The use of genomic tests for early breast cancer in Finland is likely to be cost-effective at common willingness to pay threshold

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INTRODUCTION

Knowing and being confident in the measurement of recurrence risk is an important consideration for deciding which treatment to recommend in ER+/HER2- breast cancer (1). Prosigna® Breast Cancer Prognostic Gene Signature Assays reports three key pieces of information specific to the patient. 1. Risk Group (Low, Intermediate and High), 2. Risk of Recurrence (ROR) Score, 3. Intrinsic Subtype (Luminal A, Luminal B, HER2-enriched, Basal-like). The Prosigna® Risk of Recurrence Score adds significant prognostic information to conventional risk factors such as pathological analysis of the patient tumour, and protein markers detected using Immunihistochemistry (IHC) (2). The classification into the intrinsic subtypes, enables a more acccurate assessment of tumour gene expression patterns (3). There is considerable discordance between IHC-based subtypes and the Prosigna® molecular subtypes. Patient outcomes based on melocular subtypes has been assessed in a head-to-head comparison with IHC and the Prosigna® assay was shown to be more accurate. Errors in assigning subtypes can significantly affect breast cancer treatment and outcomes (4).

In Finland, breast cancer patients are typically tested for gene expressions for immunohistochemical markers such as Ki67 (5, 6), additionally assigning a risk classification and the intrinsic subtype of the tumour to each patient, to determine the need for chemotherapy. However, recent studies have highlighted the prognostic limitations of Ki67 (7, 8, 9). In contrast, Health Technology Assessments agencies in e.g. England (NICE), France (HAS), Scotland (SHTG) and Sweden (TLV/MTP-Council) have recommended the use of more advanced genomic tests incl. Prosigna® that provide information about the likelihood of distant recurrence. These tests enable physicians to allocate treatment more efficiently, potentially increasing treatment for those who would benefit and reducing unnecessary treatment (10, 11, 12). Multiple real world evidence studies (9, 13) have been conducted to evaluate the real-world impact of the use of Prosigna®. The studies concluded that Prosigna® improved risk stratification, reduced the use of chemotherapy, but also identified high-risk ER positive patients who would not receive treatment based on only routine clinicopathology (9, 13).

OBJECTIVES

This study aims to assess the cost-utility (CU) of using Prosigna®, compared to the current standard of care (SoC) in guiding adjuvant chemotherapy decisions for early BC management in Finland in node negative, Luminal B like pT1c/pT2 pN0 and node positive populations.

METHODS

A CU analysis was conducted to evaluate the cost utility of Prosigna® in comparison to SoC as a diagnostic tool to identify molecular higher risk patients that may need chemotherapy treatment to improve prognosis in Finland. The economic model, described in **Figure 1** and **Figure 2**, was adapted from the model developed by the External assessment group during the evaluation conducted by National Institute for health and care excellence on tumor profiling tests to guide adjuvant chemotherapy decisions in BC patients (12). Finnish unit costs were used, however, in the absence of specific Finnish data, clinical inputs are based on Swedish or UK clinical practice (8, 12) but validated with Finnish oncologists. The percentages of chemotherapy per population and risk group, with and without the use of Prosigna®, are reported in **Figure 3**.

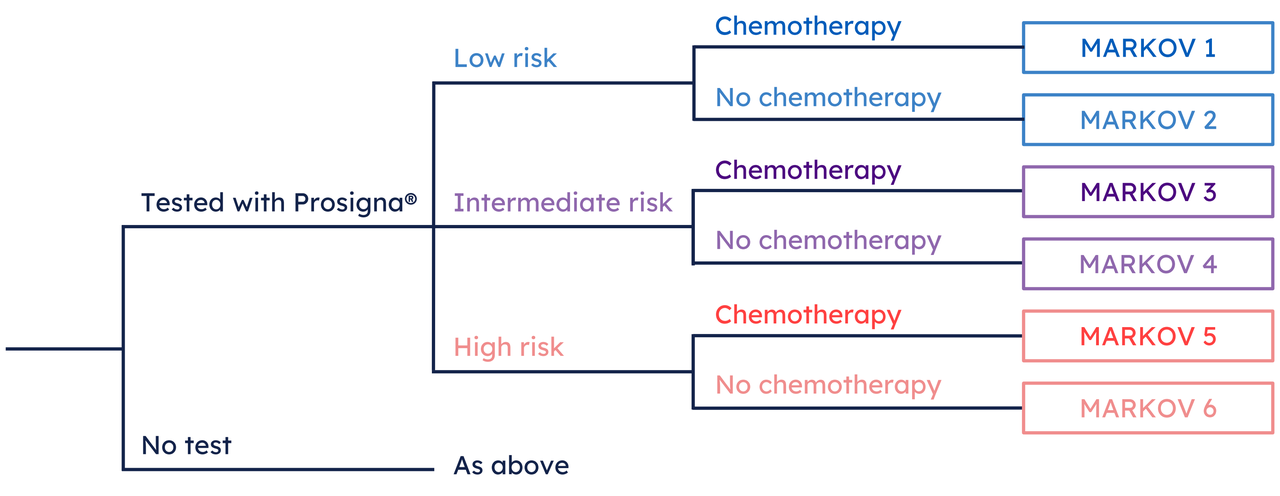


Figure 1: *The patients enter in a decision tree. Within both the test group and the current practice group, the decision tree determines the probability that a patient will be assigned to one of six Markov models depending on test versus no test, risk profile and whether they receive chemotherapy.*

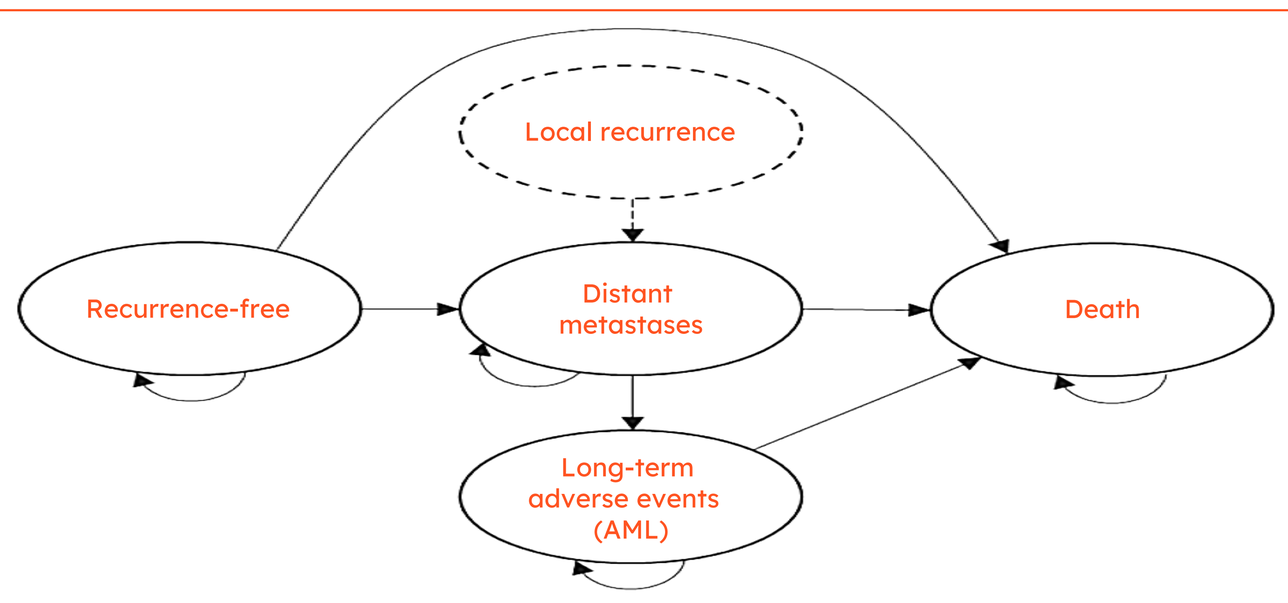


Figure 2: *The Markov nodes of the model. Each Markov node is evaluated over seventy 6-month cycles (35 years): patients are assumed to enter the model aged 62 years and the evaluation is continued until the cohort has reached age 100 years.*

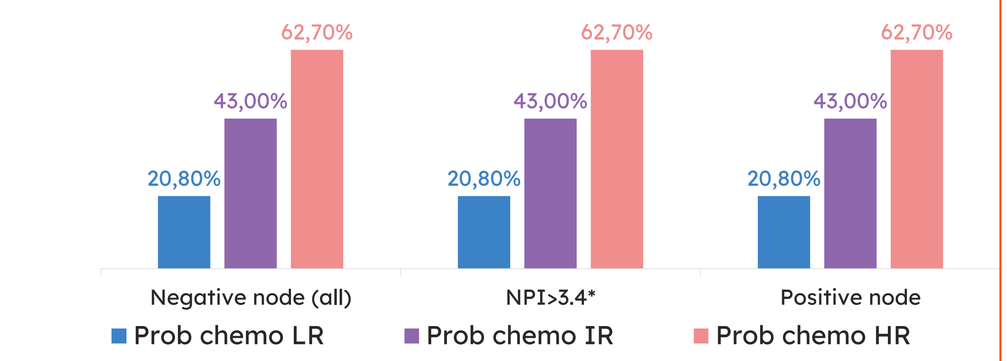
RESULTS

The results of the cost-effectiveness model demonstrate that Prosigna® is likely cost effective in the node negative, node positive and Luminal B like pT1c/pT2 pN0 populations versus SoC. The base case analysis for node negative show an QALY gain of 0,61. The total incremental costs are EUR 1.425,29, resulting in a ICER of EUR/QALY 2.335,74. The base case analysis for node positive show an QALY gain of 0,36. The total incremental costs are EUR 2.473,18 resulting in a ICER of EUR/QALY 6.813,28. The base case analysis for Luminal B like show an QALY gain of 0,59. The total incremental costs are EUR 982,85, resulting in a ICER of EUR/QALY 1653,97.

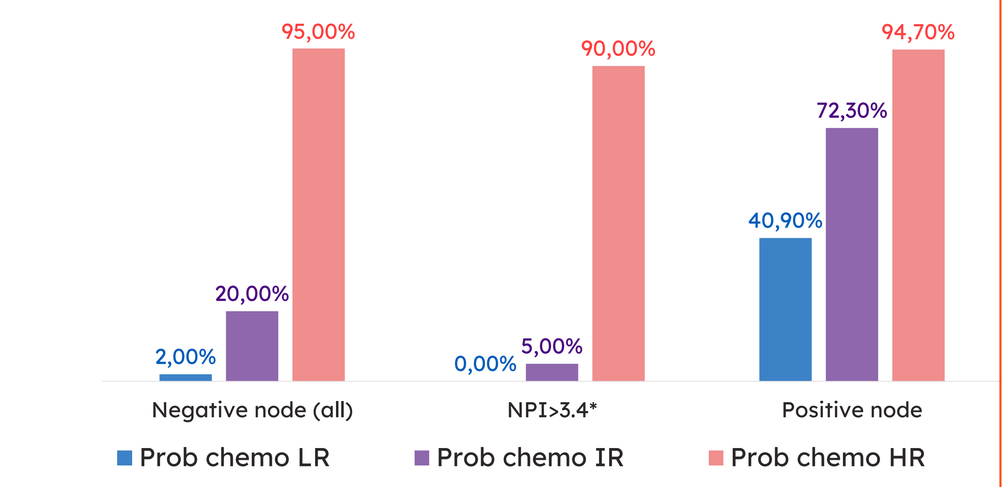
CONCLUSIONS

The CU analysis demonstrated that, in Finland, Prosigna® is likely to be a cost-effective intervention compared to standard of care for the identification of patients who may benefit the most for systemic adjuvant chemotherapy, based on their risk of recurrence, in node positive, Luminal B like pT1c/pT2 pN0 and node negative populations. These results of the CU analysis highlight that Prosigna® should be recommended as a diagnostic tool to improve classification of breast cancer patients into prognostic groups, allowing more precise identification of future recurrence risk and improved basis for adjuvant treatment decisions in Finland.

Current practice (in the absence of Prosigna®)



Following Prosigna test (post-Prosigna® test)



* Luminal B like pT1c-pT2 pN0

Figure 3: *Proportion of patients treated with chemotherapy in current practice and following Prosigna test. The data, which is based on estimates used in* External *assessment group during the evaluation conducted by National Institute for health and care excellence on tumor profiling tests to guide adjuvant chemotherapy decisions in BC patients* (8) *and* on *Swedish clinical opinion, were used as input in the economic model. All data were validated with Finnish Oncologists.*

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