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Research Article

# Exploring the Experiences of Left-Sided Breast Cancer Patients Receiving Radiation Therapy Using the Active Breathing Coordinator

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## ABSTRACT

**Background:** The Active Breathing Coordinator (ABC) to induce breath hold during radiation therapy is used with the intent to reduce the risk of long-term, radiation-induced cardiovascular morbidity. Many studies have explored the dosimetric and toxicity benefits of using the device, but limited research has been done on the patient's perspective. The aim of this study was to explore the patient's experience using the ABC device and to evaluate the teaching provided.

**Methods and Materials:** Following Research Ethics Board approval and written informed consent, paper questionnaires were used, and cross-sectional data were collected from 30 English-speaking women receiving radiation therapy for left-sided breast cancer using the ABC device. Questions were both quantitative (a 10-point Likert scale) and qualitative in nature and evaluated patient-reported anxiety levels, confidence levels, and suggestions for process improvement. Descriptive and inferential statistics were used to analyze the results, with thematic analysis of qualitative comments.

**Results:** Fifty-three percent of patients reported higher than 5 on the Likert scale for anxiety related to using the ABC device. Half the sample indicated that they were equally anxious about using the ABC as they were about receiving radiation therapy, a third reported being more anxious about using ABC than they were about receiving radiation therapy. Participants under 50 years were significantly more likely to feel "highly" anxious about using ABC than those older than 50 years (37% vs. 5%;  $P = 0.001$ ). Half the participants indicated that their confidence level increased as treatment progressed, and suggested that the inclusion of a training video, practice sessions and constant communication via the treatment unit intercom would be helpful in reducing their anxiety.

**Conclusions:** This hypothesis generating study suggests that moderate-to-high levels of anxiety were common for left-sided breast cancer patients using the ABC device, particularly for patients younger than 50 years. As treatment progressed, patients seemed to become less anxious and more confident using the device. These

preliminary findings support the need for further research in this area, using formal validated anxiety scoring tools.

## RÉSUMÉ

**Contexte :** L'utilisation de l'Active Breathing Coordinator (ABC) pour engager la retenue respiratoire durant la radiothérapie vise à réduire le risque de morbidité cardiovasculaire à long terme induite par le rayonnement. Plusieurs études ont exploré les avantages en matière de dosimétrie et de toxicité de l'utilisation de cet appareil, mais peu de recherches ont été faites du point de vue du patient. La présente étude vise à explorer l'expérience du patient face à l'utilisation de l'appareil ABC et à évaluer les leçons apprises.

**Méthodologie et matériel :** Une fois obtenus l'approbation du CER et des formulaires de consentement éclairé écrit, un questionnaire papier a été utilisé et des données transversales ont été obtenues auprès de 30 patientes anglophones recevant de la radiothérapie pour un cancer du sein latéral gauche avec utilisation de l'ABC. Le questionnaire comportait à la fois des questions quantitatives (échelle Likert sur 10 points) et des questions qualitatives qualitative et visait à évaluer les niveaux d'anxiété et de confiance rapportés par les patientes, ainsi que leurs suggestions pour l'amélioration du processus. Des méthodes de statistique descriptive et déductive ont été utilisées pour l'analyse des résultats, avec une analyse thématique des commentaires qualitatifs.

**Résultats :** 53% des patientes ont coché plus haut que 5 sur l'échelle Likert pour l'anxiété reliée à l'utilisation de l'appareil ABC. La moitié des répondantes ont indiqué que leur niveau d'anxiété face à l'utilisation de l'appareil ABC était aussi élevé que face à la radiothérapie; un tiers ont dit que leur niveau d'anxiété face à l'utilisation de l'appareil ABC était plus élevé que face à la radiothérapie. Les participantes de moins de 50 ans étaient significativement plus susceptibles de se sentir « fortement » anxieuses à propos de l'utilisation de l'ABC que celles de plus de 50 ans (37% c. 5%;  $p = 0,001$ ). La moitié des

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participantes ont indiqué que leur niveau de confiance avait augmenté à mesure que le traitement progressait, et suggéré que l'ajout d'une vidéo de formation, de séances de pratique et une communication constante via l'intercom de l'appareil de traitement auraient été utiles pour diminuer leur niveau d'anxiété.

**Conclusions :** Cette étude de génération d'hypothèses suggère que des niveaux d'anxiété modérés à élevés étaient communs pour les

*Keywords:* Active breathing coordinator; ABC; anxiety; confidence; breath hold; preparedness; pretreatment education

## Introduction

It is estimated that 90% of breast cancer patients will survive for more than 5 years after initial diagnosis [1]. Consequently, radiation-induced cardiovascular disease as a long-term side effect of radiation treatment has become of increasing concern [1]. The risk of death from cardiac disease and vascular disease was higher for women who received radiation treatment than those who did not [2]. Moreover, increased mortality was significantly higher in women receiving radiation treatment to the left breast [2, 3]. More modern radiation treatment planning focuses on ensuring sufficient dose coverage of the breast and chest wall while reducing dose to cardiac organs that are most at risk; specifically, the heart and left anterior descending artery [4]. Modern techniques, such as breath hold during radiation treatment using the Active Breathing Coordinator (ABC), offer a solution to reduce the risk of radiation-induced cardiovascular morbidity.

Deep inspiration breath hold using the ABC device has been shown to be advantageous for left breast cancer patients because it reduces lung and heart dose [5]. The ABC device holds patients in a moderate deep inspiration breath phase, reducing the volume of heart present in the treatment field by increasing the distance between the heart and chest wall [6]. It consists of a mouthpiece connected to a flow meter and a balloon valve that is controlled via a signal from a computer outside the treatment room. The patient also has control of the device by depressing and/or releasing a handheld switch. Numerous studies have been conducted to demonstrate the clinical benefits of the ABC; however, limited research exists on the patient perspective of using this complicated device.

Radiation therapists play an important role in the provision of health-related information to the patient. Jefford and Tattersall [7] found that 85% of newly diagnosed cancer patients reported that treatment-specific information was an essential supportive care need. Educating patients regarding radiation therapy can enhance patients' confidence and trust in the technology of treatment delivery [8]. If the radiation therapist relays the knowledge appropriately, it can enhance control and self-efficacy for patients, as well as decrease anxiety [8]. It has been suggested that pretreatment education could lower patient anxiety and increase the patient's self-efficacy [9]. If adequate and timely teaching is provided regarding the ABC device, it may improve compliance with

patientes atteinte d'un cancer du sein latéral gauche et qui utilisaient l'appareil ABC, principalement chez les patientes de moins de 50 ans. À mesure que le traitement progresse, les patientes semblent montrer moins d'anxiété et gagner de la confiance face à l'utilisation de l'appareil. Ces constats préliminaires appuient la nécessité de recherches plus poussées dans ce domaine, à l'aide d'outils formels validés de mesure de l'anxiété.

the breath hold, as well as help to alleviate the patients' stress and anxiety about using the device. With a dearth of knowledge available on this subject, this study focused on exploring the patient's experience using the ABC device and the challenges faced in its use. It also evaluated the patient views on the quality of the pretreatment education and teaching provided by radiation therapists.

## Methods and Materials

Institutional and Research Ethics Board approval was obtained before study commencement. The eligible population consisted of women with left-sided breast cancer receiving locoregional radiation therapy using the ABC device during simulation and treatment (Elekta Oncology Systems, Sweden). In our center, approximately 650 left-sided breast cancer patients receive radiation therapy annually, and approximately 40% of those patients are treated using the ABC device. This resulted in an estimated eligible population of approximately 30–40 patients within the accrual timeframe. As the questionnaire was written in English only, patients who were unable to respond were excluded from the sample. There were no other exclusions. Every eligible patient receiving treatment during a 6-week study period was approached for participation and, therefore, no sampling strategies were used. Thirty-five patients were approached for consent. If willing to participate, all patients were required to provide written informed consent before data collection.

A questionnaire was developed that gathered demographic information and asked questions related to the use of the ABC device, the pretreatment education, and the patient's anxiety levels using the device (Appendix A). No patient identifiers were collected. Responses were collected using a 10-point Likert scale (eg, one indicating no anxiety, 10 indicating high levels of anxiety), with some open-ended questions to allow for qualitative feedback. Although the questionnaire was not formally validated, it was piloted before distribution to assess face validity. The questionnaire was administered to patients regardless of the stage of their treatment course. This cross-sectional approach was adopted to improve the feasibility of the research based on time and resource constraints of this student project. This may have resulted in recall bias associated with the patients remembering their pretreatment status;

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