

# AORN Guidance Statement: Care of the Perioperative Patient With an Implanted Electronic Device

## Introduction

This document is intended to serve as a guide for perioperative nurses involved in the care of surgical patients with implanted electronic devices (IEDs) who are undergoing surgical and other invasive procedures. This document does not address care of patients undergoing surgery for implantation of an electronic device; it covers only issues surrounding the care of patients with existing electronic implants. Because of the rapid advancement of science and medical technology, this document does not presume to address every IED. Manufacturers' written directions for specific devices should be followed. This document is intended to help perioperative nurses provide safe care for patients with IEDs because these patients require extraordinary safety precautions in the surgical environment.

Implanted electronic devices provide a vast number of options in the treatment of many disease processes that cannot be managed with medications alone. Common examples of IEDs include permanent pacemakers, which are used to treat profound bradycardia; implantable cardioverter defibrillators (ICDs), which are used to treat sustained ventricular tachycardia (VT); deep brain stimulators (DBSs), which are used to treat tremors and Parkinson's disease; and spinal cord stimulators (SCSs), which are used to deliver low-voltage stimulation to the spinal cord to block the sensation of pain and to stimulate the sacral nerve for treatment of neurogenic bladder and tremors. Sudden failure of these implanted devices can result in patient injury or sudden cardiac death (SCD).<sup>1</sup> When precautions are implemented, patient risk for injury can be minimized.

The goal of every surgical intervention is to provide optimal patient outcomes while maintaining a safe environment. Some medical equipment devices necessary for performing surgical and other invasive procedures may interfere with the functioning of IEDs. Manufacturers of IEDs recommend precautions for and/or avoiding certain devices that create electromagnetic fields.<sup>2</sup> Because of the potential for interference, patients with IEDs require special safety precautions when undergoing a surgical procedure. The perioperative registered nurse should be knowledgeable about the specific IED and associated precautions that should be implemented to protect the patient from injury.

Implanted electronic devices are widely used in a number of diverse medical applications, ranging from the familiar cardiac pacemaker to the less frequently encountered cochlear implant. The perioperative nurse should be aware that these devices require that special precautions be taken. One predominantly important precaution is managing the sources of inherent electromagnetic interference (EMI) in the perioperative patient care environment. Cardiac patients are particularly at risk because they may be dependent on the proper function of an IED to sustain their lives. Understanding what types of IEDs exist, how they function, and the precautions that must be taken when caring for patients with IEDs is critical for every perioperative nurse because patients with these devices may be encountered in any perioperative environment. The history, application, function, and safety issues of the different types of IEDs will be addressed in this document.

## Definitions

For the purposes of this document, the following definitions apply.

*Conducted EMI:* Occurs when an electromagnetic source comes in direct contact with the body. Can be generated by electrosurgery and defibrillation.<sup>3</sup>

*Direct coupling:* The contact of an energized metal active electrode tip with another metal instrument or object within the surgical field.

*Electromagnetic:* Magnetism that is induced by an electric current.<sup>4</sup>

*Electromagnetic interference (EMI):* Any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment. *Synonym:* radio frequency interference.<sup>5</sup>

*Implanted electronic devices (IEDs):* Electronic medical devices that have been implanted in a patient to treat a physiological defect or to replace a sensory function.

*Microwave:* A short electromagnetic wave between about 1 mm and 1 m in length.

*Radiated EMI:* Occurs when the body is placed within an electromagnetic field; no contact with the source is necessary. Can be generated by magnetic resonance imaging (MRI), positron emission tomography (PET), and radiation therapy.<sup>3</sup>

*Shortwave:* A radio wave with a wavelength between 10 m and 100 m.