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Paediatric quality assurance

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1. Introduction

Ambulatory surgical facilities are rapidly changing from the traditional quality assurance (QA) methods that are directed at finding 'bad apples' towards prospective continuous quality improvement (CQI). The prospective approach seeks system changes that can be made before the fact to improve the work flow and enhance the delivery of quality service. CQI support the notion that systems and performances can be improved even when high standards appear to have been met. It is important to have an ongoing CQI program to minimize complications, educate personnel and continuously improve care.

Serious complications in pediatric ambulatory surgery are rare. A recent study of pediatric perioperative cardiac arrest showed that 'healthy' ASA 1–2 patients accounted for 20% of all cases. Anesthesia was responsible for 81% of these arrests. Cardiac arrest in these patients (27%) was most likely to result from problems with drug administration such as drug overdose or injecting the wrong drug but was associated with 100% survival [1]. Minor problems on the other hand are not uncommon.

At Children's National Medical Center (CNMC) in Washington, DC, intraoperative and immediate postoperative events are entered by the anesthesiologist on a pocket-sized card that is collected at the end of each working day. The entries are grouped by categories that are pre-printed on the form. Postoperative follow-up telephone calls are made by the nursing staff to detect later complications or compliments. Monthly meetings are conducted to review the summary of the findings and recommend improvements. Additional ad hoc projects and the results of clinical research studies are routinely used to further improve care. Some specific examples of recent protocols and findings are presented in the following sections.

2. Minimal acceptable age for ambulatory surgery

Most centers in the USA do not specify a minimal age for accepting an other wise healthy full term infant for ambulatory surgery. Although there are no prospective studies of the perioperative risks of anesthesia and surgery in these infants, there are some anecdotal reports and case histories of postoperative apnea in some of these patients. Many centers have arbitrarily assigned minimal ages ranging from 2–8 weeks. Some will not accept infants less than 6 months old for ambulatory surgery regardless of physical status. This is particularly prevalent in free-standing facilities where there is no provision for extended postoperative observation if needed.

It is universally agreed, that the premature infant is not a suitable candidate for ambulatory surgery because of potential immaturity of the respiratory center, temperature control and gag reflexes. Recent studies have confirmed a high incidence of perioperative complications such as apnea in these infants.

The age at which the premature infant attains physiological maturity and no longer presents an increased risk for postoperative apnea must be considered individually. Criteria on which these decisions are based include growth and development, persistent problems during feeding, time to recovery from upper respiratory infections, history of apnea, and presence or absence of anaemia, metabolic, endocrine, neurologic, or cardiac disorders.

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It is generally considered that infants younger than 46 weeks postconceptual age (PCA) (which is the sum of gestational and post-natal ages) and/or a preoperative history of apnea or anaemia are at greatest risk, although some authors have reported apnea in infants as old as 60 weeks PCA. Children with lower gestational age are more susceptible to apnea. As the child matures, the tendency toward apnea greatly diminishes but the age when all infants may be safely anesthetized on an ambulatory basis is unknown. Until more extensive, prospective studies are carried out, it seems prudent to have a high index of suspicion. Most anaesthesiologists will not discharge home all ex-premature infants who are younger than 50 weeks PCA on the day of surgery [2]. At CNMC, they are admitted overnight (23 h) so that they may be monitored postoperatively for apnea, bradycardia, and oxygen desaturation. The choice of this particular age is rather arbitrary. It is best to individualize this decision and, when in doubt, to err on the conservative side. If the infant has bronchopulmonary dysplasia, anaemia or other neonatal problems, this period may need to be extended. Should any questions arise, inpatient care and postoperative monitoring are recommended. Infants with apnea in the recovery room should also be admitted and monitored.

3. Preoperative requirements and screening

The preoperative requirements for safe conduct of anaesthesia in paediatric ambulatory patients include a complete history and physical examination, indicated laboratory tests based on the findings from history and physical examination, consultations when indicated, and an appropriate fasting period. In order to minimize delays and cancellations, it is desirable to complete as many of these requirements as possible before the day of surgery.

Many ambulatory surgical units actively participate in the preoperative screening of their patients. The degree of involvement varies from a simple telephone call to the parents a day or two prior to surgery to the establishment of a formal screening clinic to clear all patients before admission into the operating suite. Many anesthesiologists function as the medical directors of their facilities and perform the role of the perioperative physician. At CNMC, the parents of each child are contacted by telephone shortly after the operation is scheduled. A second call is made 48 h or less before surgery. During the initial call, information is sought concerning past or present risk factors, such as a history of prematurity or cardiac or respiratory problems. This information helps to determine if additional preoperative evaluation or consultation is required prior to the day of surgery. In some cases, it may lead to a reevaluation of the appropriateness of scheduling the procedure on an ambulatory basis. Our experience at CNMC is that patients who are screened are 65% less likely to be canceled or have their surgery postponed than those who are not screened [3]. During the second phone call, an assessment of the child's present health is made. Fasting (NPO) orders are reinforced, and practical matters related to parking, what to bring to the hospital and expected duration of stay are explained.

On the day of surgery, all patients are screened for acute illness and NPO status. Vital signs are recorded. Any consultation reports are evaluated, and the need for special preoperative psychological or pharmacologic treatment is considered before the child arrives in the operating room.

4. Preoperative fasting

The need for a prolonged period of fasting (e.g. NPO after midnight) before anaesthesia induction in otherwise healthy children has been questioned [4]. Several studies have shown that ingestion of clear liquids up to 2–3 h prior to scheduled induction does not increase the risk of pulmonary aspiration syndrome. Consequently, some anaesthesiologists have altered fasting guidelines to allow clear liquids 2–3 h prior to surgery. It is important to note that these guidelines apply to clear liquids only (not solids) in otherwise healthy children. Possible benefits of shorter fasting times include minimizing thirst and discomfort while awaiting surgery, less hypovolemic-induced hypotension during induction and less concern about hypoglycemia. Recent studies indicate that many parents find it difficult to comply with the new more liberal guidelines. This is especially true when the patients are scheduled early in the morning because administering liquids at home would necessitate awakening the child much earlier than needed [5].

5. Preoperative testing

The value of preoperative routine screening tests for healthy infants and children has been questioned. Such tests as urinalysis and chest radiography are almost never indicated in the healthy pediatric ambulatory patient. The value of routine haemoglobin and haematocrit measurement continues to be debated. It is now performed in less than 27% of US centers; mostly in infants less than one year of age where the prevalence of anaemia is higher than in older children [6].

6. Pediatric perioperative environment

Essential components have been recently identified that make the perioperative environment satisfactory for the care of infants and children (Joint Commission on Quality Assurance of the Section on Anesthesiology of the American Academy of Pediatrics and the Committee on pediatric Anesthesia of the American Society of Anesthesiologists). These components address some unique aspects of the physiology, pharmacology and psychology of the child. Important care issues for children include the availability of techniques and/or equipment for airway management, fluid administration, temperature regulation, line insertion, monitoring and postoperative pain management. Serious airway or respiratory problems can occur rapidly and are often unexpected. It is assumed that a proper pediatric environment could reduce the risk of adverse events while providing immediate backup support for the care team when a crisis occurs.

The unique psychological needs of the child must be addressed in any ambulatory surgical facility. In an efficient facility, the time between the patient's arrival and the induction of anaesthesia is usually quite short. There is little time to orient the child to all the events that will take place during his or her stay. Most centers encourage children and families to participate in presurgical preparation programs a few days before surgery. Studies have shown that children who attended these programs were much more cooperative during induction than those who did not [7]. Such findings must be interpreted carefully, since parental motivation, traveling distance, socioeconomic conditions, and the child's age (the forces that motivate parents to bring their children to these program) are the same factors that may in themselves lead to better cooperation.

Another approach to facilitate the anaesthetic induction is to allow the parents to stay with the child during induction. Some institutions have specially built induction rooms where the parents can accompany their children without having to wear special operating room attire. Others allow selected parents (with a cover-all gown or scrubs) to walk with the child into the operating room itself. This approach is gaining a lot of support and is being requested by many parents. Studies have shown that children are less upset when the parents are present [8]. Parents selection and education are essential for the success of this approach since anxious parents can make their children even more upset.

7. Postoperative pain management

Children undergoing ambulatory surgery should receive proper attention to pain assessment and management. Unfortunately, under treatment of pain in infants and children remains common despite a large number of studies demonstrating safe and effective treatment. Postoperative pain and discomfort in ambulatory children is best managed by the use of local and regional analgesic techniques such as caudal blocks, ilioinguinal and iliohypogastric nerve blocks, penile blocks, etc. local infiltration of the surgical incision is also effective. Mild analgesics such as acetaminophen or oral analgesics such as codeine or ketorolac are commonly used. Potent narcotic analgesics such as fentanyl can be used during and after surgery to prevent and/or treat more severe pain.

8. Discharge criteria

Rapid recovery and early ambulation are major objectives in ambulatory surgery. When dealing with paediatric ambulatory patients, we must guarantee safe discharge not only from the recovery room but also from the hospital. In our institution, all children recover from anaesthesia in the same recovery area. Ambulatory patients are then transferred to a special short-stay recovery unit.

In order to provide uniform care and to ensure a complete legal record, many institutions have developed specific discharge criteria for ambulatory patients. At CNMC, discharge criteria include the following: appropriateness and stability of vital signs; absence of respiratory distress; ability to swallow oral fluids, cough, or demonstrate a gag reflex; ability to ambulate consistent with the developmental age level; absence of excessive nausea, vomiting, and dizziness; and a state of consciousness appropriate to the developmental level. Recent studies suggest that children should not be required to drink before discharge from the hospital.

Every child, regardless of age, must have an escort home. The escort is given written instructions concerning the child's home care and a telephone number to call to request further advice or to report complications. Staff counsel all parents about postoperative care. Many units have also designed handouts that specify the care that should be provided and the signs that might herald a complication.

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