

Accuracy of Children's Perioperative Memories



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ABSTRACT

Children's declarative memories of medical procedures can influence their responses to subsequent events. No previous study has examined the accuracy of children's declarative memories after surgery. We tested the memory of 34 anesthesia-naïve five- to nine-year-old children undergoing ambulatory surgery for accuracy of contextual details, pain, and fear two weeks postoperatively. Parents were not present during induction, and we did not use sedative premedication. Children had a mean contextual recall accuracy of 64.5%. Most children (60.6%) remembered a prompt that was given one minute after receiving nitrous oxide. Children's memories of pain and fear were similar to their reported pain and fear on the day of surgery. Of 29 children, 6 (20.7%) exaggerated their memory of fear, and 8 of 22 children (36.4%) exaggerated their memory of pain. Although a small proportion of children had exaggerated memories, there was no evidence of consistent bias in their memory of fear or pain. *AORN J* 105 (June 2017) 605-612. © AORN, Inc, 2017. <http://dx.doi.org/10.1016/j.aorn.2017.04.002>

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In the United States, an estimated 2.3 million children younger than 15 years of age receive anesthesia each year for ambulatory procedures.¹ Not much is known about what they remember of their experiences. Even young children can form memories of painful and distressing events, and children's memories of medical procedures can influence their responses to future procedures.²⁻⁵ Understanding how children remember the day of surgery is important in identifying which children might benefit from interventions to reduce distress.⁶

- Is there a difference in the accuracy of children's contextual memories across perioperative time points (ie, preoperative holding, transfer to the OR, induction in the OR)?
- What is the accuracy of children's declarative memories for perioperative emotional responses (eg, fear, pain)?

This was a descriptive study, so we did not set a priori hypotheses.

PURPOSE

The purpose of this research was to examine the accuracy of children's declarative memories of contextual and emotional aspects of perioperative events. We aimed to investigate the following research questions:

- What is the accuracy of children's declarative memories for perioperative contextual details?

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SIGNIFICANCE TO NURSING

Perioperative nurses are essential caregivers before, during, and after surgery. Nurses play an integral role in preparing children both physically and emotionally for surgery, and they are often the health care providers who interact most with children inside and outside the OR. They are also the primary caregivers during the recovery from anesthesia, before children are reunited with their parents. This study highlights the importance of

considering children's experiences of perioperative care, a patient-centered practice that is central to nurses' roles.

LITERATURE REVIEW

Seminal research on children's memories of traumatic experiences has demonstrated that most children are capable of recalling contextual and emotional details of these events (eg, location, people present).^{7,8} Children's declarative memories (ie, the ability to recall information, sensations, and emotions) develop rapidly in preschool, and children have memories about autobiographical events as early as four or five years old.³ Children's memories are not infallible, however, and may be subject to biases, especially in younger children.⁹

Children's declarative memories are particularly important in medical contexts, because evidence suggests that children's memories of painful and distressing medical events are an important predictor of their responses to later similar events. For example, a 2010 study demonstrated that children's memories of pain during an experimental pain task predicted how much pain they experienced during a second experimental pain task, which was beyond the level of pain actually reported during the first task.⁴ Another study showed that children who had relatively negative memories of a bone marrow aspiration and lumbar puncture experienced more distress at their next procedure.¹⁰

Compared with memory of medical procedures, children's memory of anesthesia induction has received relatively little study. Chorney and Kain¹¹ found that anesthesia induction resulted in significant anxiety in up to 40% of the 293 children studied. Although anesthetic agents interfere with memory consolidation, some children have anecdotally reported distressing memories during induction, including feelings of falling.¹² Researchers have previously examined implicit memory formation (ie, memories formed without conscious awareness)¹³ in the preoperative period, with or without sedative premedication, and found that no implicit learning occurred while receiving anesthesia.¹³⁻¹⁵ Despite this attention to implicit memory, there has been limited study of children's declarative memories of the perioperative experience. Understanding the recall of declarative memories is important to help clinicians identify children who might be at risk for heightened distress during later procedures or even avoidance of future health care.^{4,10}

METHODS

We used a descriptive cohort design for this study. We conducted the study in a tertiary care pediatric health center on the east coast of Canada. We used consecutive convenience

sampling to recruit generally healthy children with an American Society of Anesthesiologists classification I or II, who were between five and nine years old, and who underwent ambulatory otorhinolaryngologic or dental procedures. A research assistant recruited children when they arrived at the surgery center in the preoperative holding area. We excluded participants if they had previously received a general anesthetic, had developmental delays, or were not fluent in English. We also excluded children who received preoperative sedative medication and those whose parents were present for induction of anesthesia.

Protection of Participants' Rights

The research ethics board at the Izaak Walton Killam Health Centre in Halifax, Nova Scotia, approved this study. We obtained written parental authorization and oral child assent from all participants. Consent and assent procedures emphasized the voluntary nature of the research and that parents or children could choose to withdraw from the study at any time.

Instruments

To obtain a measure of children's self-reported fear, we used the Children's Fear Scale (CFS), a one-item tool that depicts a set of five facial expressions representing a range from neutral to extreme fear.¹⁶ The scale has been validated with children aged 5 to 10 years undergoing painful procedures and has demonstrated convergent validity with another validated self-reported measure of fear (Children's Anxiety and Pain Scale, $r = 0.73$) and children's overt distress behavior (Child-Adult Medical Procedures Interaction Scale, $r = 0.48$) during venipunctures. Discriminant validity of the CFS was supported by significant negative correlations with children's coping behaviors (Child-Adult Medical Procedures Interaction Scale, $r = -0.30$).¹⁶ Two-week test-retest reliability of the CFS has been demonstrated to be $r = 0.76$.¹⁶

The Faces Pain Scale Revised (FPS-R) is a one-item tool to quantify children's self-reported pain.¹⁷ The tool consists of six gender-neutral faces depicting "no pain" to "the most pain possible." The FPS-R has demonstrated convergent validity with another self-reported measure of pain (Colored Analog Scale, $r = 0.85$).¹⁸ The FPS-R has also been shown to capture changes after administration of analgesic medications.¹⁸

We conducted a postoperative memory interview to assess the children's memories of 17 specific contextual details of induction, using an interview process previously reported by Chen et al.¹⁰ We used open-ended prompts first (eg, "Tell me what you remember about the day you had your operation"),

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