Anesthesia Awareness during General Anesthesia  
Formerly Considerations for Policy Development Number 4.3

Anesthesia Awareness during General Anesthesia may cause serious, and potentially disabling, psychological injury that can progress to post-traumatic stress disorder (PTSD). The AANA recommends that every anesthetizing location where general anesthesia is administered have a well-defined policy that focuses on the prevention and management of anesthesia awareness. This policy should, at a minimum, include:

- structured education offerings for all healthcare practitioners caring for patients who receive general anesthesia;
- a method for the identification of patients who may be at higher risk of experiencing anesthesia awareness;
- methods for identifying and managing an occurrence of anesthesia awareness;
- an established referral pathway for patients who experience anesthesia awareness;
- mitigation strategies for the prevention of future anesthesia awareness events; and
- a requirement for perioperative team debriefings when an anesthesia awareness event occurs.

With their expertise in anesthesia care, Certified Registered Nurse Anesthetists (CRNAs) are encouraged to become actively involved with creation of such a policy. The Considerations for Policy Development Number 4.3, “Anesthesia Awareness during General Anesthesia,” assists CRNAs in addressing this clinical situation.

The literature associated with this clinical situation uses multiple terms, many having subtle similarities as well as differences, and authors frequently use terms such as unintended awareness and anesthesia awareness interchangeably. For the purposes of this document, anesthesia awareness is the explicit recall of sensory perceptions that occurs during general anesthesia. With the specific reference to explicit recall as a determining factor for anesthesia awareness, this definition is most appropriate for the adult population. Pediatric patients younger than 3 years of age do not experience explicit recall; therefore, this definition may not fully apply to the pediatric population. Although this group may not experience explicit recall, they are still capable of experiencing anesthesia awareness. They may experience it in ways uncharacteristic to or different from the adult population. Despite these differences, CRNAs should assess all patients receiving general anesthesia for an occurrence of anesthesia awareness, regardless of age.

To offer a broader understanding of anesthesia awareness, several terms are defined within this document. Explicit recall requires an intentional recollection of an event; whereas, implicit recall relies on unintentional recollections. Research suggests that the pediatric population has the capacity to experience consciousness and implicit memory during their first years of life. Consciousness is a state in which patients are cognizant of their surroundings and this may occur regardless of cognition, memory, or high order thought processes. Sensory perceptions are known as conscious recognition of sensory stimuli. General anesthesia is a drug-induced loss of consciousness during which patients do not respond in a purposeful manner to any stimulus.

Multiple studies have found the frequency of anesthesia awareness to range between 0.1 percent to 0.2 percent of adult patients undergoing general anesthesia, or one to two patients per 1,000. Whereas in the pediatric population over the age of 3 years, studies report the incidence of anesthesia awareness to be 0.6 percent to 2.7 percent. While the incidence of anesthesia awareness is very low, there is a greater incidence in cardiac surgery (1.1-1.5%), obstetrical surgery (0.4%) and major trauma surgery (11-43%).
The situations that have been associated with a higher incidence of unintended awareness include, but are not limited to, the following:

- **Use of low-dose anesthesia due to the patient’s condition**
  - Acute trauma with hypovolemia
  - Caesarian section under general anesthesia
  - Impaired cardiovascular status
  - Cardiac surgery, including off pump
  - Expected intraoperative hypotension

- **Increased anesthetic requirements of some patients**
  - Younger age
  - Tobacco smoking
  - Chronic use of benzodiazepines, opioids or amphetamines
  - Known or suspected heavy alcohol intake

- **Malfunction or misuse of anesthesia delivery system**
  - Empty vaporizer
  - Malfunction of vaporizer or gas analyzer
  - Breakdown of machine or pump devices
  - Disconnection of catheter tubing

- **Difficult or prolonged intubation**

- **Physical Status III, IV, and V patients**

- **Past history of awareness**

- **Severe end-stage lung disease**

- **Total intravenous anesthesia**

- **Obesity**

- **Surgery occurring at night**

- **Total paralysis with muscle relaxants**

Insufficient anesthetic effect (thus allowing a state of consciousness that permits memory formation) may result from inadequate dosing or delivery of the primary anesthetic agent and may result in anesthesia awareness. Inadequate dosing may include situations where low concentrations are selected in response to the patient’s condition (e.g., hypotension), the patient has a larger-than-expected anesthetic requirement, or an aware patient is inadvertently paralyzed. Inadequate delivery of anesthetic agents may result from a failure or misuse of anesthesia equipment that is vital to agent administration. Such equipment includes the anesthesia machine, vaporizer, airway management device, breathing circuit, infusion pump, intravenous line, and catheter.

In a root-cause analysis of 81 cases of anesthesia awareness events, three primary causes were identified: low-inspired volatile agent concentration, drug error, and unknown causes. In 44 percent of the events, anesthesia awareness was caused by low-inspired volatile agent concentration or inadequate amnesia. In 40 percent of cases, a drug error led to inadvertent paralysis of an awake patient. Finally, in 16 percent of cases, the awareness incident had no obvious cause. In yet another study involving 4,001 cases, the following causes of anesthesia awareness were identified: anesthesia technique, patient age, absence of intravenous sedative hypnotics, caesarean section, nighttime surgery, and avoidable anesthesia professional error. These factors resulted in an overall 1.0 percent incidence, and a 0.8 percent anesthesia awareness incidence after controlling for high-risk groups.

Regardless of the cause, affected patients may express their experience with an episode of anesthesia awareness in differing ways. Auditory and tactile sensory perceptions are the most commonly reported sensations by patients who have experienced anesthesia awareness. Some patients have reported
experiencing pain, visual images of their surroundings, or being awake and paralyzed without being able to communicate their situation. While not every episode of anesthesia awareness is associated with negative recollections, it appears that more than half of these experiences include some degree of mental distress. Patients who experienced acute fear, panic, and a sense of helplessness realized late psychological symptoms of PTSD. PTSD may result from prolonged psychological effects that may include re-experiencing symptoms, avoidance, hyperarousal, and impaired social functioning. The need for extended psychological or psychiatric care may be required by 40 percent to 60 percent of patients following a traumatic anesthesia awareness experience. In some situations, patients who initially claim in the early postoperative period to have no after-effects due to an episode of anesthesia awareness may still be at risk of developing subsequent psychological disability many years later. Although reportedly children aged 5 to 15 years who experience anesthesia awareness typically do not develop short-term mental distress, these patients still require appropriate follow-up to identify and treat any late psychological symptoms.

Patients may also experience dreaming during an anesthetic. Dreaming is not a component of anesthesia awareness and is unrelated to depth of anesthesia; however, experiencing dreaming while under anesthesia can be alarming to patients and leave them feeling less satisfied with the anesthesia care received.

All healthcare professionals who care for patients receiving general anesthesia should be informed of the patient’s general health condition and his/her history of anesthesia awareness. They should also be educated as to the causes of anesthesia awareness; be able to identify those patients at higher risk for the development of this clinical situation; and be able to identify the short- and long-term psychological symptoms of anesthesia awareness.

Use of the following strategies will not guarantee that an anesthesia awareness event won’t occur; however, the anesthesia professional should consider implementation in order to minimize the risk of anesthesia awareness:

- Conduct a preanesthesia evaluation to assess the patient’s risk of anesthesia awareness.
- Incorporate the possibility of anesthesia awareness as part of the informed consent process for all high-risk scenarios. In cases where sedation and not general anesthesia is going to be used, such as during regional anesthesia or monitored anesthesia care, discuss with the patient that it is not unexpected that he or she may hear or see things in the operating room.
- Conduct preventive maintenance on the anesthesia machine, vaporizers and gas sampling equipment/monitors, and ensure the correct functioning of all anesthesia delivery systems prior to each anesthetic (e.g., infusion pumps, connections, emergency oxygen supply).
- Label all medications as they are prepared and read the label prior to administration to prevent drug error.
- Consider using a preoperative dose of an amnestic drug (e.g., benzodiazepine) if the patient’s condition allows and when low-dose anesthesia may be necessary due to the patient’s condition.
- Provide additional doses of hypnotic drugs or initiate volatile agent administration, if not contraindicated, for repeated intubation attempts.
- Use an end-tidal inhalation agent monitor with a low threshold alarm setting to detect sufficient inhalation agent concentration.
- Continually assess patency of intravenous lines and function of infusion devices when administering total intravenous anesthesia.
- Avoid excessive muscle relaxation unless surgically indicated and routinely monitor neuromuscular function and status to measure the degree of muscle relaxation.
- Consider the use of brain-function monitoring if available, particularly for high-risk scenarios.
During the postoperative phase of care, all patients should be promptly assessed to identify an anesthesia awareness experience and determine the cause of the event. Upon determining the cause, facilities should work with providers to establish protocols for future prevention. The timing of these assessments will be determined by various factors such as patient condition (e.g., patient unable to respond), patient disposition (e.g., inpatient versus outpatient), and availability of an anesthesia professional.

When conducting a postoperative assessment for unintended awareness, a structured interview using the Brice-modified questionnaire should be used with all patients. In addition, an interview with the parent(s) of the pediatric patient should occur to determine whether the child has exhibited any observable behavioral changes that may be indicative of anesthesia awareness. Anesthesia professionals should be cognizant that the onset time of psychological symptoms vary widely from 7 to 243 days after surgery and the median duration of psychological symptoms ranges from 4.4 to 5.6 years. The Brice-modified questions recommended for use during the structured interview are as follows:

- “What was the last thing you remember before going to sleep?”
- “What is the first thing you remember after waking up?”
- “Do you remember anything between going to sleep and waking up?”
- “Did you dream during your procedure?”
- “What was the worst thing about your operation?”

It is important that a facility policy on this issue describe the steps that should be taken when an occurrence of anesthesia awareness has been discovered by a healthcare professional. These steps may include, but are not limited to, the following:

- upon discovery of the event, contact the healthcare professionals (e.g., the anesthesia professional) who directly cared for the patient so they can offer sympathy, support, a description of possible causes, and an apology for the episode;
- document an accurate and detailed patient account of the event in the patient’s medical record, which is vital to the patient’s treatment or care in the immediate and prolonged future;
- promptly offer to refer the patient to a mental health professional (e.g., psychiatrist or psychologist), which remains the “gold” standard of care for managing mental health symptoms that may be brought on by anesthesia awareness or disorders such as PTSD;
- conduct a root cause analysis to identify, if possible, the causative factors that led to the anesthesia awareness event, and follow up with provider education and training to prevent future episodes from occurring with other patients;
- assess for and document anesthesia awareness events for quality improvement processes;
- conduct daily visits with the patient until discharge to identify any new onset of psychological sequelae; and
- confirm whether appropriate follow up care is necessary to ensure the patient receives proper care and treatment after discharge.

Anesthesia awareness event can be devastating to both the patient and the healthcare providers involved in the delivery of the patient’s care when the event occurred. It is important to recognize that the perioperative team members may struggle to deal with the knowledge that an anesthesia awareness event took place, and facilities are encouraged to support the perioperative team members’ needs through a debriefing process following such a critical incident. Team debriefing allows for the expression of team members’ moral distress, issues and concerns. Only through recognition and understanding can the team members hope to constructively learn from the incident and improve care processes for the future.

References


