Office-based Anesthesia Provided by the Oral and Maxillofacial Surgeon

Background and Purpose

The American Association of Oral and Maxillofacial Surgeons (AAOMS) and its Board of Trustees embrace safety as a core value. This white paper reflects this priority and is intended to highlight and summarize key elements of the OMS team approach to anesthesia delivery. AAOMS believes adhering to the principles outlined in this document will provide a solid foundation for the safe, effective and affordable delivery of anesthesia in the office setting – understanding these principles are not set absolute requirements nor do they guarantee specific outcomes.

A Special Committee on Office-based Anesthesia White Paper was appointed in October 2021 by the Board of Trustees to review and revise the 2016 paper. The special committee was tasked with reviewing relevant materials, including the AAOMS Parameters of Care, the American Society of Anesthesiologists’ Practice Guidelines for Sedation and Analgesia by Non-anesthesiologists, AAOMS white papers and other publications related to anesthesia safety. The committee supplemented this foundation with other evidence-based resources and considered the opinions of experts in office-based anesthesia.

Oral and Maxillofacial Surgery Residency Education and Training

From the earliest days of the specialty, there has been an emphasis on outpatient anesthesia education, with ongoing updates to formal training requirements aimed at improving patient safety. The current standards for OMS resident anesthesia training provide for a progressive didactic and clinical learning experience. Combined, anesthesia and medical service rotation assignments are for a minimum of 32 weeks. Of those, at least 20 weeks must be spent on anesthesia service, and at least four weeks should be dedicated to pediatric anesthesia. As with other off-service rotations, the OMS resident must function as at least a Post-Graduate Year-1 (PGY-1) anesthesia resident with commensurate levels of responsibility. A minimum of eight weeks must be allocated toward medical / surgical subspecialty services, with a focus on preoperative risk assessment.

OMS ambulatory anesthesia delivery includes the administration of deep sedation or general anesthesia for procedures performed on pediatric, adult and geriatric patients. The cumulative experience of each graduating resident includes the competent administration of general anesthesia and deep sedation for a minimum of 300 cases, at least 50 of which must involve individuals younger than 13 years old. Training also includes treating children under age 8 using techniques such as behavior management, inhalation analgesia, sedation and general anesthesia.

The clinical experience is supported by a program that incorporates lectures and seminars emphasizing perioperative evaluation of all patients, risk assessment, anesthesia and sedation techniques, monitoring, and the diagnosis and management of complications. These experiences are intended to prepare the graduating resident to ensure favorable outcomes when treating the scope of patients typically seen in OMS offices.

History of Anesthesia in Oral and Maxillofacial Surgery

The role of oral and maxillofacial surgeons in providing anesthesia in an office-based setting has a long history, emanating from the time of Horace Wells’ practice with nitrous oxide in the 1840s to contemporary techniques that utilize multiple agents.

In the mid-1900s, injectable anesthetics became more prominently used by the OMS community, allowing better control of the depth and duration of anesthesia without the need to intubate or otherwise use the oral or nasal pathways for delivery. Methohexital (Brevital), a barbiturate with a short duration of action, was reported in 1940 by Adrian O. Hubble, an OMS who used repeated doses to sufficiently abolish pain and recall in the office.
setting. From 1945 to the 1960s, techniques started to combine methohexital with meperidine (Demerol) or other opiates, along with an anticholinergic drug, to achieve what became known as balanced anesthesia. The introduction of intravenous benzodiazepines, particularly diazepam (Valium) in 1963, marked the beginning of a broader continuum of anesthesia. As newer sedative agents were developed, many older drugs were replaced with more effective and shorter-acting agents with fewer side effects. For example, methohexital (Brevital) has mostly been replaced with propofol (Diprivan) in addition to diazepam with midazolam (Versed) and meperidine (Demerol) with fentanyl. Low-dose ketamine in combination with other agents is used by many OMSs.

To build on the already impressive safety record of the OMS anesthesia team model, AAOMS encourages its members to participate in the Dental Anesthesia Incident Reporting System (DAIRS), an anonymous, self-reporting registry system to collect and analyze anesthesia incidents.

**OMS Team Model of Anesthesia Delivery**

For any team to operate effectively, it must work as a cohesive unit that is trained to recognize potential problems before they arise and respond effectively to any crisis. The OMS team employs a minimum of three individuals: 1) a highly trained OMS, 2) a trained staff member whose sole responsibility is to monitor the patient and 3) a surgical assistant. The team is led by an OMS who has completed a minimum of 12 to 14 years of post-secondary education. The OMS must be certified in Advanced Cardiovascular Life Support (ACLS) in addition to completing the mandatory AAOMS Office Anesthesia Evaluation (OAE) program. The monitor, who must be certified in Basic Life Support (BLS), is responsible for maintaining the patient’s head position to ensure a patent airway. They also must observe the patient’s vital signs, EKG, EtCO2, pulse oximeter and other important monitoring information. Any deviation from normal is reported immediately. Additionally, certification in anesthesia assistance can be obtained through the Dental Anesthesia Assistant National Certification Examination (DAANCE), a psychometrically validated process. The third team member is the surgical assistant who is, at a minimum, a dental assistant with current certification in BLS.

**Therapeutic Goals and Outcomes**

Therapeutic goals revolve around the successful management of anxiety, fear and pain. Equally important is an understanding of expected therapeutic outcomes along with possible anesthesia-related risks and complications. The selection of appropriate techniques for the administration of local anesthesia, sedation, and general anesthesia to meet the specific needs of a given patient and procedure must be determined by the surgeon based on training, experience and an understanding of risks and benefits.

Providers must be trained and skilled in rescuing a patient whose level of anesthesia becomes deeper than originally intended. Following are the recognized levels of anesthesia that may be employed in an effort to manage anxiety, fear and pain:

- **Minimal Sedation (Anxiolysis):** Patient responds normally to verbal commands, although cognitive function and coordination may be impaired. Airway reflexes and ventilatory and cardiovascular functions are unaffected.

- **Moderate Sedation/Analgesia:** Patient responds purposely to verbal commands, either alone or with light tactile stimulation. No interventions are required to maintain a patent airway, and spontaneous ventilation and cardiovascular function are usually maintained.

- **Deep Sedation/Analgesia:** Patient not easily aroused but responds purposely following repeated or painful stimulation. The ability to independently maintain airway patency and ventilation may be impaired. Cardiovascular function is usually maintained.

- **General Anesthesia:** Patient not arousable, even with painful stimulation. The ability to maintain ventilatory function independently is often impaired, and patients may require assistance. Cardiovascular function may be impaired.
Techniques

An individual patient’s medical conditions and physiology, responses to medications, the doses administered, and the technique used influence the level of anesthesia. A variety of administration routes can be employed to achieve the desired therapeutic goals, including local, enteral, parenteral and inhalation. The level of anesthesia achieved is independent of the administration method.

Local anesthetics minimize the amount of other anesthetic agents necessary to achieve therapeutic goals. They commonly contain vasoconstrictors to maintain higher drug concentrations at the target site and minimize surgical bleeding. Enteral anesthetic agents typically include benzodiazepines, non-benzodiazepine hypnotics and alpha-2 agonists. Many variables confound the ability to predict the behaviors of drugs when administered via the enteral route. Common parenteral agents include opioids, benzodiazepines, propofol, ketamine, barbiturates and alpha-2 agonists. Parenteral routes include intravenous, intramuscular, and subcutaneous – with the intravenous route providing the most rapid onset and bioavailability. All parenterally administered medications should follow Centers for Disease Control and Prevention (CDC) Safe Injection Practices to Prevent Transmission of Infections to Patients as well as American Society of Anesthesiologists labeling guidelines.

Anesthesia Risks and Complications

Known risks and complications of the planned anesthetic must be discussed with the patient and family as a part of the informed consent process, with all related questions answered as accurately as possible. For healthy patients, office-based anesthesia has been demonstrated over time to be safe and effective. There are rare instances where serious complications occur, and the OMS team must be prepared to appropriately recognize, diagnose and manage them. Constant vigilance in patient selection and appropriate anesthetic planning are essential in minimizing and preventing anesthesia-related risks.

Patient Evaluation

The provision of local anesthesia, deep sedation or general anesthesia involves the administration of agents with potentially significant systemic effects. It is important to identify patients with varying degrees of physical and medical compromise and adjust the anesthetic plan accordingly. Consultation with other healthcare providers and additional diagnostic testing to appropriately risk-stratify the patient may be indicated. At times, it may be appropriate for a patient to be treated in an ambulatory surgical center or hospital operating room.

Patient assessment begins with a thorough medical history that includes specific questions about previous surgical and anesthetic experiences. The initial office visit should include obtaining vital signs such as blood pressure, heart rate and oxygen saturation (SpO2), which serves as a surrogate monitor of cardiopulmonary function. All abnormal values should be flagged for review. Based on the above, patients should be classified using the American Society of Anesthesiologists (ASA) physical status system. In an ideal setting, patients within ASA I and II classes are the best candidates for office-based anesthesia.

Since the ability to establish an airway remains critical, the Mallampati classification is a good tool for predicting difficulty related to establishing and maintaining an airway in addition to intubating patients. BMI also is a useful parameter to help predict anesthesia-related complications, with patients who fall into a normal or overweight category posing limited risk. Challenges related to maintaining a patent airway or establishing one when it is lost are compounded not only by the BMI but also length and diameter of the neck. Sternomental distance is an important predictor for difficult intubation.

Cardiac Disease – A history of cardiac disease may require further evaluation and consultation with the patient’s primary care physician or cardiologist. Important subtypes include the following:

- Coronary artery disease and myocardial infarction: Angina or shortness of breath with exercise may suggest ischemic heart disease. Determining functional status using metabolic equivalents (METs) helps assess disease severity, and the use of chronic and episodic vasodilator medications (including nitroglycerine) provides additional insight.

- Cardiac arrhythmias: Cardiac arrhythmias can result in significant morbidity during anesthesia. The use of epinephrine-containing local anesthetics, endogenous
epinephrine and certain anesthetic agents – such as ketamine and inhalational agents – can result in arrhythmias. Patients with Wolff-Parkinson-White syndrome and those with second-degree Type II or third-degree heart blocks are not ideal candidates for office-based deep sedation or general anesthesia. Atrial fibrillation may predispose to a rapid ventricular rate that can lead to acute decompensation and heart failure. Patients with implanted pacemakers and internal defibrillators warrant cardiac consultation.

**Congestive failure:** Congestive heart failure is a progressive loss of the normal cardiac output. Symptoms of non-compensated failure may include shortness of breath, peripheral edema or fatigue. The functional status provides valuable insight into disease severity. Patients with moderate to severe congestive heart failure are not candidates for office-based deep sedation or general anesthesia.

**Valvular heart disease and prosthetic valves:** Patients may be referred for multiple extractions prior to a planned valve replacement. Depending on the complexity of the extractions, individuals may not be suitable for treatment in an office-based setting. Once valve replacement has occurred, patients are typically more stable.

**Respiratory Disease** – One of the major risks of office-based anesthesia delivery is the development of apnea or hypopnea. Improvements in surveillance with end-tidal carbon dioxide (EtCO2) monitors and a precordial stethoscope alert the anesthetic team to the development of apnea in real time. Obese, pediatric or patients with comorbid medical conditions have reduced functional residual capacity and may desaturate relatively rapidly.

**Asthma** – Patients with asthma require particular attention in light of the potential for anesthesia-related complications and should be screened with questions such as: In the past four weeks, has the patient had: 1) Daytime symptoms more than two times per week? 2) Night waking due to asthma? 3) Use of short-acting beta agonists for symptoms more than two times per week? 4) Any activity limitations due to asthma? In general, the patient can be considered well-controlled if he or she answers no to all questions, partly controlled if yes to one or two questions, and uncontrolled if they report yes to three or more. Mild intermittent asthmatics and mild persistent asthmatics are reasonable candidates for office-based deep sedation and general anesthesia. Moderate and severe asthmatics are better managed in an ambulatory surgery center or hospital operating room. Avoidance of known triggers such as non-steroidal anti-inflammatory medications (NSAIDs) and morphine is important. Patients with an upper respiratory infection in the previous month are not good candidates for deep sedation or general anesthesia given the increased risk of bronchospasm.

**Hepatic Disease** – Various causes of hepatic disease include viral hepatitis, chronic alcoholism and hepatotoxicity from drugs. Since many anesthetic drugs are bound to plasma proteins that are produced in the liver, hepatic disease may result in increased free-drug within the body's circulation and the potential for enhanced and prolonged drug activity. Since the liver is responsible for metabolism of many agents, there may be an increased half-life and prolonged anesthetic effects.

**Renal Disease** – Urinary excretion is a major mechanism for drug elimination. Therefore, renal disease can result in prolonged drug action, particularly when metabolites also have a therapeutic effect. Since the kidney is responsible for electrolyte and fluid homeostasis, renal disease can result in significant electrolyte abnormalities and fluid shifts, which may decrease cardiovascular reserve as predispose to arrhythmias.

**Pediatric Patients** – Children are not simply small adults. They have many unique and constantly changing anatomic, physiologic, pharmacologic and psychologic differences with their medical and surgical history typically derived completely from the caregiver. Systemic diseases and prescription medications are uncommon, and past anesthetic experiences may be rare. A targeted physical exam should include an airway, heart and lung evaluation. Recent upper respiratory infection, fever, mucopurulent nasal drainage, audible wheezing or a productive cough should prompt further evaluation. Small nares, large tongue and enlarged tonsils or adenoids can cause passive airway obstruction. The pediatric airway is far more reactive to stimuli such as secretions or foreign bodies than an adult airway. As a result, laryngospasm must be anticipated, quickly identified and skillfully managed.
Pediatric cardiac output can be maintained over a wide range of preloads without failing, but young patients rely solely on heart rate to maintain blood pressure. As a result, bradycardia must be immediately detected and corrected. Properly sized equipment is vital to the delivery of anesthesia and rescue in the instance of an emergency. Prior to anesthetic administration, calculating emergency dosages of commonly used drugs can facilitate a smooth, coordinated and successful outcome.

**Pregnant Patients** – Although elective surgery can usually be delayed, there are situations in which a pregnant female will require urgent surgery. In addition to maternal safety, anesthetic management must maintain fetal safety, which includes avoiding intrauterine fetal asphyxia and preterm labor. Most local anesthetics are considered safe during pregnancy, and single exposure to the commonly used sedatives (benzodiazepines, opioids and nitrous oxide) have undetermined risk of teratogenicity. Consultation with the practitioner managing the patient’s prenatal care may be helpful in determining appropriate timing for surgery and the optimal perioperative care.

**Obese Patients** – Obese patients present with special anatomic and physiologic problems. Obesity, defined by body mass index, is associated with increased risk for Type 2 diabetes, hypertension and cardiovascular disease relative to normal weight and waist circumference. Airway management may be difficult due to the overabundance of soft tissue or anatomic deficiencies. Comorbid conditions, decreased functional residual capacity, complex airways and difficult intravenous access place obese patients at higher risk for complications. Practitioners should be experienced in airway management, including endotracheal intubation and supraglottic device placement. The use of opioids should be considered with caution.

**Geriatric Patients** – It is prudent to consider age, frailty and comorbidities as anesthetic risk factors. Medical consultation may be necessary. Determination of the geriatric patient’s mental status is important as postoperative delirium is more common in patients with dementia or preoperative mental status changes. Assessing the level of exercise tolerance can be integral to estimating the patient’s ability to tolerate the combined stress of anesthesia and surgery. The anesthetic plan should consider reduced dosing with an expectation for longer elimination half-lives of anesthetic drugs. Medications with anticholinergic effects should be limited and preference should be given to reversible anesthetic agents.

**Monitoring**

Continuous real-time monitoring should reflect the OMS team model’s shared patient safety responsibilities. Monitoring should be started before the administration of anesthesia and continue throughout the procedure and the post-anesthetic recovery period. In addition to diligent surveillance through direct observation, electronic monitors should include EKG, pulse oximetry, blood pressure, and pulse and end-tidal CO2. Pre-cordial and pre-tracheal stethoscopes also may be used as deemed useful. Despite the advancements offered by today’s high-tech monitors, the maxim of “treat the patient, not the monitor” should be respected.

**Office Anesthesia Evaluation**

The Office Anesthesia Evaluation (OAE) is a unique peer review process that has been in existence since 1975. The OAE was conceived, developed, implemented and mandated by AAOMS through its state societies to benefit the public its members serve. The AAOMS OAE digital app (available on Apple Store or Google Play) can be used to assist with this process. To maintain AAOMS membership, all member oral and maxillofacial surgeons must complete this mandatory program at least every five years. The process involves a thorough inspection of the member’s practice locations, team, equipment and patient care skills particularly as they pertain to the delivery of anesthesia and preparedness to manage office emergencies. Inspections are typically conducted by outside surgeons or state dental board designates.

The program consists of four parts: 1) evaluation of office facilities, medications and emergency equipment; 2) management of simulated office emergencies; 3) debriefing; and 4) observation of the anesthesia and surgeries performed in the office, subject to state laws and patient consent. The AAOMS Office Anesthesia Evaluation Manual published periodically (9th edition available) guides the process. Among other things, the OAE Manual provides sample forms, checklists and a variety of emergency scenarios to guide crisis drills and scrimmages for the anesthetic team.
Mobile Anesthesia

Mobile anesthesia is a model where a qualified individual delivers services in a facility where the anesthesia provider does not practice or have input into office design or staffing. Anyone involved in the mobile anesthesia model should be aware of applicable state laws, rules and regulations, professional resources, and the scope of their professional training and experience. Mobile anesthesia providers retain the responsibility of providing coordinated and patient-focused care and must maintain the same standards as someone delivering anesthesia in their home office. This includes, but is not limited to, being responsible for patient selection, the anesthetic plan, monitoring and recovery, emergency preparedness, record keeping and overall patient safety.

Emergency Preparedness

Despite the best efforts of all concerned, crisis events can and do occur. It is important to have a process in place to prevent as well as recognize and respond to potential crises. Preparation has two components: systems and practice.

Systems are deliberate strategies to limit risk and enhance outcomes. Examples include written patient assessment protocols, standardized clinical documentation forms or electronic medical record templates, pre-procedure timeout checklists, and crash cart checks to ensure all supplies are available and functioning.

Practice is an effective approach to improving outcomes. It has two components: drills and scrimmages. Drills are used to develop the skills necessary to perform effectively, while scrimmages require the application of knowledge and skills during simulated challenges. Together, they help the team to progress through stages of learning from unconscious incompetence (unable to do something with little idea what needs to be done), to conscious incompetence (understand what needs to be done but unable to do it), conscious competence (aware of what needs to be done and able to do it with conscious effort), and unconscious competence (know what to do and able to act without conscious effort).

Practices should be conducted on a regular basis, be challenging, mimic real-life situations, include constructive feedback, emphasize a growth mindset and incorporate an element of engaging team building.

Scenarios should emphasize the types of patients the office typically treats, including age, medical and physical status, and procedure types. While focusing on events where anesthetics are most likely to be administered, they also should include other spaces such as the recovery room, waiting room, hallway and bathroom. Algorithms should be creative rather than formulaic and allow for progression through a variety of workable solutions. To make sessions realistic, the team should use a manikin and carry out tasks in a manner that approximates reality, such as performing CPR, managing the airway, connecting IV tubing and drawing up mock drugs. AAOMS members and their offices must conduct quarterly mock crisis drills.

Provider Training/Continuing Education

Active engagement in lifelong learning from multiple sources supports the efficiency and effectiveness of both the OMS and his or her staff. AAOMS supports the OMS team in keeping abreast of the latest knowledge and techniques through the efforts of the AAOMS Committee on Continuing Education and Professional Development and the Committee on Anesthesia. Together, they are responsible for creating high-level contemporary lectures, webinars and symposia on anesthesia topics offered as in-person and online programs. Examples for members include but are not limited to the Anesthesia Update lecture series delivered before the AAOMS Annual Meeting and the AAOMS Anesthesia Patient Safety Conference. Courses intended for members and their staff include Advanced Protocols for Medical Emergencies in the OMS Office, Anesthesia Assistants Skills Lab and the Anesthesia Assistants Review Course.

Simulation Training

AAOMS has created a simulation-based learning experience intended to provide every OMS and their staff training in Office-Based Emergency Airway Management (OBEAM) and Office-Based Crisis Management (OBCM). Modules in the program include didactic and hands-on mastery-based skills training and adult cooperative learning modules that allow participants to learn and update their airway skills as well as improve team dynamics.
Ongoing Quality Assessment and Lifelong Learning

Ongoing quality assessment and lifelong learning are signature elements in practice efficiency, procedural effectiveness, the delivery of high-quality state-of-the-art patient care, and optimized patient safety and emergency response. Given that oral and maxillofacial surgery spans both medicine and dentistry, ongoing quality assessment has been an integral part of the specialty from both process and quality improvement perspectives.

Lifelong learning continues beyond the completion of formal education and results in the growth of important knowledge and skills. The results should be monitored using objective measures. AAOMS and the American Board of Oral and Maxillofacial Surgery fully support this process in tangible ways.

Conclusion

AAOMS expects this white paper will be revised over time as warranted, as is the case where there is ongoing evolution of knowledge, technology and practice preferences. Reality informs AAOMS that there is a necessary balance between what is ideal and what is practical, particularly in communities where resources are limited and access to care is challenged. While it is understood the choice of agents and techniques is dependent upon the experience, training and preferences of individual practitioners, safety can never be sacrificed.

Related Readings

Accreditation Standards for Advanced Dental Education Programs in Oral and Maxillofacial Surgery. Available at https://coda.ada.org/~media/CODA/Files/oms.pdf?la=en


American Society of Anesthesiologists (ASA). Standards for basic anesthetic monitoring. Developed By: Committee on Standards and Practice Parameters (CSPP) Last Amended: October 28, 2015 (original approval: October 21, 1986). Available at: https://www.asahq.org/standards-and-guidelines/standards-for-basic-anesthetic-monitoring


