Review articles

Preparing children for the operating room: psychological issues

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Children respond psychologically to the prospect of surgery in a variable and age-dependent manner. This review summarizes the psychoanalytic, cognitive, behavioural and family system models of child development. It then reviews studies of hospitalization and anaesthesia in children. These studies suggest that younger children, children previously anaesthetized, and children who experience turbulent anaesthetic inductions are at particular risk for postoperative behavioural disturbances. Strategies of dealing with children and their parents during the perioperative period are discussed. Such strategies include: allowing a parent to be present during induction of anaesthesia, administering sedative premedication, creating a supportive environment, educating children and parents (verbal descriptions, tours, books, videos), and establishing rapport with children and their parents. Age-specific techniques of establishing rapport with children are discussed. If children are less anxious during the perioperative period, not only will they often exhibit less behavioural disturbances postoperatively, but they may face subsequent medical care more easily.

Chez l'enfant, la répercussion psychologique de la chirurgie est variable et influencée par l'âge. Ce survol rappelle en résumé les aspects psychanalytiques, cognitifs et comportementaux propres au développement infantile. Par la suite, il étudie les effets de l'hospitalisation et de l'anesthésie des enfants. Ces études suggèrent que les enfants plus jeunes, anesthésiés auparavant ou ayant subi des inductions agitées sont particulièrement su-

jets à des troubles du comportement après une intervention. Pour ces enfants et leurs parents, des stratégies permettant de faire face à l'intervention sont discutées. Elles comprennent: la présence d'un parent à l'induction, l'administration de sédatifs en prémédication, la mise en place d'un climat favorable, l'éducation (descriptions, visites, dépliants, vidéos), et des prises de contact tant avec les enfants qu'avec leurs parents. Des techniques de rapprochement appropriées à l'âge sont discutées. En soulageant l'anxiété des enfants à la période préopératoire, non seulement on améliore leur comportement postopértoire, mais on leur permet d'affronter plus facilement la suite des événements médicaux.

Childhood disease can be viewed in a psychosocial as well as a biologic context. Indeed, for many elective paediatric surgical procedures, the attendant psychological disruption appears to match or surpass the pathophysiological insult. Familiarity with developmental theories and psychological studies of hospitalization and anaesthesia in children can help one to recognize how different children cope with anxiety and respond to the stresses of hospital care. With this knowledge, the practitioner can prepare children for surgery more effectively and anticipate postoperative behavioural disturbances. This article reviews theories of personality development as well as psychological studies of hospitalization and anaesthesia in children. It then discusses parental presence during induction of anaesthesia and sedative premedication. General issues regarding communication with children and their parents are discussed. Finally, specific strategies for preparing the environment, preparing the parents, and preparing the child for the operating room are discussed.

Models of personality development

Personality can be defined as the organization of psychophysical systems within the individual that determine his or her unique adjustments to the environment.[1] Various features of personality theories can be used in attempting to understand how children of different ages respond to stress. With increased understanding of age-

specific responses to anxiety, one can communicate with children more effectively and help them to deal with anxiety better.

Psychoanalytic theory

The first modern theory of personality development is the psychoanalytic theory. The child is seen psychoanalytically as being motivated by basic sexual and aggressive drives, and as proceeding through stages where the drive discharge is focused on different bodily sites. The oral, anal, and phallic stages have been described.[2] These stages are influenced at first primarily by the parents and subsequently by an enlarging circle of social contacts.

Psychoanalytic theory suggests that a considerable portion of all mental activity occurs at an unconscious level, and that these unconscious "thoughts" and processes influence the development of conscious thought and behaviour. But, the development of mental activity involves conflict, arising as a result of different mental structures being at odds with each other.

Freud conceived of three such structures within the subconscious that interact with each other and with the environment: the id, the ego, and the superego. The id is the most primitive structure, viewed to be the repository of the individual's basic drives. The ego interacts with the real world to satisfy the demands of the id. The superego unconsciously monitors the activities of the ego and determines the individual's moral code. Anxiety in the psychoanalytic theory is viewed as a reaction of the ego to erupting id impulses that could be both dangerous and highly unpleasant. The ego and superego mobilize various defences to combat the id impulses. Defences are many, and vary from primitive (e.g., denial, repression), to mature (e.g., humour, altruism).

In the psychoanalytic theory, evolution and development of personality are emphasized. Recently, Bernzweig and Eisenberg[3] described how defence mechanisms to cope with distress evolve in early childhood. Trad[4] has reviewed how defences can develop pathologically to disguise the presence of conflict. In preschool children, these were processes previously used to achieve adaptive developmental goals (e.g., thumb-sucking following weaning). Viewing the anxious child within the context of the psychoanalytic theory might help the practitioner to recognize age-appropriate defences (e.g., denial in the five-year-old who "isn't scared," humour in the adolescent whose appendicitis "at least gets me out of my chemistry midterm") and encourage the more adaptive defences. To whatever extent one embraces the psychoanalytic theory of personality development, it is apparent that the defence mechanisms of younger children are incompletely equipped (with immature defence mechanisms) to process the anxiety arising from the unknown or imagined.

Cognitive theory

Jean Piaget introduced a cognitive model of intellectual development in the 1940s and 1950s.[5,6] Familiarity with Piaget's observations helps in recognizing developmental differences of children in comprehending concepts such as "future" or "death." Piaget grouped children into age categories according to their abilities to understand the environment. He called the first two years of life the sensory-motor period. During this period, children learn basic things about their relationship with the environment. They discover that objects exist apart from themselves and continue to exist when they do not perceive them. They also learn simple cause-and-effect relationships. They come to understand spatial relationships and acquire some idea of how one thing can symbolize another (e.g., a toy car).

The period between age two and about seven years is termed the pre-operational period, and is sub-divided into the pre-conceptual (up to about four years) and the intuitive (four to seven years) periods. In the pre-conceptual substage, children become increasingly able to represent one thing with another, so that they can use language symbols and represent things by drawing them. During the intuitive substage, children can give reasons for their actions and beliefs, but their thinking remains "preoperational." Such thinking depends on immediate perceptions rather than mental representations of the relevant concepts. A classic example would be the child who is unable to understand how the volume can remain constant when the contents of a tall thin glass are poured into a short wide glass. This type of thinking imposes limitations, such as attributing causation to something that happens sequentially. It is also characterized by frequent changes of opinion, and a persistence of the young child's egocentric attitude. Life and feelings are still attributed to inanimate objects, and concepts such as classes or categories are not well understood.

This stage is followed at about age seven by the period of concrete operations. Children now become able to internalize the properties of objects, and their thinking becomes less egocentric. The capacity to internalize properties means that children can put objects in order, or classify them by size, shape or colour without physically comparing them with one another. These comparisons can be made in their minds, which enables them to come up with answers more readily.

Piaget called adolescence the period of formal operations. This is characterized by much more flexible thinking. The main features are the ability to accept assumptions for the sake of argument, and to make hypotheses and set up propositions to test them. This stage is characterized also by the ability to look for general properties and laws in symbolic material (e.g., verbal, mathematical)

and so to invent imaginary systems and conceive of concepts beyond what is tangible, finite and familiar.

Behavioural model
The behavioural model of child development is more concerned with patterns of overt response to external stimuli that occur at different ages than with what occurs mentally.[7] This model is based on learning theory, and emphasizes that most behaviour is learned. Appropriate behaviour may be reinforced by positive pleasant, rewarding experiences, whereas inappropriate behaviour may be diminished by ignoring it. Use of this model can help physicians counsel parents to teach children desirable behaviour (e.g., holding the anaesthesia mask).

Family system model
Finally, paediatric practitioners should be familiar with the family system as a conceptual model.[7] The child develops within a complex set of interpersonal systems that include relationships with parents and other members of the family or household, as well as their relationship with each other. The child models his or her behaviour after that of the parents. The behaviour and values of the parents have a considerable impact upon the child. Various investigators[8-10] have demonstrated how parental coping mechanisms affect their children's coping mechanisms. For example, children of parents with chronic pain complain of abdominal pain and use more medication than children of parents without pain.[8]

Psychological effects of hospitalization
At the turn of this century, concern in hospital care for children was mainly disease-oriented and custodial. The predominant emphasis in the child's management was the facilitation of medical treatment plans.[11] The management routine was usually an adaptation of the procedures used with adults and not only ignored the child's developmental status, but the complications that resulted from the child's psychosocial deprivation. Indeed, when rules or procedures were modified for children, they were more limited rather than sensitive or beneficial. Rules for visiting, bed confinement, and feeding were all more restrictive for children than for adults. The child was separated from his family, and parents were usually allowed to visit perhaps once a week for an hour. The child was seldom treated as a person, let alone a person whose needs centred upon close, personal and loving support.

The first major change in hospital care for the child arose from Bowlby and Spitz's studies of separation and emotional deprivation in institutionalized children. In the 1940s, John Bowlby[12] provided individual accounts of the emotional and behavioural disruption that ensued upon the separation of young children from their parents.

In 1945, Rene Spitz[13] published a landmark article entitled "Hospitalism." In this study, two groups of chronically institutionalized infants were followed: one group was a "nursery group," which was part of a woman's penal institution. In this group, the natural mothers regularly visited and helped care for their children. The other group of infants resided in an orphanage, and were cared for by nurses who provided little emotional nurturing.

Sixty-nine nursery and 61 orphanage babies were followed with observation and developmental quotients over the first year of life. The infants in both groups received similar food, medical care, and clothes, and were situated in similar physical surroundings. This study documented the developmental decline in the orphanage infants who were left to their own devices. The results of this study caused Spitz to conclude: "It will be necessary to take into consideration in our institutions, in our charitable activities, in our social legislation, the overwhelming and unique importance of adequate and satisfactory mother-child relationships during the first year, if we want to decrease the unavoidable and irreparable psychiatric consequences deriving from neglect during this period."

The realization of the child's need for close affectionate contact led to the relaxation of visitation rules. The once-a-week visitation rule was suspended, and parents were allowed to visit their children on a daily basis. As a result of the effects of this liberalization, the rules were relaxed even more. It was also found that children who were cared for by their parents while in the hospital showed a much better response to treatment and a better post-hospital adjustment. This experience led to the practice of "rooming in," whereby the parent could stay with the child in the hospital.[14]

Psychological effects of anaesthesia and surgery
As more became known about children's psychological needs, more attention was turned toward possible psychological "sequelae" to anaesthesia and surgery. The first study to address specifically the question of the psychological effects of surgery on children was published by Levy in 1945.[15] The study was retrospective. He reviewed the records of 124 children who had been referred to him for behavioural problems and who had undergone surgery at some time in childhood. He then determined the percentage of children within different age groups who manifested emotional sequelae after their surgery. He did not clarify how he determined which behaviour problems represented emotional sequelae to surgery, but suggested that this determination was largely based upon the mother's recollection of the surgical event (i.e., when mothers noted new behaviour problems shortly after surgery, these problems were considered "sequelae").

The highest incidence of postoperative emotional sequelae was seen between the ages of one and three years. However, 12 of the 25 children with postoperative problems had a history of emotional problems before surgery. This suggests that this study overestimated the true incidence of postoperative emotional sequelae in children.

These problems included: prolonged night terrors (children between one and two years), negativism (children > four years), and a variety of phobias, hysterical reactions, and anxiety reactions in all age groups. Levy reasoned that surgery represented a greater emotional hazard to the one- to three-year-olds because of their keener response to pain, poorer comprehension, increased dependency on their mothers, decreased experience with social contacts outside the home, and decreased ability to handle anxiety.

In 1952, Jackson published several studies which examined emotional trauma in children after tonsillectomy. In one report, [16] 140 children were studied. Parents were interviewed by a psychiatric social worker regarding their children's behaviour. The interviews took place before surgery, in the immediate postoperative period, and again three months after surgery. Thirteen of the 140 children (9%) exhibited postoperative behavioural changes which were felt to be indicative of emotional trauma (vs 20% in Levy's study). This new behaviour included nightmares, fears, and negativism. Again, children between the ages of one and three years were at increased risk for postoperative behaviour changes. Ninety-one percent of the children in this study were not affected or emotionally improved by surgery.

In 1953 Eckenhoff[17] published a retrospective study in which he examined postoperative behaviour in 612 children. Overall, he found a 17% incidence of postoperative behavioural changes. The incidence was 40% in the two-to-three-year age group. In this report, postoperative behavioural changes were associated with stormy induction of anaesthesia.

In the 1960's, Vernon, Shulman and others at the Children's Memorial Hospital in Chicago undertook a series of investigations examining the psychological response of children to anaesthesia and surgery.[18-20] In 1967 they published the first study[19] which involved prospectively manipulating variables and observing outcomes.

Thirty-two children aged two to six years were studied. The children were divided into two groups: 16 whose mothers were present at induction, and 16 who were separated from their mothers prior to induction of anaesthesia. The children were observed by the investigators from the time of arrival (the morning of surgery) up to and including induction of anaesthesia. The parents were then sent a questionnaire six days after surgery, asking

about the child's postoperative behaviour (and specifically signs suggestive of anxiety). Anaesthesia was induced in all children with a N_2O/O_2/halothane mask technique.

Considerable postoperative anxiety was related to previous hospitalization (particularly under unpleasant circumstances), the age range between two and three years, and the particular anaesthetist involved. The incidence of postoperative anxiety was not related to the birth order of the child, the preoperative behaviour of the child, or the presence or absence of the mother during induction, although induction was reported as generally smoother when the mother was present.

Other investigators' studies addressing the issue of parental presence during anaesthetic induction also reveal smoother anaesthetic inductions with parents present.[21,22] In a survey of British anaesthetists, Roman[23] found that the majority of respondents favoured parental presence at induction of anaesthesia in children greater than one year of age. One study[24] suggests that anaesthetists' anxiety about parents' presence at induction of anaesthesia diminishes as experience is gained with this technique. However, several studies suggest that anxious parents may exacerbate or prolong their children's anaesthetic induction.[25-27] In addition, while studies often purport to show a parental preference for being present at induction of anaesthesia and other hospital procedures,[28-30] one study found that >90% of parents present at their child's anaesthetic induction were upset by the experience.[31]

Other investigators have concentrated on anxiety in the immediate perioperative period. In 1972, Bothe and Galdston attempted to delineate some factors which lead to a stormy induction and/or emergence from anaesthesia.[32] They studied 50 children, aged four to 14 years of age, who were anaesthetized for elective surgery. They interviewed the children upon admission to the hospital, prior to induction of anaesthesia, and after surgery. In this study, interactive children who appeared at ease experienced no perioperative behavioural difficulties, whereas "quiet" and anxious children were more apt to experience stormy anaesthetic induction (14%) and/or emergence (10%) from anaesthesia. When asked subsequently what had caused them to go to sleep, about half reported "gas" or "mask," about one quarter indicated the premedication, while another quarter could give no explanation. When asked to relate the events leading up to the induction, none of the five children with emergence delirium could recall the pre-induction events in the operating suite. Anxiety appeared to interfere with recall; the authors suggested that in these children, preoperative anxiety precipitated postoperative repression.

More recently, others have confirmed and expanded upon these findings. Vetter[33] prospectively observed 407 consecutive children aged two to eight years. In this study,

two-year-old children were more likely to undergo stormy anaesthetic induction (23%) than children aged three to six years (12%) or seven to eight years (3%). Other predictors of turbulent anaesthetic induction included not taking a preoperative family tour, having undergone previous surgery, and preoperatively displaying a dependent or withdrawn affect.

Brophy and Erickson studied 61 children aged five to 11 yr,[34] and examined the relationship of children's self-statements to their levels of anxiety. They found the use of negative self-statements (e.g., self-criticism) to be related to increased anxiety. Interestingly, the absence of negative self-statements, not the presence of positive self-statements, was related to lower levels of anxiety in this group of children.

Sedative premedication and anxiety

For over 50 yr, mood altering drugs have been administered to children preoperatively to facilitate a calmer anaesthetic induction.[35,36] Children have been sedated following preoperative administration of opioids,[37-40] barbiturates,[41-45] chloral hydrate,[46,47] ketamine,[48,51] droperidol,[52,53] and benzodiazepines,[54-60] both alone and in various combinations.[61-63] In order to avoid parenteral injections, these medications have been administered via oral,[39,46,47,53,58-60,64] nasal,[65,66] transmucosal,[67-71] and rectal[61,72-74] routes.

While it is clear that sedated children often appear less anxious, we can only infer this to be the case. One study found lower intra- and postoperative levels of ACTH and other stress hormones in children premedicated with an opioid-benzodiazepine combination than with a benzodiazepine alone.[75] This might have merely reflected opioid suppression of the neuroendocrine response to surgery, rather than a reduction of anxiety per se. Studies of premedication in adults have indicated that premedicants had little effect on self-reported anxiety, although observers have frequently recorded dose-dependent sedation and anxiolysis.[76,77] A review of paediatric premedication studies has pointed out that small sample size and inappropriate statistical methods limit the value of many of these studies.[78] In addition, several studies[79-81] have reported that the behaviour, at anaesthetic induction, of unsedated children was similar to that of sedated children.

While a number of investigators have reported that stormy anaesthetic induction is positively correlated with adverse postoperative behaviour,[16,17,82] no published prospective controlled study has yet demonstrated that pharmacological or other techniques employed to minimize anxiety at anaesthetic induction affect the incidence of adverse postoperative behaviour. McGarry in 1970 studied 190 children[52] and found that diazepam premedica-

tion resulted in fewer nightmares than did other premedicants or placebos, but the preoperative incidence of sleep disturbances was not documented. In this study, postoperative nightmares were not related to behaviour at induction. Meyers and Muravchick[82] in a study of 85 children, reported that those children who were asleep before anaesthetic induction had fewer postoperative behavioural disturbances than did awake children. They did not describe the nature of the awake inductions, other than to comment that some of the children were "frightened and screaming" after having been "premedicated by the surgeons."[82] More recently, in a preliminary study of 44 children, McGraw et al.[83] were unable to demonstrate a decrease in the incidence of postoperative nightmares in children who had been given oral midazolam before anaesthetic induction, even though these children appeared calmer at induction. Tsuchiya et al.[84] studied polygraphs and personality profiles of children undergoing dental surgery and suggested that postoperative behaviour disturbances are a reflection of pre-existing personality traits.

In summary, the perioperative behavioural studies of children consistently demonstrate that younger children are at greater risk of experiencing turbulent anaesthetic induction and adverse behavioural sequelae. Other children at risk for adverse perioperative behaviour include quiet or negative children, children with previous hospital experience, and children who have not undergone psychological preparation (e.g., books, tours) for anaesthesia and surgery.[85-90] Little is known about the course and duration of adverse behaviour following surgery and hospitalization. Several investigators[91,92] found that prolonged or repeated admissions to the hospital before five years of age were associated with behaviour disturbances in adolescence. However, no research has demonstrated that traumatic anaesthetic induction in children causes long-term psychological difficulty. In one study,[83] all postoperative behavioural difficulties resolved within four weeks after surgery. More studies are needed to clarify these issues.

Preparing children for the OR

General strategies

The major purpose and process of the clinical interview is the exchange of information. In any social interaction, communication has two features: one is the content or message; the other is the process, or the manner in which the content is exchanged within the relationship. The notion of process refers to the non-verbal aspects of communication. The tone of voice, rate of speech, inflection of words, facial expressions, head movements, hand gestures and body postures all communicate meaning. These

non-verbal cues indicate to the receiver how the content is to be interpreted.

Script is the specific set of words used to convey the message. The specific word content of the message may also convey subtleties of meaning. Certain words will inhibit or impede communication, whereas other words or phrases, conveying essentially the same message, will facilitate effective communication. For example, in attempting to reassure a frightened parent during a preoperative visit, one might be tempted to say "don't worry" or "take it easy," phrases which might be perceived as condescending or patronizing. An alternative approach would be to acknowledge the parents' stress: "I know it's tough to bring your child to the hospital for surgery; we're going to take good care of her."

Professional conversations with children have certain rules of etiquette:[93,94]

1 Don't talk to children in a condescending way, but as a physician talks to a patient.

2 Do not convey to the child the notion that his/her feelings, concerns, or ideas are "childish."

3 Do not laugh at what a child says unless you are quite sure the child intends to be humorous. By that same token, do not try always to be funny or amusing to children. Children are quite aware of the difference between doctors and comedians.

4 Never tease a child unless one knows him/her very well, and the child knows he/she has permission to tease in return.

5 Initial encounters with young children are often made easier when introduced in a whisper, which young children may find reassuring. In addition, squatting or kneeling to be at eye level with the child may present a less imposing image.

6 With children greater than three to four years of age, discuss their care in terms they can understand; never discuss their illness or treatment in their presence unless discussing it *with* them as well. It is not always advisable to seek eye contact with children; it may serve to increase the child's stress. During a medical interview, children are most often listening intently to what is being said, even when appearing not to do so.

Specific strategies

PREPARE THE ENVIRONMENT

A familiar, supportive environment will help normalize a child's situation against the threat of illness. This can be accomplished through the use of tours, special books, videos, and toys.

PREPARE THE PARENTS

It is important to reassure the parents, because the par-

ents' anxiety is reflected in the child. If the parent can be comfortable about leaving a sick child, the child might be better able to sustain the separation. With young children, especially, a young parent's conception of his/her role as a parent is often measured by the child's progress in attaining developmental milestones. Illness therefore produces a double threat: the anxiety and stress produced by the illness is compounded by the disruption of the chance to experience the usual tasks of child development, which feeds back a negative message to the parent, suggesting failure and serving to increase anxiety.

When asking the parents (or the child, if older) about any previous hospitalizations, one should attempt not only to gather medical information, but to try and ascertain "how things went." For example, if a six-year-old was "promised the mask, but got the needle" the specifics could be explored, and that pitfall perhaps avoided. Ask the parents about what preoperative preparation has been done with the child. When completing an interview with the parents, it is important always to ask if they have any questions. One might reinforce this by asking if they feel clear about the explanations given.

PREPARE THE CHILD

Studies addressing anaesthetic technique have emphasized the importance of establishing rapport with the child. This is best accomplished during the preoperative visit. Shulman and Vernon[20] noted that successful induction of anaesthesia involved establishing rapport, even when the child was met immediately preoperative.

It is important not to lie to the child (needles hurt, propofol stings, etc.). When being honest about unpleasantries, we gain trust and can establish ourselves more easily as allies with the child.

All children three years or older should be told preoperatively that they will go to sleep before the surgery, that they will feel no pain during the surgery, and that they will wake up after the surgery. The phrase "being put to sleep" should be avoided, as it may conjure up images of what happened to a pet.

Once in the operating suite, especially with frightened, young children, many experienced paediatric anaesthetists prefer to avoid questions. Not only can questions arouse the child, they can promote negative responses and generate needless anxiety. The child should be allowed to feel as a passive participant in the flow of events.

Anaesthetic induction and developmental status

LESS THAN NINE MONTHS

At this stage, infants are able to accept surrogates. They respond favourably to holding, rocking and gentle voices.

ONE TO THREE YEARS

By this stage, children are well bonded to their parents, and much less willing to be separated, especially when stressed. There is increased risk of stormy induction and postoperative emotional reactions and behavioural changes. They are usually too young to understand explanations. However, many two- and three-year-olds are capable of magical thinking,[95] and may accept stories or songs. Children at this age are often comforted by their favourite toy or treasured object.

THREE TO SIX YEARS

This period has been termed the "bandaid age" (J. Templeton, personal communication). These children have concerns with bodily integrity and demonstrate the need for reassurances.[96] Anxiety can often be allayed by giving the child a sense of mastery and participation such as by "holding the mask." Their "preoperational" thinking is very literal and one must be careful with similes and metaphors, e.g., if you take a four-year-old's temperature, she may want to know where you put it. At this stage, explanations per se appear to be more important than accuracy of the content. Bothe and Galdston[32] noted that children given explanations, whether accurate or not, experienced fewer postoperative behavioural changes than those who were not. The children in this study had some interesting notions of their problems. Examples include: "I have a hydraulic seal on me," "one of my intestines didn't come down" and "my technical is in the wrong place" and one seven-year-old with a penile wart coming to surgery "to have the worms on the end of my penis sanded off."

SEVEN TO 12 YEARS

Children during this stage of "concrete operations" are more independent. Although they cannot think abstractedly, they have an increased need for explanation and participation. An eight-year-old haemophiliac may be able to tell where Factor VIII fits into the intrinsic clotting cascade, but be unable to understand that a pound of feathers weighs the same as a pound of rocks.

When discussing the operating and anaesthesia with these children, participation is important, but must be distinguished from decision-making. Options should be discussed preoperatively. It can be very anxiety-provoking to force a terrified child to choose between "the needle" and "the mask" in the operating suite.

ADOLESCENTS

Qualities necessary for successfully dealing with adolescents include competence, humility, and affection.[96] In psychoanalytical terms, adolescents are able to recognize and exhibit mature defence mechanisms. Like adults, ad-

olescents are more likely to be cooperative with physicians perceived to be attentive and non-judgmental. Adolescence is a period of increased body awareness and independence. There are concerns regarding coping, "losing face," losing control, waking up prematurely, not waking up, and dying.[97] Adolescents should be specifically told that they will not awaken during a general anaesthetic. Clear explanations and assurances should be provided. Independence and need for privacy should be respected. Adolescents should be allowed some decision-making. During induction, many adolescents are receptive to hypnotic techniques, and respond to suggestions of calmness, comfort, and favourable operative result.

Summary

Personality development, the impact of hospitalization and surgery upon children, and techniques of preparing children psychologically for surgery have been reviewed. Children at different developmental stages respond to stress with different defense mechanisms and with different cognitive potential. Children appear to learn coping mechanisms from their parents. Cooperative behaviour in the perioperative period can be taught and reinforced using behavioural techniques.

Children between the ages of one and three years, children who have been hospitalized previously, and children who undergo turbulent anaesthetic inductions are at increased risk for exhibiting adverse postoperative behaviour, including phobias and nightmares. This behaviour appear to be self-limited. Parental presence during induction of anaesthesia and/or sedative premedication may lessen the incidence of crying during anaesthetic induction. However, there is no evidence that these techniques lessen the incidence of postoperative behaviour changes.

Establishing rapport with children does allay anxiety and may avert adverse postoperative behaviour. Preparing the environment, preparing the parents, and providing educational materials for children and their parents helps them to cope with real or perceived impending dangers while in the operating room. When communicating with children, one should take into account their developmental stage. Ideally, following appropriate psychological preparation, children can experience an anaesthetic which is not only safe, but as non-threatening as possible.

References

1 Freud A. The role of bodily illness in the mental life of children. In: Eissler RS et al. (Eds.). The Psychoanalytic Study of the Child. New York: International Universities Press, 1952; 69–81.

2 Schwartz S, Johnson JH. Psychopathology of Childhood. Elmsford, NY: Pergamon Press, 1985: 11–4.

3   Bernzweig J, Eisenberg N, Fabes RA.   Children's coping in
     self- and other-relevant contexts. J Exp Child Psychol
     1993; 55: 208–26.

4   Trad PV.   Use of developmental principles to decipher the
     narrative of preschool children. Journal of the American
     Academy of Child & Adolescent Psychiatry 1992; 31:
     581–92.

5   Inhelder B, Piaget J.   The Growth of Logical Thinking
     from Childhood to Adolescence. London: Routledge and
     Kegan Paul, 1958.

6   Schulman JL, Restaino-Baumann LCR, Butler L (Eds.).
     The Future of Piagetian Theory. The Neo-Piagetians. New
     York: Plenum Press, 1985.

7   Forman MA, Kerschbaum WE, Hetznecker WH, Dunn
     JM.   Some conceptual models of child development. In:
     Behrman RE, Vaughn VC III, Nelson WE (Eds.). Nelson
     Textbook of Pediatrics. Philadelphia: W.B. Saunders, 1987:
     36.

8   Jamison RN, Walker LS.   Illness behavior in children of
     chronic pain patients. Int J Psychiatry Med 1992; 22:
     329–42.

9   Perrin EC, Ayoub CC, Willett JB.   In the eyes of the be-
     holder: family and maternal influences on perceptions of
     adjustment of children with a chronic illness. J Dev Behav
     Pediatr 1993; 14: 94–105.

10 Klein A.   Behavior management issues for pediatric pa-
     tients. J Am Dent Assoc 1991; 122: 70–2.

11 Meursing AEE.   Psychological effects of anaesthesia in
     children. Current Opinion in Anaesthesiology 1989; 2:
     335–8.

12 Bowlby J, Robertson J, Rosenbluth D.   A two year old
     goes to hospital. In: Eissler RS (Ed.). The Psychoanalytic
     Study of the Child. New York: International Universities
     Press 1952: 82–94.

13 Spitz R.   Hospitalism. In: Eissler RS (Ed.). The Psychoan-
     alytic Study of the Child. New York: International Univer-
     sities Press 1945: 53–72.

14 Kenny TJ.   The hospitalized child. Pediatr Clin North Am
     1975; 22: 583–93.

15 Levy DM.   Psychic trauma of operations in children
     and a note on combat neurosis. Am J Dis Child 1945; 69:
     7–25.

16 Jackson K.   Psychological preparation as a method of re-
     ducing the emotional trauma of anesthesia in children.
     Anesthesiology 1951; 12: 293–300.

17 Eckenhoff JE.   Relationship of anesthesia to postoperative
     personality changes in children. Am J Dis Child 1953; 86:
     587–91.

18 Vernon DTA, Schulman JL, Foley JM.   Changes in child-
     ren's behavior after hospitalization. Some dimensions of re-
     sponse and their correlation. Am J Dis Child 1966; 111:
     581–93.

19 Vernon DTA, Foley JM, Schulman JL.   Effect of mother-

child separation and birth order on young children's re-
     sponses to two potentially stressful experiences. J Pers Soc
     Psychol 1967; 5: 162–74.

20 Schulman JL, Foley JM, Vernon DTA, Allan D.   A study
     of the effect of mother's presence during anesthesia induc-
     tion. Pediatrics 1967; 39: 111–4.

21 Hannallah RS, Rosales JK.   Experience with parents' pres-
     ence during anaesthesia induction in children. Can Anaesth
     Soc J 1983; 30: 286–9.

22 Gauderer MW, Lorig JL, Eastwood DW.   Is there a place
     for parents in the operating room? J Pediatr Surg 1989; 24:
     705–6.

23 Roman DE, Barker I, Reilly CS.   Anaesthetists' attitudes
     to parental presence at induction of general anaesthesia in
     children. Anaesthesia 1993; 48: 338–40.

24 Schofield NM, White JB.   Interrelations among children,
     parents, premedication, and anaesthetists in paediatric day
     stay surgery. BMJ 1989; 299: 1371–5.

25 Bevan JC, Johnston C, Haid MJ, et al.   Preoperative pa-
     rental anxiety predicts behavioural and emotional responses
     to induction of anaesthesia in children. Can J Anaesth
     1990; 37: 177–82.

26 Shaw EG, Rough DK.   Effect of mother presence on
     children's reaction to aversive procedures. J Pediatr Psychol
     1982; 7: 33–42.

27 Hickmott KC, Shaw EA, Goodyer I, Baker RD.
     Anaesthetic induction in children: the effects of maternal
     presence on mood and subsequent behavior. Eur J Anaes-
     thesiol 1989; 6: 145–55.

28 Henderson MA, Baines DB, Overton JH.   Parental atti-
     tudes to presence at induction of paediatric anaesthesia.
     Anaesth Intensive Care 1993; 3: 324–7.

29 Bauchner H, Waring C, Vinci R.   Parental presence during
     procedures in an emergency room: results from 50 observa-
     tions. Pediatrics 1991; 87: 544–8.

30 Braude N, Ridley SA, Sumner E.   Parents and paediatric
     anaesthesia: a prospective survey of parental attitudes to
     their presence at induction. Ann R Coll Surg Engl 1990;
     72: 41–4.

31 Bogetz MS, Vessey JA, Caserza CL.   Parental upset caused
     by participating in their child's anesthetic induction. Anesth
     Analg 1991; 72: S16.

32 Bothe A, Galdston R.   The child's loss of consciousness: a
     psychiatric view of pediatric anesthesia. Pediatrics 1972; 50:
     252–63.

33 Vetter TR.   The epidemiology and selective identification of
     children at risk for preoperative anxiety reactions. Anesth
     Analg 1993; 77: 96–9.

34 Brophy CJ, Erickson MT.   Children's self-statements and
     adjustment to elective outpatient surgery. J Dev Behav Pe-
     diatr 1990; 11: 13–6.

35 Waters RM.   Pain relief for children. Am J Surg 1938; 39:
     470–5.

36 *Leech BC.* Preanesthetic medication in children. Anesth Analg 1935; 14: 283.

37 *Rita L, Seleny FL, Levin RM.* A comparison of pentazocine and morphine for pediatric premedication. Anesth Analg 1970; 49: 377-82.

38 *Sjovall S, Kanto J, Iisalo E, Himberg JJ, Kangas L.* Midazolam versus atropine plus pethidine as premedication in children. Anaesthesia 1984; 39: 224-8.

39 *Rita L, Seleny FL, Goodarzi M.* Comparison of oral pentazocine, oral diazepam and intramuscular pentazocine for paediatric premedication. Can Anaesth Soc J 1983; 30: 512-6.

40 *Nelson PS, Streisand JB, Mulder S, Pace NL, Stanley TH.* Comparison of oral transmucosal fentanyl citrate and an oral solution of meperidine, diazepam, and atropine for premedication in children. Anesthesiology 1989; 70: 616-21.

41 *Dundee JW, Nair SG, Assaf RAE, Clarke RSJ, Kernohan SM.* Pentobarbitone premedication for anaesthesia. The influence of the preparation and route of administration on its clinical action. Anaesthesia 1976; 31: 1025-31.

42 *Liu LMP, Goudsouzian NG, Liu PL.* Rectal methohexital premedication in children: a dose-comparison study. Anesthesiology 1980; 53: 343-5.

43 *Goresky GV, Steward DJ.* Rectal methohexitone for induction of anaesthesia in children. Can Anaesth Soc J 1979; 26: 213-5.

44 *Laishley RS, O'Callaghan AC, Lerman J.* Effects of dose and concentration of rectal methohexitone for induction of anaesthesia in children. Can Anaesth Soc J 1986; 33: 427-32.

45 *Forbes RB, Vandewalker GE.* Comparison of two and ten per cent rectal methohexitone for induction of anaesthesia in children. Can J Anaesth 1988; 35: 345-9.

46 *Stetson JB, van Schaik Jessup G.* Use of oral chloral hydrate mixtures for pediatric premedication. Anesth Analg 1962; 41: 203-15.

47 *Saarnivaara L, Lindgren L, Klemola UM.* Comparison of chloral hydrate and midazolam by mouth as premedicants in children undergoing otolaryngological surgery. Br J Anaesth 1988; 61: 390-6.

48 *Rita L, Cox JM, Seleny FL, Tolentino RL.* Ketamine hydrochloride for pediatric premedication: I. Comparison with pentazocine. Anesth Analg 1974; 53: 375-9.

49 *Rita L, Seleny FL.* Ketamine hydrochloride for pediatric premedication. II. Prevention of postanesthetic excitement. Anesth Analg 1974; 53: 380-2.

50 *Hannallah RS, Patel RI.* Low-dose intramuscular ketamine for anesthesia pre-induction in young children undergoing brief outpatient procedures. Anesthesiology 1989; 70: 598-600.

51 *Krantz EM.* Low-dose intramuscular ketamine and hyaluronidase for induction of anesthesia in non-premedicated children. S Afr Med J 1980; 58: 161-2.

52 *McGarry PMF.* A double-blind study of diazepam, droperidol, and meperidine as premedication in children. Can Anaesth Soc J 1970; 17: 157-65.

53 *Fozard JR, Manford ML.* A controlled clinical trial of oral droperidol and droperidol plus diazepam for premedication in children. Br J Anaesth 1977; 49: 1147-51.

54 *Mattila MA, Ruoppi MK, Ahlstrom-Bengs E, Larni HM, Pekkola PO.* Diazepam in rectal solution as premedication in children, with special reference to serum concentrations. Br J Anaesth 1981; 53: 1269-72.

55 *Sonander H, Arnold E, Nilsson K.* Effects of the rectal adminitration of diazepam. Diazepam concentrations in children undergoing general anaesthesia. Br J Anaesth 1985; 57: 578-80.

56 *Rita L, Seleny RL, Mazurek A, Rabins SY.* Intramuscular midazolam for pediatric preanesthetic sedation: a double-blind controlled study with morphine. Anesthesiology 1985; 65: 528-31.

57 *Levine MF, Spahr-Schopfer IA, Hartley E, Lerman J, MacPherson B.* Oral midazolam premedication in children: the minimum time interval for separation from parents. Can J Anaesth 1993; 40: 726-9.

58 *Weldon BC, Watcha MF, White PF.* Oral midazolam in children: effect of time and adjunctive therapy. Anesth Analg 1992; 75: 51-5.

59 *McMillan CO, Spar-Schopfer IA, Sikich N, Hartley E, Lerman J.* Premedication of children with oral midazolam. Can J Anaesth 1992; 39: 545-50.

60 *Feld LH, Negus JB, White PF.* Oral midazolam preanesthetic medication in pediatric outpatients. Anesthesiology 1990; 73: 831-4.

61 *Haagensen RE.* Rectal premedication in children. Comparison of diazepam with a mixture of morphine, scopolamine, and diazepam. Anaesthesia 1985; 40: 956-9.

62 *Freeman A, Bachman L.* Pediatric anesthesia: an evaluation of preoperative medication. Anesth Analg 1959; 38: 429-37.

63 *Brzustowicz RM, Nelson DA, Betts EK, Rosenberry KR, Swedlow DB.* Efficacy of oral premedication for pediatric outpatient surgery. Anesthesiology 1984; 60: 475-7.

64 *Tobias JD, Phipps S, Smith B, Mulhern RK.* Oral ketamine premedication to alleviate the distress of invasive procedures in pediatric oncology patients. Pediatrics 1992; 90: 537-41.

65 *Slover R, Dedo W, Schlesinger T, Mattison R.* Use of intranasal midazolam in preschool children. Anesth Analg 1990; 70: S377.

66 *Karl HW, Kiefer AT, Rosenberger JL, Larach MG, Ruffle JM.* Comparison of the safety and efficacy of intranasal midazoam or sufentanyl for preinduction of anesthesia in pediatric patients. Anesthesiology 1992; 76: 209-15.

67 *Ashburn MA, Streisand JB, Tarver SD, et al.* Oral trans-

mucosal fentanyl citrate for premedication in paediatric out-patients. Can J Anaesth 1990; 37: 857–66.

68 Feld LH, Champeau MW, van Steennis CA, Scott JC. Preanesthetic medication in children: a comparison of oral transmucosal fentanyl citrate versus placebo. Anesthesiology 1989; 71: 374–7.

69 Goldstein-Dresner MC, Davis PJ, Kretchman E, Siewers RD, Certo N, Cook DR. Double-blind comparison of oral transmucosal fentanyl citrate with oral meperidine, diazepam, and atropine as preanesthetic medication in children with congenital heart disease. Anesthesiology 1991; 74: 28–33.

70 Stanley TH, Leiman BC, Rawal N, et al. The effects of oral transmucosal fentanyl citrate premedication on preoperative behavioral responses and gastric volume and acidity in children. Anesth Analg 1989; 69: 328–35.

71 Streisand JB, Stanley TH, Hague B, van Vreeswijk KH, Ho GH, Pace NL. Oral transmucosal fentanyl citrate premedication in children. Anesth Analg 1989; 69: 28–34.

72 Lindahl S, Olsson AK, Thomson D. Rectal premedication in children. Use of diazepam, morphine and hyoscine. Anaesthesia 1981; 36: 376–9.

73 Lin SM, Liu K, Tsai SK, Lee TY. Rectal ketamine versus intranasal ketamine as premedicant in children. Ma Tsui Hsueh Tsa Chi 1990; 28: 177–83.

74 Stevens RW, Hain WR. Tolerance to rectal ketamine in paediatric anaesthesia. Anaesthesia 1981; 36: 1089–93.

75 Sigurdsson G, Lindahl S, Norden N. Influence of premedication on plasma ACTH and cortisol concentrations in children during adenoidectomy. Br J Anaesth 1982; 54: 1075–80.

76 Wilson SL, Vaughn RW, Stephen CR. Subjective patient evaluations of commonly used preanesthetic medications. Anesthesiology Review 1979; 6: 35–41.

77 Forrest WH Jr, Brown Cr, Brown BW. Subjective responses to six common preoperative medications. Anesthesiology 1977; 47: 241–7.

78 Morgan-Hughes JO, Bangham JA. Pre-induction behaviour of children. A review of placebo-controlled trials of sedatives. Anaesthesia 1990; 45: 427–35.

79 Beeby DG, Morgan-Hughes JO. Behaviour of unsedated children in the anaesthetic room. Br JAnaesth 1980; 52: 279–81.

80 Vetter TR. A comparison of midazolam, diazepam, and placebo as oral anesthetic premedicants in younger children. J Clin Anesth 1993; 5: 58–61.

81 Mansson ME, Fredrikzon B, Rosberg B. Comparison of preparation and narcotic-sedative premedication in children undergoing surgery. Pediatric Nursing 1992; 18: 337–42.

82 Meyers EF, Muravchick S. Anesthesia induction technics in pediatric patients: a controlled study of behavioral consequences. Anesth Analg 1977; 56: 538–42.

83 McGraw TT, Striker TW, Liedhegner BG. Oral midazo-

lam premedication and postoperative behavior in children. Anesth Analg 1993; 76: S255.

84 Tsuchiya T, Yamauchi T, Yokoi K, Yamada Y, Braham RL, Kurosu K. Psychological studies of emotional changes in children undergoing dental treatment. 1. Changes in plethysmogram. Aichi-Gakuin Dental Science 1991; 4: 15–34.

85 Morgan SF, Furman EB, Dikmen S. Psychological effects of general anesthesia on five- to eight-year-old children. Anesthesiology 1981; 55: 386–91.

86 Visintainer MA, Wolfer JA. Psychological preparation for surgery pediatric patients: the effects on children's and parents' stress responses and adjustment. Pediatrics 1975; 56: 187–202.

87 Bates TA, Broome M. Preparation of children for hospitalization and surgery: a review of the literature. Journal of Pediatric Nursing 1986; 1: 230–9.

88 Davenport HT, Werry JS. The effect of general anesthesia, surgery, and hospitalization upon the behavior of children. Am J Orthopsychiatry 1970; 40: 806–24.

89 Fergusen BF. Preparing young children for hospitalization: a comparison of two methods. Pediatrics 1979; 64: 656–64.

90 Wolfer JA, Visintainer MA. Prehospital psychological preparation for tonsillectomy patients: effect on children's and parents' adjustment. Pediatrics 1979; 64: 646–55.

91 Douglas JW. Early hospitalization admissions and later disturbances of behaviour and learning. Dev Med Child Neurol 1975; 17: 456–80.

92 Quinton D, Rutter M. Early hospitalization admissions and later disturbances of behaviour: an attempted replication of Douglas' findings. Dev Med Child Neurol 1976; 18: 447–59.

93 Forman MA, Klerschbaum WE, Hetznecker WH, Dunn JM. Assessment and interviewing. In: Behrman RE, Vaughan VC III, Nelson WE (Eds.). Nelson Textbook of Pediatrics. Philadelphia: W.B. Saunders 1987; 50–3.

94 Wood DJ. Talking to young children. Dev Med Child Neurol 1982; 24: 856–9.

95 Lillard AS. Pretend play skills and the child's theory of mind. Child Dev 1993; 64: 348–71.

96 Rich J. Interviewing Children and Adolescents. London: Macmillan, 1968.

97 Litt IF. Evaluation of the Adolescent Patient. Philadelphia: Hanley & Belfus, 1990.