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TITLE: Outcomes of Screening Mammography in Elderly Women

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<b>13. ABSTRACT (Maximum 200 Words)</b> There is uncertainty about whether women older than age 65 should undergo screening mammography. Although screening mammography may benefit some elderly women through the detection of early breast cancers, it may harm other women through the detection of early breast cancers, it may harm other women through false positive diagnoses and the detection of clinically insignificant lesions. This research study involves the design and implementation of a data analysis of HCFA Medicare billing claims linked with national tumor registry data from the Surveillance Epidemiology and End Results (SEER) program. The specific aims of this research will evaluate 1) differences in breast cancer mortality, 2) differences in breast cancer treatment and 3) differences in breast cancer tumor attributes between women who were screened and those who were not. In the second year of this grant the PI focused on validating that the Medicare claims are accurate for determining screening mammography. She obtained data from the three Breast Cancer Surveillance Consortium Registries (New Mexico, Seattle, and San Francisco) that prospectively collect screening information, has linked this with the Medicare/SEER data, and is currently determining whether Medicare claims accurately assess mammography utilization. Following completion of this validation study, the PI will analyze differences in breast cancer treatments, tumor characteristics and mortality based on screening.				
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## INTRODUCTION

There is uncertainty about whether women older than age 65 should undergo screening mammography. Although screening mammography may benefit some elderly women through the detection of early breast cancers, it may potentially harm other women through false positive diagnoses and the detection and surgical treatment of clinically insignificant lesions. This research study involves the design and implementation of a data analysis of HCFA Medicare billing claims linked with National tumor registry data from the Surveillance Epidemiology and End Results (SEER) program. The specific aims of this research validates that Medicare billing claims can be used to assess screening mammography use, evaluates the use of screening mammography in elderly women, and the outcomes associated with the use of screening mammography in elderly women.

The numbering below refers to the Revised Statement of Work.

## STUDIES and RESULTS

### SOW #1: Obtain Health Care Financing Administration/SEER Tumor Registry Data

The linked Medicare HCFA/SEER database describing Medicare claims through 1998 and breast cancer cases through 1996 was obtained, and data cleaning was completed in Years 1 and 2.

### SOW #2: Detailed study Design and project development for Specific Aim #1

**a) Develop Algorithm that will be used for determining the predictor variable of screening mammography utilization (in women with breast cancer)**

Task completed in Year 2.

**b) Develop mammography registry abstraction algorithm.**

Task completed in Year 2.

### SOW #3 Validating Algorithm for Determining Screening History

**a) Analyze HCFA claims**

Task completed in Year 2.

**b) Choose women on whom the algorithm will be validated and obtain mammography registry on these women**

Task completed in Year 2.

**c) Perform Statistical Analysis**

The purpose of this analysis is to determine whether the SEER-Medicare data can be used to determine the use of screening mammography. In summary, Medicare administrative data are reliable for assessment of mammography utilization, and have become more accurate over time. Population trends in the use of mammography can be assessed using these data.

**d) Further refine the criteria for defining a screening mammogram**

Task completed in Year 3-4.

**e) Manuscript preparation describing the method of using Medicare data to determine whether or not a woman underwent screening mammography**

The manuscript "Can Medicare Billing Claims Data Be Used To Assess Mammography Utilization Among Women Age 65 and Older" has been submitted to *Medical Care* (abstract attached). A separate manuscript entitled "How Accurate Are Medicare Data for Determining Whether Women Have Undergone Screening Mammography" is currently being written. This later manuscript focuses on the characterization of women, whereas the first manuscript focuses on the individual mammogram.

**SOW #4: Evaluate breast cancer treatments by mammographic screening**

**a) Perform literature reviews on variables that are associated with breast cancer**

Task completed in Year 3.

**b) Perform statistical analyses to determine differences by screening**

Task completed in Year 4. In summary:

- 1) The utilization of screening mammography is far lower than suggested by other studies
- 2) There are substantial differences by age and race/ethnicity in the use of screening mammography
- 3) There are substantial differences in breast cancer treatments by age and race/ethnicity, particularly the percentage of women who undergo recommended radiation treatments as per professional guidelines.

**c) Manuscript preparation**

"Racial and Ethnic Differences in the Treatment of Early-Stage Breast Cancer" and "Screening Mammography Rates by Race and Ethnicity Using Medicare Data" abstracts have been accepted for presentation at the Bay Area Clinical Symposium (abstract attached) and both manuscripts are nearly complete, and will be submitted for publication shortly.

**SOW #5: Evaluate breast cancer tumor attributes by mammographic screening**

**a) Perform statistical analyses to determine differences in tumor attributes by screening history**

The preliminary analyses have been completed. We have found that cancers detected through screening are small (< 10 mm) and of lower stage than cancers detected clinically, and that the age and race differences in cancer stage at diagnosis is largely, but not entirely, explained by differences in the use of mammography screening. Additional analyses are underway adjusting for co-morbidities in this analysis.

**b) Manuscript preparation, describing tumor attributes by screening history**

Task to be completed in Year 5.

**SOW #6: Evaluate outcomes of screening, adjusted by co-morbidities**

**a) Perform literature review on co-morbidities and breast cancer and total mortality**

Task completed in Year 4.

**b) Development adaptation of Charlson/Deyo Index to use as a means to adjust for co-morbidities using inpatient and outpatient diagnoses**

Task underway and to be completed Year 5. We are approving two methods to account for patient illness, including a modified Charlson Index, and a more specific system that looks at all outputs demographically. Additionally we have developed an algorithm to account for visits to physicians.

**c) Evaluate outcomes of breast cancer adjusting for and stratified by co-morbidities**

Task underway and to be completed Year 5. Some of the methodology for developing the scale to adjust for co-morbidities has taken longer than expected, but we will make up this time in the upcoming year.

**d) Manuscript preparation**

Task underway and to be completed Year 5.

**SOW #7: Evaluate breast cancer and total mortality by screening history**

**a) Obtain National Death Registry Tapes and perform data linkages**

Task to be completed Year 5.

**b) Statistical analysis of breast cancer survival by mammographic screening, adjusting for co-morbidities and breast cancer treatment differences**

Task to be completed Year 5.

**c) Manuscript preparation, mortality differences by mammographic screening**

Task to be completed Year 5.

**Additional Work**

As mentioned in previous progress reports, while based in the U.K. during the first year of funding, Dr. Smith-Bindman began a study entitled "US-UK Comparison of Screening Mammography". The manuscript is In Press with the *Journal of the American Medical Association*, will be published in the October 22 issues, and acknowledges the funding support of the DOD Breast Cancer Research Fund.

## **SIGNIFICANCE**

Medicare physicians claims can be used to determine whether women have undergone screening mammography. The remaining year of research will focus on evaluating outcomes related to screening mammography use in elderly women.

## **KEY RESEARCH ACCOMPLISHMENTS**

- Determined Medicare claims can be used to determine the use of mammography.
- “Can Medicare Billing Claims Data Be Used To Assess Mammography Utilization Among Women Age 65 and Older” submitted to *Medical Care*.
- Found the degree to which older women undergo regular mammography screening is much lower than suggested by self-reported surveys.
- “Screening Mammography Rates by Race and Ethnicity Using Medicare Data” accepted for presentation at the Bay Area Clinical Symposium, October 17, 2003 in San Francisco, CA. Manuscript is in preparation.
- We found age, race/ethnic, and geographic differences in the use of mammography and breast cancer treatments among elderly women.
- "Racial and Ethnic Differences in the Treatment of Early-Stage Breast Cancer" accepted for presentation at the Bay Area Clinical Symposium, October 17, 2003 in San Francisco, CA. Manuscript is in preparation.
- “U.S. – U.K. Comparison of Screening Mammography” In Press, October 22, 2003 issue of *JAMA*.

## **REPORTABLE OUTCOMES**

None

## **CONCLUSIONS**

The fourth year of the project has been successful and we achieved major goals outlined in the Statement of Work. Analyses of the remainder of the aims are expected to proceed as originally planned and will be completed within the last year of funding.

# ABSTRACT FORM

APPENDIX 1

Deadline Aug 15, 2003

E-mail abstract to: [connie@cooper.cpmc.org](mailto:connie@cooper.cpmc.org)

Abstracts should not exceed 500 words, and should be submitted via e-mail to Connie Christensen ([connie@cooper.cpmc.org](mailto:connie@cooper.cpmc.org)) at CPMC Research Institute by August 15, 2003. *The word ABSTRACT should be included in the subject heading of the e-mail.* Investigators may submit more than one abstract.

<b>Title:</b> Racial and Ethnic Differences in the Treatment of Early-Stage Breast Cancer	
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<b>City:</b> San Francisco	<b>Zipcode:</b> 94110
<b>Please check the appropriate box if any of the following apply to you:</b> <input type="checkbox"/> Resident <input checked="" type="checkbox"/> Fellow <input type="checkbox"/> Graduate Student <input type="checkbox"/> Junior Investigator (3 Years or Less Out of Training)	
<b>Consider abstract for:</b> <input type="checkbox"/> Poster Presentation Only <input type="checkbox"/> Oral Presentation Only <input checked="" type="checkbox"/> Either Poster or Oral Presentation	

**Background:** The National Cancer Institute has targeted the reduction of cancer-related health disparities among specific population groups as an important challenge. Previous studies of variation in breast cancer treatment by race and ethnicity have shown mixed results and were based mostly on data prior to 1993, but have shown that African-Americans, Mexicans, and Puerto Ricans were more likely to receive inappropriate primary surgical and radiation treatment for early-stage breast cancer.

**Methods:** Using linked SEER-Medicare data, we identified a population-based sample of 57,094 women age 65 or older who had been diagnosed with Stage I or II breast cancer between 1991-1998 in one of 11 U.S. areas covered by SEER (Surveillance, Epidemiology, and End Results Project). The SEER-Medicare database is a population-based source of information which combines clinical and demographic data from multiple cancer registries with health care claims from Medicare. Our sample includes non-Hispanic white (n = 34,168), black (n = 2116), Hispanic (n = 1368), and Asian/Pacific Islander (n = 1300) women. We evaluated the relationship between patient race/ethnicity and the receipt of breast-conserving surgery or chemotherapy within 4 months of diagnosis, and among women who underwent breast-conserving surgery, the receipt of radiation therapy. Multivariable regression models were constructed adjusting for patient age, year of diagnosis, stage, tumor size, and regional cancer registry.

**Results:** Non-Hispanic white patients were more likely to undergo breast-conserving surgery (47.1%) than Hispanic (44.2%), and Asian/Pacific Islander (39.2%) women, but were no more likely than African-American women (47.3%). Among women who underwent breast-conserving surgery, non-Hispanic white patients were more likely to receive radiation therapy (73.1%) than African-American (64.1%) and Hispanic (70.2%) women, but were less likely than Asian/Pacific Islander (77.4%) women. Rates of chemotherapy utilization were similar among non-Hispanic white (10.0%), African-American (11.8%), Hispanic (11.0%), and Asian/Pacific Islander (11.1%) women. After adjusting for potential confounders, no racial/ethnic group was more or less likely to receive chemotherapy. However, non-Hispanic white patients continued to be more likely to undergo breast-conserving surgery than patients who were Hispanic (odds ratio [OR] = .88; confidence interval [CI] = .78-.99) or Asian/Pacific Islander (OR = .47; CI = .41-.55), and among women who underwent breast-conserving surgery, non-Hispanic white patients were still more likely to undergo radiation therapy than Hispanic (OR = .75, CI = .60-.94) or African-American (OR = .57, CI = .48-.67) women.

**Conclusions:** Treatment for breast cancer varied by race and ethnicity during the 1990s. Racial/ethnic variation in treatment patterns were different across different types of treatment. Patients from minority groups often were less likely to receive appropriate treatments for early-stage breast cancer.

# ABSTRACT FORM

APPENDIX 2

Deadline Aug 15, 2003

E-mail abstract to: [connie@cooper.cpmc.org](mailto:connie@cooper.cpmc.org)

Abstracts should not exceed 500 words, and should be submitted via e-mail to Connie Christensen ([connie@cooper.cpmc.org](mailto:connie@cooper.cpmc.org)) at CPMC Research Institute by August 15, 2003. *The word ABSTRACT should be included in the subject heading of the e-mail.* Investigators may submit more than one abstract.

<b>Title:</b> Screening mammography utilization among elderly women, 1991-2001. Do utilization rates vary by race?	
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<b>City:</b> San Francisco	<b>Zipcode:</b> 94115
<b>Please check the appropriate box if any of the following apply to you:</b> <input type="checkbox"/> Resident <input type="checkbox"/> Fellow <input checked="" type="checkbox"/> Graduate Student <input type="checkbox"/> Junior Investigator (3 Years or Less Out of Training)	
<b>Consider abstract for:</b> <input type="checkbox"/> Poster Presentation Only <input type="checkbox"/> Oral Presentation Only <input checked="" type="checkbox"/> Either Poster or Oral Presentation	

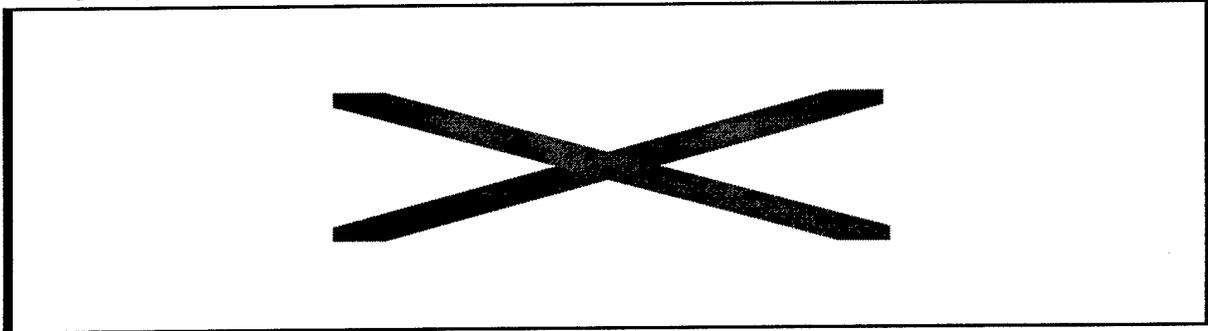
**Background:** Evidence-based screening guidelines recommend annual or biennial mammography screening in women age 40 and above; many medical, governmental and advocacy groups explicitly recommend screening for women even beyond age 70. Published analyses of self-reported data suggest that progress is being made towards achieving recommended screening frequencies and that the historical gap between African-American and white women in mammography screening use has almost been eliminated. However, other analyses have called into question the validity of self-reported data, thus suggesting a need for objective measures of progress in promoting mammography screening, particularly among African-American, Hispanic and Asian women, all of whom tend to present at later stages of disease and suffer disproportionately high mortality rates from breast cancer as compared to white women.

**Methods:** A representative 5% sample of women living in 11 Surveillance, Epidemiology and End Results (SEER) areas for the years 1991-2001 was constructed from the National Cancer Institute's linked Medicare-SEER datasets using claims and denominator files for women with and without cancer diagnoses, including only women eligible for Medicare coverage. The study population size ranged from 79,012 (2000/01) to 89,761 (1991/92). Biennial rates of screening mammography (at least one bilateral mammogram in a 2-year period) were calculated over overlapping two-year periods, controlling for age; year; major medical diagnoses within the year of analysis; SEER site; visits to physicians including primary care providers, Ob/Gyns and E.R. physicians; inpatient hospitalizations; and zip-code-level SES information, including proportion of non-high-school graduates and median income.

**Results:** Between 1991 and 2001 the percentage of women age 65 and above who underwent biennial screening mammography increased from 38.1% to 48.0%. The proportion of women age 65-69 who were screened biennially increased from 49.4% to 61.2%. As shown in Figure 1, the biennial, age-adjusted screening rates in 1991/92 were lower for African-American women (32.2%), Hispanic women (28.1%) and Asian women (26.9%) than for white women (39.8%). Over time, the racial and ethnic discrepancy in screening rates increased; age adjusted rates in 2000/2001 were 42.3% for African-American women, 38.1% for Hispanic women, 36.4% for Asian women and 52.8% for white women. Among women of all races entering Medicare at age 65, 37.6% did not have a mammogram during their first 3 years in the program. After controlling for confounding variables, African-American women had an odds ratio of 0.84 (95% CI 0.81 - 0.86), Hispanic women 0.72 (0.68 - 0.76) and Asian women 0.56 (0.56 - 0.59) for mammogram screening in a given year compared with non-Hispanic white women.

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Conclusions: Elderly women undergo significantly less mammogram screening than suggested by self-reported surveys, and a substantial number are not screened at all. The screening rates are particularly low among African-American, Hispanic and Asian women, even when controlling for other measures of socio-economic and health status, potentially explaining the continuing later stages at presentation and adverse outcomes seen in breast cancer in those populations.

Figure 1: Age-adjusted rates of biennial screening mammography by race, 1991-2001



**ABSTRACT**

**Background:** Medicare data may be a useful source for determining the utilization of mammography among elderly women. The accuracy of these data has not been assessed.

**Objective:** To determine if Medicare physician billing claims are an accurate reflection of mammography utilization among women age 65 and older

**Methods:** Mammography use was assessed by comparing Medicare administrative billing claims with medical reports from mammography registries that participate in Breast Cancer Surveillance Consortium (BCSC), an NCI-funded consortium of mammography registries in the United States. Data were included from three geographic areas where we were able to link information for each patient and each mammogram from Medicare and the BCSC mammography registries. The completeness of the Medicare data were assessed by comparing mammography usage based on Medicare data alone with data from both data sources.

**Subjects:** Women age 65 and older, diagnosed with breast cancer between 1991-1996, who had at least one mammogram between 1993-1998.

**Results:** There were 4664 mammograms obtained by 1258 women between 1993 and 1998 included. Overall 86% of mammograms obtained by women age 65 and older had a corresponding billing claim in the Medicare data. In multivariable analysis, a mammogram was more likely to be associated with a billing claim among women age 75 and older and in the more recent years studied, and less likely to be associated with a billing claim among Hispanic as compared with non-Hispanic white women. Women were accurately classified by the Medicare data as having undergone at least biennial mammography (at least one mammogram in a two year period) in the majority (93%) of two-year time periods studied.

**Conclusion:** Medicare administrative data are reliable for assessment of mammography utilization, and have become more accurate over time. Population trends in the use of mammography can be assessed using these data.