This research aims to propose methods to identify and monitor the clinical and non-clinical variables that influence the receipt and adherence to radiotherapy in breast cancer patients. Building upon Bayesian network models for mining cancer registry data, two methods with different purposes are developed in this study.

The identification and characterization method presents the characterization of the clinical and non-clinical variables for patients, who received breast-conservation surgery with and without radiotherapy, by means of a Bayesian network and the proposed Zoom-in heuristic that systematically explores the model. Cancer registry data is used for training and testing of this model. The data is obtained from the SEER Program with
11,736 patients from the Detroit area from 2007 to 2012. Using the Zoom-In heuristic, it was established that patients under stage 0, grade undetermined, histology lobular carcinoma in situ, and aged between 26-50, were more likely to receive breast-conservation surgery without radiotherapy. For early invasive breast cancer, patients under stages I, IIA, or IIB, aged between 51-75, and grade II were more likely to receive breast-conservation surgery with radiotherapy.

The monitoring method, presents a quality control framework for the monitoring of patients to predict radiation treatment receipt based on the associations among clinical and non-clinical variables. This framework was developed using information from a regional cancer institution with a sample of 1,922 patients from years 2009-2014. The method is based on a Bayesian network approach and is formally divided into three modules: i) classification, ii) surveillance, and iii) quality control. As result of the implementation, a total of 48 patients were flagged for the year, 2014. The quality control framework flagged patients with a metastatic disease as condition for an aggressive treatment in the cancer center. Physicians from the review panel denoted that radiation treatment is offered as a palliative treatment for patients in a metastatic phase to mitigate side effects and pain. Moreover, this study found that a group of patients declined radiation treatment, and for other cases, radiation was received in other institutions or given in different years to the ones registered.