

## Abstract

**Introduction:** With incidence numbers still rising, breast cancer is the leading cancer diagnosis in women worldwide. Therefore, early detection and precise diagnosis of breast cancer is an important factor contributing to accurate therapy and better survival chances. The goal of this study is to outline the hospital-based diagnostic care pathway of patients with suspected breast cancer in the Netherlands and to identify features which influence the diagnostic pathway.

**Method:** Two different databases have been analysed; one 'benign' database containing approximately 31,000 patients with suspected breast cancer, and one 'malignant' database containing approximately 2,200 diagnosed breast cancer patients. Information in the malignant database originates from the Netherlands Cancer Registry (NCR) and hospital-based financial data, accommodated by Performance. Information in the benign database was based on financial data only. Both databases have been carefully evaluated to reveal variation between and patterns within the diagnostic care pathways. Influencing features on the diagnosis of breast cancer, days until diagnosis and number of diagnostic care activities have been identified in the malignant diagnostic care pathway, using the Lasso method and cross-validation together with Cox and Poisson regression models.

**Results:** In the benign diagnostic care pathway, mammography in combination with ultrasound was the most frequently performed diagnostic care activity on the first diagnostic care day (i.e. first visit to the hospital). Patients mostly received one or two diagnostic care activities on the first diagnostic care day. On average, 66.4% of benign patients was diagnosed on this first care day. In the malignant pathway, triple diagnostics (mammography, ultrasound and pathology diagnosis) was most frequently performed on the first care day. 61.5% of patients was diagnosed on the first care day. In the malignant pathway, approximately 45% of patients receive either four or five diagnostic care activities on the first care day. The average time until diagnosis was 1.6 care days for both benign and malignant patients. Malignant patients were on average diagnosed resulting from 4.7 diagnostic care activities, for benign patients this average number was lower at 2.6. Considering the malignant pathway, patients referred from population-based screening show significant decrease in days until diagnosis. Other influencing features of days until diagnosis were BI-RADS score, hospital of diagnosis, tumour stage, type of first therapy and type of HER2/neu test. Influencing features of number of diagnostic activities for malignant patients were hospital of diagnosis, multidisciplinary consultations, HER2/neu status, gene expression profile, medical history and year of diagnosis.

**Conclusion:** In conclusion, this study provides an accurate and detailed insight into the diagnostic care pathway of patients with suspected breast cancer. Differences between the benign and malignant pathway can be observed in terms of frequently performed care activities and the utilisation of different diagnostic imaging modalities. Several factors which influence either the time until diagnosis or the number of diagnostic care activities have been identified and evaluated.

**Keywords** *PAMMOTH, lasso, diagnostic pathway, breast cancer*