

# Risk of General Anesthesia for the Special Needs Dental Patient

By: Sina Moshiri

## Introduction

- In general, general anesthesia (GA) for dental treatment is a safe procedure. From 1952 to 1990, the United Kingdom experienced a decrease in deaths from 1/200,000 to 1/2,000,000. The mortality rate in Canada from 1973 to 1995 was estimated at 1.4/1,000,000.
- While the numbers are promising, many of these studies fail to specify the American Society of Anesthesiology (ASA) classification of the patients surveyed. Thus the question remains whether the special needs community is at a higher risk of morbidity and mortality compared to the general population.
- Compared to dentistry, a 2001 retrospective study placed the risk of death due to GA from all procedures (medical or otherwise) at 1/40,000. The relatively smaller risk of mortality associated with dental procedures compared to medical procedures is thought to be attributed to:
  1. A healthier patient population (ASA I and II) that typically makes up the outpatient GA patient pool for dental cases
  2. The non-invasive nature of most dental procedures.
- An ASA newsletter published in 2001 reported 5,480 adverse events from 1970 to 1995, of which 753 were in an ambulatory surgical setting and 14 were in an office-based setting. Of the complications, 65% were intra-operative, 14% were during recovery and 21% were after discharge.
- The mortality rate of 1:40,000 consisted of drug-related events (37%), most of which were associated with halothane use, cardiac-related events (38%), respiratory events (20%) and miscellaneous (5%). When considering the special needs population these values may vary since many of those patients present with multiple complicating factors, including:
  1. Advanced age
  2. Underlying unstable systemic diseases
  3. Physical limitations impacting physiologic function
  4. Specific syndromes with physiologic or anatomic abnormalities
  5. Pediatric patients with congenital disease or underlying physical limitations
  6. Mental illness or cognitive impairments
  7. Other complex medical conditions

## Geriatric Anesthetic Considerations

- Geriatric populations are at an increased risk of anesthetic emergency or adverse outcome. Dodds reviewed the the risk of adverse events for two geriatric age groups: over age 75 and over age 85 (extremely elderly). He found the increased risk of acute adverse event under GA is related to the deterioration of protective physiological and functional reserve, which decreases these patient groups tolerance to adverse effects of GA. Moller et al. found that in 1218 elderly patients over age 60, 21.8% experienced post-operative cognitive dysfunction one week post-operatively, and 7.7% three months post-operatively. Hypotension and hypoxemia were the main etiologic factors. Factors increasing the risk of adverse outcome were duration of surgery, increases in age, and advanced systemic diseases. Efforts to

formulate a protocol for safe GA for dental treatment of geriatric patients have been hindered by the complex variables affecting this population.

### **Pediatric Anesthetic Considerations**

- Compared to adults, children present significant physiologic, pathophysiologic, pharmacologic and psychological differences that necessitate modification of routine adult anesthesia protocol. For instance, children are more sensitive to unfavourable conditions, including hypoxia, hypothermia or fluid imbalances. Many drugs including vagotonic drugs can, at the conventional dose, produce marked bradycardia and may precipitate an adverse event. IV sedation carries a greater risk of oversedation in children and may not be a viable option.
- A study of 928 medical centers in the United States found no anesthesia-related deaths in children ages 1-6 over a 10-year period and 22,615 dental procedures.
- Intubation of children with upper respiratory tract infections (URI) have increased risk of complications such as bronchospasm and obstruction. Some suggest use of a laryngeal mask airway (LMA) as a safer alternative.

### **Developmentally Delayed Anesthetic Considerations**

- Patients with mental disabilities (IQ<36) have been shown to produce statistically significant increase in cortisol and prolactin levels during venipuncture and extubation, which is associated with increased blood pressure and heart rate. This may not pose a clinical risk if the patient is healthy. However, patients with mental disabilities with underlying physical and physiological limitations, as well as behavioral issues may be at increased risk for adverse outcomes.
- The Closed Claims Study in 2007 found that preventable oversedation was the largest factor in intraoperative morbidities. Since patients with mental illness or impairments require more profound levels of anesthesia to permit the procedure, they be at increased risk of oversedation. Advanced training in anesthesia and knowledge of rescuing patients from deeper than intended levels of sedation is crucial when treating this patient group.

### **Disabled Persons' Anesthetic Considerations**

- The form and extent of physical disabilities affects the level of risk related to general anesthesia. For instance, patients with severe scoliosis or vertebral abnormalities can have altered functional residual capacity of the lungs (FRC) and respiratory function.
  - Aside: FRC is important as it maintains patency of small airways and prevents complete emptying of the lungs at the end of expiration. Without FRC the alveolar PO<sub>2</sub> and PCO<sub>2</sub> will fluctuate during breathing and normal diffusion of respiratory gasses will not occur, leading to decreasing oxygenation
- Patients with diminished cough reflex such as cerebral palsy or pseudobulbar palsy may have a history chronic aspiration, leading to recurrent lung infections. Quadriplegic patients suffer nerve demyelination and increased serum potassium, leaving them at higher risk of arrhythmias secondary to succinylcholine.
- Morbidly obese patients are also at increased risk of complications and mortality under general anesthesia. Some reasons include reduced FRC, increased risk of restrictive pulmonary disease, increased risk of aspiration, increased risk of drug overdose and prolonged anesthetic effects.

- Many factors limit our ability to accurately assess the anesthetic risks for developmentally disabled patients. These include:

Medical Risk Assessment:

1. Limited or complete lack of medical work-up required for medical risk assessment for general anesthesia.
2. Uncooperative behavior rendering airway assessment impossible.
3. Compromised post-operative care due to lack of cooperation or lack of support system.

Surgical Risk Assessment:

1. Lack of pre-surgical workup making it difficult to predict extent of treatment required and length of surgical and anesthesia needed.
2. Greater chance of intraoperative adverse events if no pre-treatment surgical workup was done
3. Difficult post-surgical care and follow-up

### Complications Associated With Medically Compromised Individuals

- ASA IV and V are at increased risk of intraoperative morbidity and mortality during general anesthesia. It remains unclear whether the benefit of providing dental treatment and controlling the bacterial load outweighs the risk of providing general anesthesia on such patients.
- Patients with end-organ disease that require transplant classify as ASA IV.

Class	Physical status	Example
I	A healthy patient	A fit patient with an inguinal hernia
II	A patient with mild systemic disease	Essential hypertension, mild diabetes without end organ damage
III	A patient with severe systemic disease that is a constant threat to life	Angina, moderate-to-severe chronic obstructive pulmonary disease (COPD)
IV	A patient with an incapacitating disease that is a constant threat to life	Advanced COPD, cardiac failure
V	A moribund patient who is not expected to live 24 hours with or without surgery	Ruptured aortic aneurysm, massive pulmonary embolism
E	Emergency case	

Source: Adapted from American Society of Anesthesiologists (2013).

### General Considerations

- Safety: available data shows that risk of death under general anesthesia in the dental office is far lower than the overall risk of general anesthesia. However, the patients from these studies are likely ASA I and II and since special needs patients are usually more medically complex, they may be at increased risk of adverse event.
- Frequency: there is no clear answer for how frequently these patients should be receiving general anesthesia. Many of these patients are very uncooperative and have poor compliance with preventive treatment. Frequent recalls would be beneficial, however, does this mean they should receive GA every 6 months? While the data indicates low risk of mortality, there are significant risks of undergoing GA. Managing the general populations perception of dentistry and general anesthesia is critical to avoid creating a false sense of comfort and lead to overuse of general anesthesia.
- Consent: true informed consent requires the patient's knowledge and acceptance of the potential risk of treatment and general anesthesia. The onus lies on the health care provider to clearly explain these risks in nontechnical terms. Thus, it is very important that when discussing treatment with the patient, a thorough discussion of the anesthetic risks is also held.

### **Access to Care Issues**

- With dwindling operatory room times in hospitals, the challenge lies in improving access to dental care for patients with special needs. Some common challenges with hospital-based dentistry under GA include:
  1. Limited access to operating room time leading to scheduling problems and long wait times
  2. Emergency cases resulting in cancelled dentistry cases, especially in tertiary care and level 1 trauma centers.
  3. Very high cost of same-day surgery in hospital setting
  4. Availability of well-trained dental anesthesiologist or physical anesthesiologist with knowledge of the anesthetic considerations of the special needs dental patients.

### **Summary**

- The relative risk versus benefit of dental treatment under general anesthesia for the special needs population is a common dilemma practitioners face, yet very little research has been dedicated towards this subject. Further research is required in order to stratify the risk of general sedation in these populations and convey these risks to the patients and guardians during the decision making process. For example, a nation-wide retrospective study of patients treated under general anesthesia for the last decade can assess various variables and associated risks and complications, and relate the risk to the patients physical and mental disabilities. This data can then be used to develop guidelines to assist practitioners and patients and prevent adverse outcomes.
- Lastly, special needs patients are at greater risk of oversedation and often present with physical impairments or medical comorbidities that further increase the anesthetic risks. Geriatric patients must be managed with caution, especially concerning medical comorbidities and drug dose modifications. Children are not little adults. Knowledge of pediatric physiology and common emergencies and their management is necessary for safe provision of general anesthesia.

### **Reference:**

Messieha, Zakaria. "Risks of general anesthesia for the special needs dental patient." *Special Care in Dentistry* 29.1 (2009): 21-25.