A Stochastic Simulation Model of US Breast Cancer Mortality Trends from 1975 to 2000

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Background: We present a simulation model that predicts U.S. breast cancer mortality trends from 1975 to 2000 and quantifi es the impact of screening mammography and adjuvant therapy on these trends. This model was developed within the Cancer Intervention and Surveillance Network (CISNET) consortium. *Method:* A Monte Carlo simulation is developed to generate the life history of individual breast cancer patients by using CISNET base case inputs that describe the secular trend in breast cancer risk, dissemination patterns for screening mammography and adjuvant treatment, and death from causes other than breast cancer. The model generates the patient's age, tumor size and stage at detection, mode of detection, age at death, and cause of death (breast cancer versus other) based in part on assumptions on the natural history of breast cancer. Outcomes from multiple birth cohorts are summarized in terms of breast cancer mortality rates by calendar year. *Result:* Predicted breast cancer mortality rates follow the general shape of U.S. breast cancer mortality rates from 1975 to 1995 but level off after 1995 as opposed to following an observed decline. Sensitivity analysis revealed that the impact adjuvant treatment may be underestimated given the lack of data on temporal variation in treatment efficacy. *Conclusion:* We developed a simulation model that uses CISNET base case inputs and closely, but not exactly, reproduces U.S. breast cancer mortality rates. Screening mammography and adjuvant therapy are shown to have both contributed to a decline in U.S. breast cancer mortality.