Access to evidence, based clinical decision making is crucial in maximizing the outcome of women with breast cancer, but it is a scarce resource, especially in developing countries. The Navya Expert System is a patented, software based clinical decision support system that exhaustively searches and assembles relevant medical literature and guidelines to make specific therapeutic recommendations for individual patients based on their clinical data. This study is a retrospective validation of Navya Expert System's output against tumor board decisions of a multidisciplinary group of expert breast cancer clinicians working in a tertiary care oncology center in India.

With structured clinical data as the input, the patented Navya Expert System queries its structured databases of evidence and guidelines indexed per Navya's ontology of decision criteria, and returns output treatment decisions most applicable to a given unique patient. The objective of the study was to test the results of the automated system against tumor board decisions made by expert treating oncologists. The automated system is inherently scalable and aims to eventually enable patients and physicians worldwide to increase their access to evidence based and expert treatment decisions.

Validation of a Software Based Clinical Decision Support System for Breast Cancer Treatment in a Tertiary Care Cancer Center in India

NS Nair1, S Gupta1, N Ramarajan2, G Srivastava2, V Parmar1, A Munshi1, S Vanmali1, V Vanmali1, R Hawaldar1, RA Badwe1
1. Tata Memorial Centre, Mumbai, India, 2. Navya Network, Cambridge, MA

Background

Access to evidence, based clinical decision making is crucial in maximizing the outcome of women with breast cancer, but it is a scarce resource, especially in developing countries. The Navya Expert System is a patented, software based clinical decision support system that exhaustively searches and assembles relevant medical literature and guidelines to make specific therapeutic recommendations for individual patients based on their clinical data. This study is a retrospective validation of Navya Expert System’s output against tumor board decisions of a multidisciplinary group of expert breast cancer clinicians working in a tertiary care oncology center in India.

Objective

With structured clinical data as the input, the patented Navya Expert System queries its structured databases of evidence and guidelines indexed per Navya’s ontology of decision criteria, and returns output treatment decisions most applicable to a given unique patient. The objective of the study was to test the results of the automated system against tumor board decisions made by expert treating oncologists. The automated system is inherently scalable and aims to eventually enable patients and physicians worldwide to increase their access to evidence based and expert treatment decisions.

Methodology

A retrospective trial was conducted to compare the Navya Expert System decisions to tumor board decisions made at a tertiary care cancer centre (Tata Memorial Centre, Mumbai) in India. Cases of women with non-metastatic breast cancer treated at Tata Memorial Centre, for whom treatment decisions involved therapeutic complexities such as two or more treatment options were included in the trial.

Clinical and pathological data were abstracted from the case files as per Navya’s decision criteria, eg. Age, ER/PR, HER2Neu status, Tumor Size, Number of positive lymph nodes, Co-Morbidity, etc.

Patient preferences, and financial and logistic constraints were not factored into the decision criteria.

Data was processed through Navya’s automated, patented Evidence Engine and Guidelines Engine.

Navya treatment decisions were classified as follows:

- MAJOR DECISIONS
  - RT 4+ LN (22)
  - RT N0 (3)
  - Surgery (82)
  - Adjuvant chemotherapy (38)
  - Chemotherapy (10)
  - Radiotherapy (95)
  - NACT/Sx (108)
  - Adjuvant chemotherapy & radiation (3)

- MINOR DECISIONS
  - HER2neu+ (12)
  - Her2neu- (123)
  - tumor status (1)
  - lymph node (41)
  - metastasis (224)

Results

A total of 76 patients involving 224 major and 224 minor therapeutic decisions were included in the study.

Navya Expert System’s output was concordant with the tumor board or expert review in 224/224 major decisions (100%, 95 CI 98%-100%)

- 221/224 minor decisions (98.5%, 95 CI 91.9%-100%)
- Navya Expert System’s output was concordant with the tumor board alone in 210/224 major decisions (93.7%, 95 CI 98.6%-96.9%)
- 160/224 minor decisions (71.4%, 95 CI 68.5%-75.7%)

Most common reasons for discordance were:
- Non-prescription of HER2 targeted therapy by the tumor board due to financial constraints.
- Non-use of adjuvant radiotherapy for 1-3 node positive patients (as tumor board decisions were based on guidelines from 2012).

Of the 64/224 Navya Expert System decisions discordant with the tumor board, only three Navya decisions were finally deemed discordant with expert clinical practice.

Conclusion

- Commonly available clinical data + Navya Expert System
  - Expert Treatment Decisions
  - Navya decisions are concordant with expert clinical practice i.e. concordant with the tumor board and experts at a tertiary care cancer center
  - Navya Expert System can increase global access to evidence based expert treatment decisions

Future Trials

A conjoint analysis based decision aid to assess risk/benefit tradeoffs for patients will be prospectively validated to include as a resource in decision making. This trial will test the hypothesis that factoring in patient’s preferences in evidence based expert results will result in further improved outcomes.