Equipment Safety, Maintenance and Inspection

What the Oral Surgeon Needs to Know

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KEYWORDS

• Equipment maintenance • Patient safety • Office-based surgery • Biomedical testing
• Equipment calibration • Sterilization monitoring • Radiation safety and monitoring
• Nitrous oxide sedation

KEY POINTS

- Equipment requires annual biomedical testing and calibration.
- Process indicators, spore tests, and regular maintenance assure sterilizer effectiveness.
- Radiation survey can be satisfied by short-term dosimetry badge wearing or an area monitor.
- Medical gases need to be properly stored and monitored to decrease risks to patients and staff.
- Back-up power and lighting are needed for critical equipment during an electrical failure.

INTRODUCTION

Many oral and maxillofacial surgical procedures are done in an office-based setting, with many oral and maxillofacial surgeons (OMSs) directly or indirectly involved in oversight of equipment maintenance. Goals in equipment management are to prevent harm to patients and staff, stay compliant with current regulations, and increase equipment longevity where possible. Harm to patients or staff can happen when there is electrical leak from equipment, inaccurate vital sign data, an improperly functioning autoclave, excessive radiation, incorrect plumbing of anesthetic gases, or loss of light and/or power during a procedure or resuscitative event. Fortunately, the steps needed to prevent equipment-related mishaps are straightforward and easy to implement.[1,2] There are few data on equipment-related events in office-based surgery, but in a review of sentinel events reported to the Joint Commission (JC) in 2012, medical equipment-related incidents were only the tenth most common type of incident. Of those incidents, greater than 82% of them were caused by human factors, not mechanical failure. Even if the number of cases may be small, the consequences can be catastrophic, as in the case of errors in the administration and storage of medical gases. It is imperative to always follow the manufacturer's recommendations and train all employees in the proper use and maintenance of all medical equipment.

Regulatory compliance is becoming more of a concern for the office-based OMS, especially those that are medically licensed. In the past, the sometimes voluntary, state-run, Office Anesthesia Evaluation (OAE) program[3] was the only regularly recurring inspection an OMS would face, every 5 years. The OAE is required to maintain American Association of Oral and Maxillofacial Surgeons (AAOMS) membership[4] and assesses an office for appropriate anesthesia rescue equipment and drugs as well as tests the provider on his or her knowledge of the management of medical emergencies. The inspection checks for presence of

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equipment, but not functionality of equipment, or current inspection and certification of equipment. In many states, as an MD licensed OMS, one would not even be subjected to the OAE for an anesthesia permit since many states did not, and at least 25 still do not, require certification for an MD to do office-based anesthesia or surgery.[5,6] As more surgical procedures go to the outpatient setting, and surgical and anesthetic mishaps in the office setting continue to be high profile, there has been a push for more regulation.[7] The regulations, when enacted by state legislatures, apply to MD licensed OMSs, and stem from Centers for Medicare and Medicaid Services (CMS) conditions of participation that apply to inpatient facilities. CMS relies on accrediting organizations (OAs) to survey facilities with state agencies conducting audits or validation surveys. This is the same model usually utilized for affected MD office-based anesthesia offices. The 3 national organizations that offer accreditation of office-based surgical facilities are the American Association for the Accreditation of Ambulatory Surgical Facilities (AAAASF), Association for the Accreditation of Ambulatory Healthcare (AAAHC), and the JC (**Box 1**). Most states also do a yearly site visit. The tests and procedures for optimal equipment safety and maintenance discussed in this article are those usually required by these governing agencies and the relevant state and federal organizations.

This article will cover the safety, maintenance, and inspection related to electrical equipment used in the treatment of patients, autoclaves, radiograph machines, nitrous oxide and oxygen medical gases, and required back-up power and lighting. In all cases the office should follow manufacturer's recommendations regarding maintenance and inspection, and document policies and monitoring so compliance can be proved to governing bodies.

ELECTRICAL SAFETY AND CALIBRATION

All medical/surgical equipment needs to be on a program of scheduled preventive maintenance and calibration, done by a credible biomedical service vendor.[8] All electrical equipment in the patient treatment areas, and other major medical electric equipment like a sterilizer or radiology machine, must be tested (**Table 1**). Electrical safety inspection helps prevent the hazards of using defective or improperly grounded electric medical equipment. The biomedical service provider will inventory equipment by manufacturer, type, model, and serial number. This should be done annually and a log book kept with the inspection reports (**Table 2**). Anesthesia machines should be tested from 1 to 4 times a year, depending on the manufacturer and type of machine. After the equipment is tested, a sticker is placed on the item with the date and year of the inspection and when it expires (**Fig. 1**).

The inspection is a test to ensure that equipment is working within the acceptable safety parameters set out by the National Fire Protection Association (NFPA) and the Association for Advancement of Medical Instrumentation (AAMI). Both organizations are nonprofit organizations devoted to reducing hazards in health care through the development of standards, research, training, and education. When these voluntary standards are adopted by CMS or other government agencies in their licensing requirements, like NFPA's Standards for Health Care Facilities,[9] they become mandatory requirements for hospitals, and as an extension, the outpatient Accrediting Organizations (AO)s.[10]

Box 1
National accrediting bodies for office-based anesthesia practices

Accreditation Association for Ambulatory Health Care (AAAHC)
5250 Old Orchard Road, Suite 200
Skokie, IL 60077
www.aaahc.org

American Association for Accreditation of Ambulatory Surgery Facilities (AAAASF)
5101 Washington Street, Suite 2F
Gurnee, IL 60031
www.aaaasf.org

The Joint Commission (JC)
One Renaissance Boulevard
Oakbrook Terrace, IL 60181
www.jointcommission.org

Table 1
Equipment requiring electrical testing and calibration

Patient Treatment Room Equipment	Major Medical Electrical Equipment
Vital signs monitors	Sterilizer
Electric drill consoles	Radiology equipment
Headlight	
X-Ray viewer	
Dental/surgical chair	
Portable suction unit	
Automated external defibrillator/ Defibrillators	
Anesthesia machine[a]	

[a] Electrical testing and calibration should be done from 1 to 4 times per year, depending on the manufacturer.