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Original Article

The Patient Perspective on Radiogenomics Testing for Breast Radiation Toxicity

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Abstract

Aims: In the field of radiogenomics, several potential predictive genetic markers have been identified that are associated with individual susceptibility to radiation toxicity. Predictive models of radiation toxicity incorporating radiogenomics and other biomarkers are being developed as part of the ongoing multicentre REQUITE trial. The purpose of this study was to explore patient attitudes towards future predictive radiogenomics testing for breast radiation toxicity.
Patients and methods: Twenty-one semi-structured interviews were conducted with breast cancer patients taking part in the REQUITE study at one centre. We used inductive thematic analysis to generate common themes.
Results: We identified three emerging themes describing attitudes and feelings towards a predictive radiogenomics test for breast radiation toxicity: theme 1 – willingness to undergo a test (subthemes – information, trusted expert); theme 2 – implications of a test (subthemes – preparation and planning, anxiety without recourse); theme 3 – impact on treatment decision-making (subthemes – prioritising cancer cure, preserving breast integrity, patient preferences).
Conclusions: Results from the present study indicate that patients support and have confidence in the validity of a radiogenomics test for breast radiation toxicity, but they would prefer the result be provided to healthcare professionals. Except in cases of significant chronic symptoms and pain or significant end-organ damage, participants in this study rarely felt that advance knowledge of their personal risk of breast radiation toxicity would influence their treatment decision-making. These findings provide a number of insights that will allow us to anticipate how patients are likely to engage with predictive radiogenomics testing in the future.

Key words: breast; personalised medicine; qualitative research; radiogenomics; radiotherapy; toxicity

Introduction

Breast cancer survival has improved markedly, with current predicted 10 year survival rates in excess of 80% [1]. Survivorship issues and quality of life (QoL) are an increasingly important research focus in cancer care [2]. Over 70% of breast cancer patients undergo radiotherapy. Radiotherapy reduces the risk of local recurrence and contributes to a reduction in overall mortality [3–5], but can be associated with side-effects (toxicity) in the breast. Acute toxicity occurs within 90 days of treatment and includes erythema (reddening) and fatigue. Late (long-term) toxicity, such as fibrosis, shrinkage and telangiectasia can occur months and years after treatment [6]. Patients are affected by radiation toxicity to varying degrees [7]. Individual sensitivity to radiotherapy depends on various clinical factors, including dosimetry, body habitus and smoking, but genetic variation is also an important contributor [8–10].

The impact of radiation toxicity on QoL is well documented in existing breast radiotherapy trials [11–13]. Most women due to undergo radiotherapy are anxious about side-effects and changes to their breast appearance [14]. To guide the treatment decision-making process, individual risk prediction models for radiation toxicity are currently

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being developed by integrating clinical and patient factors with predictive biomarkers [15]. Several potential predictive genetic markers for radiation toxicity have been identified through genetic association studies [16–19].

However, before predictive genetic (radiogenomics) testing is implemented in the clinic, it is important to gather patients' perspectives to ensure this research is relevant and appropriate, and to explore how such predictive test results should be delivered in the future. The aim of the present study was to explore the views of breast cancer patients enrolled in the ongoing REQUITE cohort study [20] on future predictive radiogenomics testing for breast radiation toxicity, using acute skin toxicity as a prompt. Although late radiotherapy side-effects remain a clinical concern, acute radiation toxicity is increasingly recognised for its impact on breast cosmesis and patient QoL [21,22]. The objectives of the study were to generate a thematic description of patients' feelings and attitudes towards a radiogenomics test and to explore how such a predictive test could impact the patients' breast cancer treatment decision-making.

Patients and Methods

Study Design

This qualitative study was conducted using semi-structured interviews with breast cancer patients enrolled in the REQUITE cohort study. It was approved by major amendment as the REQUITE-AB-QoL sub-study by the NRES Committee North West – Greater Manchester East (14/NW/0035).

Setting

Semi-structured interviews were conducted with breast cancer patients on completion of treatment in the radiotherapy department or at the 6 week follow-up at University of Leicester Hospitals. These time points were chosen in anticipation that most patients had experienced toxicity by this point. One patient was interviewed in her home. Interviews were preferred over focus groups, as the issues explored were potentially personally sensitive.

Sampling and Recruitment

Eligibility criteria for the REQUITE breast cohort study were: being female, over age 18 years with primary cancer of the breast and having received whole-breast radiotherapy after breast-conserving surgery (BCS), including patients who had received neoadjuvant or adjuvant chemotherapy. Mastectomy patients and patients with previous breast irradiation were excluded. For the present qualitative study, patients were required to give additional consent to be interviewed.

The sample size was determined by data generated from participants; patients were recruited by the first author for interviews until thematic saturation was reached and no new topics emerged. Participants were sampled purposively to ensure adequate representation of degree of toxicity, age, cancer stage and history of chemotherapy [23].

Patient Interviews

Interviews were semi-structured and conducted by one researcher (TR) following an interview guide developed specifically for this study (see Supplementary Material). Pilot interviews were conducted with five female postgraduate researchers in psychology and five female non-academic university staff, all of whom had no history of breast cancer or radiotherapy. Two authors (TR and JBS) reviewed the pilot interviews and changes were made to the interview guide, particularly because pilot participants found it difficult to comprehend the concept and purpose of predictive radiogenomics testing. No further changes were made to the guide once interviews with patient participants had begun.

Interviews were audio-recorded and transcribed verbatim using professional transcription services. Anonymity was ensured by using only first names, initials or the option of using a fictional name during the interview. At the start of the interview, the concept of radiogenomics testing for radiation toxicity was explained, using the example of a test for acute skin toxicity, and the participant's understanding was confirmed. Participants were invited to express their perceived pros and cons of this proposed test. Participants were verbally presented with three standardised fictional case vignettes: one with test results suggesting a high likelihood of severe skin toxicity; one suggesting mild or no skin toxicity and one inconclusive test result. Based on their own experience of radiotherapy, participants were invited to describe their reaction to the different test results.

Following the initial discussion, the interview guide further inquired about the feasibility and implementation of a predictive test for breast skin toxicity as well as integration of the test result into treatment decision-making [24]. Participants were asked about perceived advantages and disadvantages for themselves and their healthcare professionals (HCPs), and the level of predicted toxicity risk that would influence their treatment decision-making (e.g. BCS + radiotherapy versus mastectomy ± reconstruction without radiotherapy). Attitudes towards testing for long-term toxicity were also explored.

The relationship between researcher and participant was carefully considered [25]. Although the researcher conducting the interviews was surgically trained and worked as a research physician on the main REQUITE study, he was not involved in the participants' usual medical care, nor did he work clinically in the radiotherapy department where participants were recruited. Participants were advised that any medical issues raised during the interview would be referred to their usual medical team.

Data Analysis

Anonymised transcripts were imported into NVivo 10 for Windows software. We used inductive thematic analysis to

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