Case Study: Population Health

AI Approach Finds Patients up to 15x More At-Risk for Breast Cancer

The Problem with Predicting Breast Cancer

1 in 8
women in the US will develop breast cancer in her lifetime

276K+
estimated number of new breast cancer cases in 2020

3.1M
women in the United States have a personal history of breast cancer

THE PROBLEM:

You probably know someone who has been impacted by breast cancer. One in eight women in the US will develop breast cancer in her lifetime, and it's estimated that there will be 276,480 new cases in 2020 alone.[1]

This is a key challenge for healthcare organizations responsible for maintaining health in their communities. These organizations receive little help in the identification and treatment of high-risk patients. Popular identification methods such as the Gail Model and Tyrer-Cuzick rely on patients filling out surveys, and recently announced Artificial Intelligence (AI) methods solely use digital imaging data.[2,3]

At-risk patients rely on early intervention which is often delayed with the current identification approaches using imaging data and/or surveys. Organizations often cast a wide net, blanketing everyone in the market, which is not only costly but also decreases a healthcare organization's capacity by flooding it with patients at minimal risk. A northeastern health system wanted to drive a highly targeted outreach to at-risk populations by using SymphonyRM's AI and Next Best Actions on their EMR & information system data.

These healthcare leaders desired to find the best methods to engage the most patients at-risk for breast cancer. Could Next Best Actions outperform leading methods?

SymphonyRM

1 – US Breast Cancer Statistics – BreastCancer.org
2 – ROC Analysis for Tyrer-Cuzick and Gail in Breast Cancer Screening – Medical Science Monitor
3 – AI for Breast Cancer Detection in Digital Mammography - PubMed

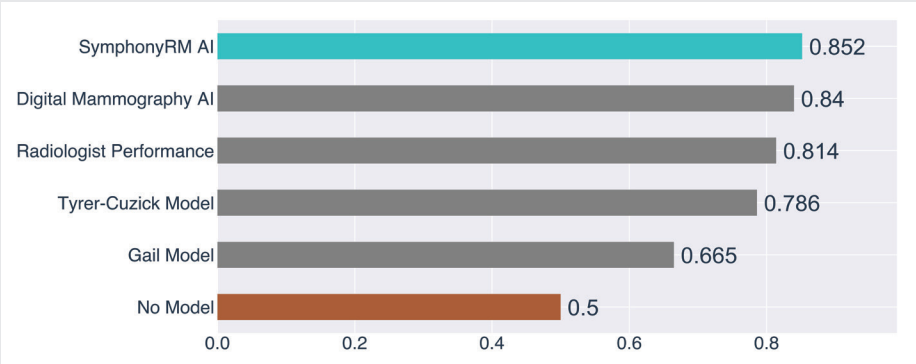
SOLUTION:

The Next Best Action model's goal was to identify at-risk patients before surveys or imaging studies and with a greater degree of accuracy. To develop this machine learning approach, we trained and tested our model on over 2M patients separately.[1]

The model observed traits, behaviors, and patterns derived from the health system's EMR & clinical data to discover which patients were most at-risk for a breast cancer diagnosis. Machine Learning localized the model to the health system. The model picked up on factors such as age, BMI targets, white blood cell count, and many other factors specific to the region.

We evaluated the model using AUC score, which assigns between 0 (low) and 1 (high) based on how well a model identifies patients. The graph below compares Next Best Actions to other approaches.

Breast Cancer Detection Performance Across Models



AUC Score - Measures Overall Classification Performance, Higher is Better

What about OUR data?
We commonly see approx. 10% undiagnosed female patients in the highest breast cancer risk category.

THE RESULTS:

SymphonyRM outperformed all the leading methods in scalability and performance. The wider availability of EMR data makes this approach more feasible than the others, and patients this model identifies as high risk are 5-15x more likely to contract breast cancer.

What this means for the health system:

Better models allow care teams & marketers to focus resources on patients who need them most. Intervening with the right patients early reduces costly procedures and improves outcomes.

5-15x
Patients identified by the model were 5-15x more likely to have breast cancer

675k
Patients scored by the model. This approach is scalable, not limited by surveys & image data

1 – We split 2,027,943 patients into training (n=1,352,396) and test groups (n=675,547). No patient in the test group was used to train the model. Performance reflects how well the model performed on **"out-of-sample"** data & generalizes to new patients.

SymphonyRM

Learn more at
www.symphonyrm.com

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