Addressing Potential Health Disparities in the Adoption of Advanced Breast Imaging Technologies

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With the advent of new screening technologies, including digital breast tomosynthesis, screening ultrasound, and breast magnetic resonance imaging, there is growing concern that existing disparities among traditionally underserved populations will worsen. These newer screening modalities purport improved cancer detection over mammography alone but are not offered at all screening facilities and often require a larger co-pay or out-of-pocket expense. Thus, the potential for worsening disparities with regard to access and appropriate utilization of supplemental screening technologies exists. Currently, there is a dearth of literature on the topic of health disparities related to access and the use of supplemental breast cancer screening and their impact on outcomes. Identifying and addressing explanatory factors for persistent and potentially worsening disparities remain a central focus of efforts to improve equity in breast cancer care. Therefore, this paper provides an overview of factors that may contribute to present and future disparities in breast cancer screening and outcomes, and explores specific relevant topics requiring greater research efforts as more personalized, multimodality breast cancer screening approaches are adopted into clinical practice.

Key Words: Breast Cancer; Health Disparities; Advanced Imaging.

INTRODUCTION

Although breast cancer incidence in the United States has steadily increased over the past four decades, breast cancer mortality rates have declined with current 5-year relative survival rates of 99% and 84% in women diagnosed with localized and regional diseases, respectively (1,2). Decreased mortality has largely been attributed to both increased mammography screening resulting in early detection and improved therapies (3). However, not all women have benefitted equally from these advances that have led to improved breast cancer survival. Racial and ethnic minorities, women from low socioeconomic backgrounds, those living in rural areas, and the elderly bear a disproportionate burden of breast cancer morbidity and mortality (4,5). These vulnerable populations often contend with barriers to screening, experience delays in diagnosis, and present with a more advanced stage of disease at the time of diagnosis (6–8).

With the advent of new screening technologies, including digital breast tomosynthesis, screening ultrasound, and breast magnetic resonance imaging (MRI), there is growing concern that existing disparities will worsen (9) because typically, vulnerable populations have been the last to benefit from new health technologies (10,11). These newer screening modalities purport improved cancer detection over mammography alone but are not offered at all screening facilities and often require a larger co-pay or out-of-pocket expense (12). Thus, the potential for worsening disparities with regard to access and appropriate utilization of supplemental screening technologies exists.

Currently, there is a dearth of literature on the topic of health disparities related to access and the use of supplemental breast cancer screening and their impact on outcomes. Identifying and addressing explanatory factors for persistent and potentially worsening disparities remain a central focus of efforts to improve equity in breast cancer care (13). Therefore, this paper provides an overview of factors that may contribute to present and future disparities in breast cancer screening and outcomes, and explores specific relevant topics requiring greater research efforts as more personalized, multimodality breast cancer screening approaches are adopted into clinical practice.

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PERSISTENT DISPARITIES

Between 1973 and 2010, breast cancer incidence in the United States rose from 82.6 to 127.3 per 100,000 women, with white women having a higher incidence rate (127.3 per 100,000) compared to African-American, Hispanic, Asian-Pacific Islander, and American Indian-Alaskan Native women (rates of 118.4, 91.1, 84.7, and 90.3, respectively). Despite having a lower incidence rate, African-American and subgroups of Hispanic women demonstrate higher mortality rates (14,15). Although African-American women have the highest breast cancer-specific mortality of all ethnic groups, breast cancer represents the leading cause of cancer death in Hispanic women (16,17).

Differences in outcomes seen among vulnerable populations are linked to more advanced disease at diagnosis, worse biological features of disease, and more comorbid conditions (18). Patient-level factors, including low income, limited education, lack of health insurance, and rural residence, have all been associated with worse breast cancer outcomes, potentially because of decreased screening and delays in care (19,20). Other patient-level factors, including cultural differences, acculturation, and linguistic barriers, may also play a role (21). Many of these characteristics are disproportionately seen in certain ethnic minority groups, potentially exacerbating mortality disparities observed in these populations.

Community-level factors also likely influence cancer screening outcomes. Rural communities, as well as regions demonstrating low per capita income and high unemployment rates, demonstrate diminished access to overall medical services because of limited resource allocation and proximity to medical services (13,19). Variable geographic access likely contributes to the different screening rates seen among non-Hispanic white women compared to minority groups (3). Differences in screening adherence strongly contribute to advanced stage at diagnosis and increased mortality seen in certain minority populations, including black and subgroups of Hispanic women (22). Native Americans, who have the least geographic access to screening services, demonstrate the lowest screening rates out of all ethnicity groups in the United States, with less than one-third of Native women undergoing screening mammography (23).

ADVANCED IMAGING USE BEYOND MAMMOGRAPHY

Over the last decade, new imaging-based breast cancer screening technologies have emerged, including tomosynthesis, screening (automated) ultrasound, and breast MRI, which are rapidly changing the landscape of breast cancer screening (9,24–26). These modalities show promise in improving sensitivity for detecting additional cancers when added to mammography, are Food and Drug Administration-approved, and are increasingly available in community settings (27–30). New state laws across the United States now require imaging facilities to directly inform patients about increased breast cancer risk because of dense breast tissue, further increasing the demand for supplemental screening (31). Breast density legislation, present in 60% of states as of April 2017, may further facilitate increased use of emerging imaging modalities because of variable state recommendations and modality-specific reimbursement rates for adjunct screening (32).

In contrast to digital mammography, advanced imaging services are inconsistently reimbursed by third-party payers. Nevertheless, from 2013 to 2015, digital breast tomosynthesis availability increased from 0% to 50% among Breast Cancer Surveillance Consortium facilities (33). Market competition and patient demand appear to act as primary drivers of rapid diffusion of this technology throughout U.S. community practices (34). Similar to digital breast tomosynthesis, prior studies supporting improved breast cancer detection in women with dense breast tissue with whole breast ultrasound have led to its increased use (24). Automated breast ultrasound offers similar sensitivity to handheld ultrasound while removing intraoperator variability (35,36). Breast MRI screening is currently recommended by the American Cancer Society for women at high lifetime (>20%) risk (37). Additionally, potential expansion of breast MRI screening to women with dense breast tissue is currently being evaluated through the DENSE trial (38). Widespread use of breast MRI as an efficient breast cancer screening tool may become more prevalent, as abbreviated screening protocols are now being tested (39).

Given the known financial pressures on mammography facilities, these emerging technologies offer the opportunity to increase revenue through either higher reimbursement for MRI or higher out-of-pocket payments for tomosynthesis and screening ultrasound. As a consequence, the adoption of adjunct technologies may inadvertently cause decreased availability and access to imaging services for those unable to afford them. Furthermore, vulnerable women may be displaced from routine screening if there are fixed or decreasing imaging capacity and preference for accommodating more financially sustainable examinations among facilities.

Previous studies corroborate that unequal adoption of new technologies disproportionately affects vulnerable populations and can potentially exacerbate pre-existing health disparities (10,40). This finding is likely to be true with new advanced breast imaging technologies, as they are geographically less accessible than routine mammography and are often associated with high out-of-pocket expenses or higher co-pay requirements. Unlike mammography screening, which has benefited from the Patient Protection and Affordable Care Act (PPACA), expanding mandatory health insurance coverage for routine preventive services and prohibiting cost sharing for screening mammography, there is no requirement for insurance coverage of supplemental screening modalities (41).

PATIENT-LEVEL ENABLING FACTORS

The health belief model takes into account the association between perceived susceptibility to disease and the benefits of breast cancer screening (42). Patient-level factors, including