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Task Group/Practice Parameter

The American College of Radiology and the American Brachytherapy Society practice parameter for the performance of low-dose-rate brachytherapy

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ABSTRACT Brachytherapy is the use of radionuclides to treat malignancies or benign conditions by means of a radiation source placed close to or into the tumor or treatment site. This practice parameter refers only to the use of radionuclide brachytherapy. Brachytherapy alone or combined with external beam therapy plays an important role in the management and treatment of patients with cancer. Low-dose-rate (LDR) brachytherapy has traditionally been used for treating prostate, head and neck, breast, cervical, and endometrial cancers as well as obstructive bile duct, esophageal, or bronchial lesions. It has been practiced for over a century with a variety of sources including radium-226, cesium-137, and, more recently, iridium- 192, iodine-125, and palladium-103. Low-dose-rate (LDR) brachytherapy can be given as interstitial, intracavitary, intraluminal, and/or plesiotherapy to a wide variety of treatment sites. This practice parameter addresses sealed sources as they are used for LDR brachytherapy. It is recognized that unsealed sources (e.g., yttrium-90) are also a form of LDR brachytherapy.

Keywords: Low-dose-rate brachytherapy; Brachytherapy; Radionuclides; LDR brachytherapy; Radionuclide brachytherapy; Prostate cancer; Head and neck cancer; Breast cancer; Endometrial cancer; Obstructive bile duct lesions; Esophageal lesions; Bronchial lesions; Pulse-dose-rate brachytherapy; Treatment goals; Treatment planning; Radiation safety; LDR applicators

Preamble

This document is an educational tool designed to assist practitioners in providing appropriate radiation oncology care for patients. Practice Parameters and Technical Standards are not inflexible rules or requirements of practice and are not intended, nor should they be used, to establish a legal standard of care[1]. For these reasons and those set forth below, the American College of Radiology and our collaborating medical specialty societies caution against the use of these documents in litigation in which the clinical decisions of a practitioner are called into question.

The ultimate judgment regarding the propriety of any specific procedure or course of action must be made by the practitioner in light of all the circumstances presented. Thus, an approach that differs from the guidance in this document, standing alone, does not necessarily imply that the approach was below the standard of care. To the contrary, a conscientious practitioner may responsibly adopt a

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[1] Iowa Medical Society and Iowa Society of Anesthesiologists v. Iowa Board of Nursing, ___ N.W.2 d ___ (Iowa 2013) Iowa Supreme Court refuses to find that the *ACR Technical Standard for Management of the Use of Radiation in Fluoroscopic Procedures* (Revised 2008) sets a national standard for who may perform fluoroscopic procedures in light of the standard's stated purpose that ACR standards are educational tools and not intended to establish a legal standard of care. See also, Stanley v. McCarver, 63 P.3 d 1076 (Ariz. App. 2003) where in a concurring opinion the Court stated that "published standards or guidelines of specialty medical organizations are useful in determining the duty owed or the standard of care applicable in a given situation" even though ACR standards themselves do not establish the standard of care.

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** As of May 2010, all radiation oncology collaborative parameters are approved by the ACR Council Steering Committee and the ACR Board of Chancellors and will not go through the ACR Council (ACR Resolution 8, 2010). The effective date is displayed below: Development Chronology for this Practice Parameter, 1996 (Resolution 13), Revised 2000 (Resolution 24), Revised 2005 (Resolution 16), Amended 2006 (Resolution 16g, 36), Revised 2010 (Resolution 4), Amended 2014 (Resolution 39), Revised 2015 (CSC/BOC).

course of action different from that set forth in this document when, in the reasonable judgment of the practitioner, such course of action is indicated by the condition of the patient, limitations of available resources, or advances in knowledge or technology subsequent to publication of this document. However, a practitioner who employs an approach substantially different from the guidance in this document is advised to document in the patient record information sufficient to explain the approach taken.

The practice of medicine involves not only the science, but also the art of dealing with the prevention, diagnosis, alleviation, and treatment of disease. The variety and complexity of human conditions make it impossible to always reach the most appropriate diagnosis or to predict with certainty a particular response to treatment. Therefore, it should be recognized that adherence to the guidance in this document will not assure an accurate diagnosis or a successful outcome. All that should be expected is that the practitioner will follow a reasonable course of action based on current knowledge, available resources, and the needs of the patient to deliver effective and safe medical care. The sole purpose of this document is to assist practitioners in achieving this objective.

Introduction

This practice parameter was revised collaboratively by the American College of Radiology (ACR) and the American Brachytherapy Society (ABS).

Brachytherapy is the use of radionuclides to treat malignancies or benign conditions by means of a radiation source placed close to or into the tumor or treatment site. This practice parameter refers only to the use of radionuclide brachytherapy. Brachytherapy alone or combined with external beam therapy plays an important role in the management and treatment of patients with cancer (1).

Low-dose-rate (LDR) brachytherapy has traditionally been used for treating prostate, head and neck, breast, cervical, and endometrial cancers as well as obstructive bile duct, esophageal, or bronchial lesions (1). It has been practiced for over a century with a variety of sources including radium-226, cesium-137, and, more recently, iridium-192, iodine-125, and palladium-103. Low-dose-rate (LDR) brachytherapy can be given as interstitial, intracavitary, intraluminal, and/or plesiotherapy to a wide variety of treatment sites (1).

Low-dose-rate brachytherapy is accomplished by (1) temporary implants, in which radioactive sources are ‘‘afterloaded’’ for a period of a few hours or days into applicators that are placed temporarily into the patient or (2) permanent implants, in which the radioactive sources are permanently inserted into the cancerous tissue. Source handling and loading into the applicator or tissue can be performed manually or remotely, with source loading performed by a computerized unit. Low-dose-rate brachytherapy is delivered at dose rates of 4–200 cGy per hour at a designated point. Remote afterloading pulse-dose-rate (PDR) brachytherapy is a method that is delivered over a protracted time in periodic (usually hourly) pulses at rates similar to those used for LDR brachytherapy. Brachytherapy can also be administered using remote afterloading, high-dose-rate (HDR) techniques. The use of HDR brachytherapy is covered in the ACR–ABS Practice Parameter for the Performance of High-Dose-Rate Brachytherapy (2). Despite different nomenclature, these types of brachytherapy have many common treatment principles. The types of applicators, methods of insertion, and many aspects of