 min, and sevoflurane was started in a concentration of 0.5% then increased every three breaths to a maximum of 6%.

Behavioral coding—Two research assistants completed the behavioral coding. The lead coder had been previously trained to code and has extensively used the R-PCAMPIS, and served as a trainer for the other coder. The second coder was trained to code the R-PCAMPIS by first using study-independent training videos. Coding for the different behaviors was done in different passes to ensure that all HCP and parent behaviors were captured (*i.e.*, each behavior was coded in a separate pass). The two raters established inter-rater reliability by both coding the same videos for all behaviors for 10% of the sample. Differences were discussed and resolved until the two raters established a minimum of 80% agreement for each of the behaviors (range: 80-100% agreement).

Statistical Analysis

Data analyses were conducted using SPSS 18.0 (SPSS Inc., Chicago, IL). To assess whether the intervention successfully changed HCP behaviors, a series of Wilcoxon signed ranks tests were conducted comparing baseline rates of desired and undesired behavior to posttraining rates for anesthesiologists. Because the parents and children were in either the baseline or intervention condition, Mann-Whitney U tests were conducted to assess differences in rates of parental behaviors and children's anxiety levels. Nonparametric tests were used in consideration of the small sample size and nonnormal distribution.

Additionally, because residents and attending anesthesiologists have differing levels of experience, analyses were separated between the two groups of physicians. In consideration of the pilot nature of this study, the small sample size would unduly influence the rate of Type-II errors (*i.e.*, failing to reject the null hypothesis; nonsignificant *p*-values) from traditional paired *t*-tests[36]. In consideration of this issue, Cohen's *d* effect sizes were calculated and displayed alongside traditional significance test results. Cohen *d* effect size are generally classified as small ($|d|$= 0.20 to 0.49), medium ($|d|$= 0.50 to 0.79), and large ($|d| \geq 0.80$). Effect sizes help to indicate the magnitude of the effect (practical significance), whereas *p*-values help to indicate the probability of a significant finding (statistical significance)[36]. The effect sizes displayed were calculated with consideration to the dependent nature of the data (*i.e.*, within study differences) for the HCP data; therefore, the correlation between the two scores was factored into the effect size calculations[37]. Effect sizes and *p*-values were taken in consideration in the discussion of the results.

Results

Change in Physician Behavior

Table 1 displays rates of behaviors of attending and resident anesthesiologists. Residents showed a meaningful increase in their rates (*i.e.*, number of behaviors per minute) of *desired* behaviors, as indicated by the large effect sizes (average *d*=.97) in all the discrete time periods. Attending physicians in this sample demonstrated large, meaningful changes in their rates of desired behaviors during the holding and walk to the OR time periods. These increased rates approached statistical significance during the walk to the OR and during holding. Residents' change in rates of *undesired* behaviors were primarily small medium in their magnitude (average *d* = .31; see table 2). Despite these decreases in the rates of undesired behaviors, and given their potentially meaningful significance, paired *t*-tests failed to reach statistical significance for any of the comparisons of residents' change in undesired behavior rates. In contrast to the residents' behavioral changes, attending physicians' rates of undesired behaviors decreased at a larger rate (see table 2). Attendings' had a larger decrease in the rate of undesired behaviors were larger in their magnitude, denoting large and meaningful effect sizes (average *d* =1.19).

Change in Nurses' Behaviors

Nurses' education and behavioral scores demonstrated a significant increase in nurses' ability to present information to parents, modeling of *desired* behaviors, and in the quality of their interactions with children after the intervention (see table 3). Nurses' consistently demonstrated a large change in their ability to present information to parents and demonstrate effective behaviors (average *d* = 1.59). Moreover, the quality of nurses' interactions with families (*i.e.*, sensitive to children's interests) showed significant improvement.

Change in Parental Behaviors

As indicated by table 4, parents' rates of *desired* behaviors were higher in the postintervention group when compared to the baseline group across all time periods (small to medium effect size, average *d*=.43). Parents in the intervention group also demonstrated lower rates of *undesired* behaviors during all time periods. These differences were small to medium in their effect sizes (average *d*=.34). Despite the meaningful differences, as indicated by their effect sizes, only the difference during the walking period was statistically significant.

Change in Children's Anxiety

Children in the intervention group showed meaningful differences in their anxiety levels when they were assessed during the walk to the OR and induction compared to the baseline children, as indicated by small and medium effect sizes (see table 5). Moreover, the difference was statistically significant for children in the intervention during the walk to the OR and during induction.

Discussion

The goal of the present report was to describe the development of a new preoperative intervention, P-TIPS, aimed at changing HCPs' and parents' behaviors, and to examine the feasibility of behavior change as a function of the intervention. Under the conditions of this study we were able to demonstrate that P-TIPS was successful at both increasing rates of desired behaviors and reducing rates of undesired behaviors among anesthesiologists, nurses, and parents. Moreover, although not the primary aim of the study, we were also able to demonstrate a reduction in children's preoperative anxiety as a result of the intervention. As a whole, this study supports the feasibility of the empirically-based behavioral intervention targeted at changing the behaviors of HCPs and parents to reduce children's anxiety.

Although previous research has suggested that physician behavior may not be readily modified, anesthesiologists in the present investigation were amenable to behavior change as a result of P-TIPS. Included in this study were both attending and resident anesthesiologists and, as previously predicted, there were differences in the effectiveness of the training between the two groups. Resident anesthesiologists demonstrated greater increases in rates of desired behaviors; whereas, attending anesthesiologists demonstrated greater decreases in rates of undesired behaviors. Attending anesthesiologists, having more experience than their resident counterparts, generally displayed higher rates of baseline desired behaviors, which likely contributed to the lower gains in this area. That is, there was likely a ceiling effect given attending anesthesiologists had a larger developed repertoire of desired behaviors prior to the intervention. However, in consideration of anesthesiologists' rates of undesired behaviors, attending physician's greater years of experience may also allow for the incorporation of some undesired behaviors into their usual manner of interaction with patients and parents. This is most likely the reason that attending anesthesiologists demonstrated greater reductions in the rates of undesired behaviors as compared to their resident counterparts. Although both attending and resident anesthesiologists' behaviors were malleable, residents exhibited the largest behavioral changes. Residents' amenability to the training intervention represents a potential key population to shape and educate in order to change the clinical practice of pediatric anesthesiology.

Nurses represent medical specialists who can have a tremendous amount of influence over children's experience in the perioperative environment. Nurses' behaviors were highly malleable to the training; they demonstrated the largest changes in their behaviors. Not only were nurses effective in integrating information from the training into their own behavioral repertoires, they were also able to effectively convey this knowledge to the parents. In turn, parents in the intervention condition demonstrated higher rates of desired behaviors, and lower rates of undesired behaviors; this is a strong indicator of the effectiveness of utilizing nurses as trainers for parents in the clinical setting.

Influencing parents' behavior through training provided directly by nurses and from anesthesiologists' cues for how to interact with the child in coping promoting ways suggests that it is not necessary to conduct specialized seminars or training sessions with every parent as a part of the intervention. This approach of training HCPs who interact with multiple

parents helps to reduce logistical and financial considerations of implementing this type of program in a clinical setting. The program can be coordinated with the HCPs at each hospital, and nurses would subsequently help to educate parents as a part of their interactions with the families.

Although these are strong preliminary results, a couple of methodological limitations should be noted. That is, the nurses' parental education revealed the training status to the raters, which may have influenced the behavioral rating. While this is a potential limitation, the investigators could not avoid this because of the nature of this study. Additionally, although the behavioral coding measure (R-PCAMPIS) was slightly modified from its original version[34], and previously published with[24-25], it did not undergo an extensive validation process within the context of this study.

In sum, the present study confirms the feasibility of a behavioral change intervention and that the amount and type of training provided was appropriate to change HCP and parent behavior as noted by clinically meaningful effect sizes. Anecdotally, all HCPs who were part of this study were very enthusiastic about the study and were willing engage in this type of training, as it is highly applied and relevant to clinical practice. Our next step is to examine if change in HCP and parent behavior is associated with improved postoperative outcomes. We would like to note that this preliminary study was not powered to assess child outcomes but only the feasibility and dose-effectiveness of the intervention. Nonetheless, our findings with regard to children's outcomes are promising in terms of the ability of the intervention to decrease children's preoperative distress and perhaps postoperative outcomes such as analgesics requirements. These preliminary findings regarding P-TIPS show promise to be able to effect change to HCP and parent behaviors, and subsequently help reduce children's anxiety. Additionally, P-TIPS may potentially represent a viable, affordable alternative to pharmacological solutions to managing children's anxiety. Indeed, the authors of this study have just been awarded a multiyear National Institutes of Health grant to test this intervention in a multi-site study over the next 5 yr.

The underlying concept of all current interventions in this field is to treat the individual child and parent dyad directly (*e.g*., a sedative or preparation program). The fact that P-TIPS is directed at the HCP and not the individual child-parent dyad may certainly change the field, as the training of one HCP may result in improvement of anxiety and postoperative outcomes in large numbers of children and parents they encounter in their clinical practice. We are not advocating to stop the use of current interventions but rather to provide this as a complimentary approach. However, in future studies it will be important to assess behavior maintenance following training and determine whether booster sessions may be required. Moreover, it would be informative to examine the conditions under which these behaviors are best maintained. In sum, P-TIPS is a promising new alternative method in managing children's preoperative anxiety that can have a large impact on children's health, with minimal impact on hospital logistics and cost.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgments

Financial Support: National Institutes of Health, Bethesda, Maryland, 5R01HD048935 (PI: Zeev N. Kain, M.D.)

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Summary Statement

This report examines the effect of a new intervention aimed at changing healthcare provider and parental behaviors when working with children in the preoperative setting. The intervention was successful at increasing rates of desired behaviors, and decreasing the rates of undesired behaviors.

What we already know about this topic

- Health care providers are open to behavioral change to reduce stress and anxiety in children undergoing surgery, but their behaviors are not readily modified

What this article tells us that is new

- In a pilot study, multimodal training of physicians and nurses significantly increased desired behaviors, reduced undesired behaviors, and reduced levels of stress and anxiety in children undergoing surgery.

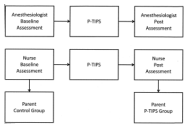

Figure 1.
Flowchart of study procedures by participant type.

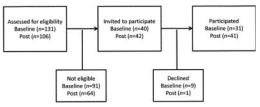

Figure 2.
Flowchart of patient recruitment (P-TIPS = Provider-Tailored Intervention for Perioperative Stress).

Table 1

Effect Sizes and *p*-values of Changes in the Rates of Desired Behaviors by Residents (n = 7) and Attending Faculty (n = 4).

Physician	Time Period	Assessment Point	Desired Behavior Rates				
			Mean	SD	Effect Size	% change	*p*-value
Residents	Preoperative Holding Area	Pre	2.6	3.7	.89	+129.9	0.09
		Post	6.0	2.8			
	Walk to the OR	Pre	2.2	1.5	1.49	+275.0	0.02
		Post	8.1	4.9			
	Entry into the OR	Pre	1.5	2.1	0.64	+139.4	0.13
		Post	3.6	2.3			
	Anesthesia Mask Placement	Pre	2.1	1.8	1.00	+110.5	0.04
		Post	4.4	2.5			
	Induction of Anesthesia	Pre	2.1	1.6	0.96	+110.5	.06
		Post	4.4	2.6			
Attending Faculty	Preoperative Holding Area	Pre	4.1	.9	1.30	+77.2	0.07
		Post	7.2	2.1			
	Walk to the OR	Pre	2.8	2.2	1.17	+192.3	0.07
		Post	8.1	2.7			
	Entry into the OR	Pre	6.7	2.7	0.27	+14.0	0.72
		Post	7.7	1.8			
	Anesthesia Mask Placement	Pre	7.4	7.8	0.22	+25.4	0.72
		Post	9.2	1.8			
	Induction of Anesthesia	Pre	7.6	6.3	0.22	+23.6	0.47
		Post	9.4	2.2			

Note: Cohen's *d* - small (|*d*|= 0.20 to 0.49), medium (|*d*|= 0.50 to 0.79), large (|*d*|≥0.80) OR = Operating room

Table 2

Effect Sizes and *p*-values of Changes in the Rates of Undesired Behaviors by Residents (n = 7) and Attending Faculty (n = 4).

			Undesired Behavior Rates				
Physician	**Time Period**	**Assessment Point**	**Mean**	**SD**	**Effect Size**	**% change**	***p*-value**
Residents	Preoperative	Pre	0.2	0.2	0.15	−24.1	0.74
	Holding Area	Post	0.1	0.2			
	Walk to the OR	Pre	0.5	0.9	0.17	−34.9	0.66
		Post	0.3	0.8			
	Entry into the OR	Pre	0.3	0.2	0.33	−64.7	0.69
		Post	0.1	0.7			
	Anesthesia Mask Placement	Pre	0.5	0.6	0.42	−59.5	0.27
		Post	0.2	0.3			
	Induction of Anesthesia	Pre	0.6	0.5	0.74	−70.1	0.04
		Post	0.2	0.3			
Attending Faculty	Preoperative	Pre	0.9	1.2	0.91	−79.8	0.07
	Holding Area	Post	0.2	0.1			
	Walk to the OR	Pre	0.6	0.9	1.20	−66.7	0.29
		Post	0.2	0.2			
	Entry into the OR	Pre	1.3	1.4	2.15	−89.8	0.07
		Post	0.1	0.2			
	Anesthesia Mask Placement	Pre	1.1	1.0	0.89	−84.7	0.14
		Post	0.2	0.1			
	Induction of Anesthesia	Pre	1.1	0.8	0.81	−65.0	0.14
		Post	0.4	0.3			

Note: Cohen's *d* - small (|*d*|= 0.20 to 0.49), medium (|*d*|= 0.50 to 0.79), large (|*d*|≥0.80) OR = Operating room

Table 3

Effect Sizes and *p*-values of Changes in Informing Parents, Quality of Interactions, and Modeling of Behaviors by Nurses (n = 10).

	Assessment Point	Mean	SD	Effect Size	% change	*p*-value
Educating Parents on their Role	Pre	0.3	0.4	1.93	+742.3	0.007
	Post	2.2	1.6			
Educating Parents on Behaviors	Pre	0.0	0.1	1.44	+6,550.0	0.007
	Post	1.3	1.1			
Quality of Interaction	Pre	0.1	0.3	2.13	+872.7	0.007
	Post	1.1	0.6			
Rate of Desired Behavior Modeling	Pre	0.9	0.5	0.89	+142.9	0.017
	Post	2.2	1.3			
Rate of Undesired Behavior Modeling	Pre	0.1	0.1	0.38	−50.0	0.18
	Post	0.1	0.1			

Note: Cohen's *d* - small (|*d*|= 0.20 to 0.49), medium (|*d*|= 0.50 to 0.79), large (|*d*|≥0.80)

Table 4

Effect Sizes and *p*-values of Differences in the Rates of Desired and Undesired Parental Behaviors between Baseline (n = 31) and Intervention Group (n = 41) Parents.

Type of Behavior	Time Period	Group	Parental Behavior Rates				
			Mean	SD	Effect Size	% Change	*p*-value
Desired	Walk to the OR	Baseline	0.9	1.4	0.60	+204.1	0.17
		Intervention	2.9	4.3			
	Entry into OR	Baseline	1.5	1.6	0.41	+199.4	0.66
		Intervention	4.3	9.7			
	Anesthesia Mask Placement	Baseline	1.2	2.0	0.38	+73.9	0.22
		Intervention	2.1	2.7			
	Induction of Anesthesia	Baseline	1.2	2.1	0.30	+52.1	0.27
		Intervention	1.8	2.1			
Undesired	Walk to the OR	Baseline	0.5	1.0	0.61	−90.5	0.04
		Intervention	0.0	0.2			
	Entry into OR	Baseline	1.4	3.9	0.32	−67.4	0.92
		Intervention	0.4	0.9			
	Anesthesia Mask Placement	Baseline	1.4	3.3	0.30	−54.4	0.90
		Intervention	0.6	1.2			
	Induction of Anesthesia	Baseline	1.1	2.2	0.16	−27.3	0.82
		Intervention	0.8	1.4			

Note: Cohen's *d* - small (|*d*|= 0.20 to 0.49), medium (|*d*|= 0.50 to 0.79), large (|*d*|≥0.80) OR = Operating room

Table 5

Effect Sizes and *p*-values of Differences in Children's Anxiety between Baseline (n = 31) and Intervention Group (n = 41) Children.

Time Period	Group	Anxiety Levels				
		Mean	SD	Effect Size	% Change	*p*-value
Preoperative Holding	Baseline	39.4	11.5	0.05	+1.8	0.93
	Intervention	40.1	14.5			
Walk to the OR	Baseline	42.3	10.5	0.52	−12.0	0.06
	Intervention	37.2	8.8			
Induction of Anesthesia	Baseline	54.2	17.3	0.38	−14.0	0.006
	Intervention	46.6	21.3			

Note: Cohen's *d* - small (|*d*|= 0.20 to 0.49), medium (|*d*|= 0.50 to 0.79), large (|*d*|≥0.80) OR = Operating room