

# Predicting Radiotherapy-Related Clinical Toxicities in Cancer: A Literature Review

Claire O'Gorman, BSc, PGDip, RGN, Wojciech Sasiadek, MD, Suzanne Denieffe, MSc, BNS, RGN, RPN, RNT, PhD, and Martina Gooney, BSc, PhD



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Assessment of patients receiving radiotherapy for cancer is essential, with the ability to identify those who may be more likely to experience radiotherapy-related side effects noted as an important issue for nurses. Body mass, age, and radiation dose may be predictive factors for the development of such side effects. This review considers these factors and how nurses can use this evidence to inform their care, with results indicating that the dose of radiation, the site treated, and body mass index are predictive of toxicities that may develop. Increased awareness of these predictive factors will aid nurses in identifying patients at greater risk of developing radiation-related side effects. This will assist in guiding nursing interventions, as well as enabling the individualization of patient education, by placing greater emphasis on preventive measures for patients who are more vulnerable to the development of radiation-related toxicities.

Claire O'Gorman, BSc, PGDip, RGN, is a nursing doctoral student in the Department of Nursing at the Waterford Institute of Technology in Ireland; Wojciech Sasiadek, MD, is a consultant radiation oncologist at UPMC Whitfield Cancer Centre in Waterford; and Suzanne Denieffe, MSc, BNS, RGN, RPN, RNT, PhD, and Martina Gooney, BSc, PhD, are lecturers and researchers, both in the Department of Nursing at the Waterford Institute of Technology. The authors take full responsibility for the content of the article. Funding was provided through a grant by Health Service Executive. The content of this article has been reviewed by independent peer reviewers to ensure that it is balanced, objective, and free from commercial bias. No financial relationships relevant to the content of this article have been disclosed by the independent peer reviewers or editorial staff. O'Gorman can be reached at [cogorman@wit.ie](mailto:cogorman@wit.ie), with copy to editor at [CJONEditor@ons.org](mailto:CJONEditor@ons.org). (Submitted July 2013. Revision submitted August 2013. Accepted for publication September 2, 2013.)

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The use of ionizing radiation to treat numerous forms of cancer is now widely accepted as standard practice (Ryan, 2012). However, despite many technological advances in this area, the development of toxicities and side effects remains a significant problem that affects the delivery of optimum treatment doses and poses a challenge for nursing care (Ryan, 2012). Documented side effects of radiotherapy include fatigue, dermatologic effects, and site-specific issues such as genitourinary dysfunction, gastrointestinal issues, and pain (O'Gorman, Denieffe, & Gooney, 2013).

The literature indicates the provision of information about side effects is an important unmet requirement of patients receiving radiotherapy, and a need exists to strengthen health education for those more prone to developing symptoms (Knapp et al., 2012; Tang, Wang, Hung, & Lin, 2011). Nurses care for patients before, during, and after radiotherapy and, therefore, are in an ideal position to perform a thorough assessment of a patient's risk for developing radiation-related symptoms, particularly because it has been demonstrated that nurse-led care is widely acceptable to patients and leads to positive outcomes (Dunberger & Bergmark, 2012; Moore et al., 2002).

The extent of side effects experienced by patients is determined partly by their level of radiosensitivity. This inherent individual response leads to increased effects of radiotherapy on the body and the development of toxicities and side effects (Twardella & Chang-Claude, 2002). Highlighting factors that may increase patients' radiosensitivity would enable nurses to perform a more comprehensive assessment, tailor patient information requirements, and implement necessary interventions in a timely and efficient manner. For patients receiving radiotherapy for cancer, studies have shown that predictive factors of clinical radiosensitivity may include body mass index (BMI), age, and radiation dose. This review will examine these studies and critically appraise the evidence to consider how knowledge of these factors can guide clinical practice.

## Methods

A literature search was conducted using CINAHL®, PubMed, Science Direct, the Cochrane Library, and Wiley Online Library. Search terms employed were *radiotherapy*, *cancer*, *radiosensitivity*, *side effects*, *toxicities*, *body mass index*, *age*,