

Mobile Mammography: Assessment of Self-Referral in Reaching Medically Underserved Women

Monica E. Peek, MD, MPH and Jini Han, MD, MSc

Background: Mobile mammography can be useful in reaching medically underserved women. However, it is not known whether self-referral for mobile mammography is the best approach for reaching the most vulnerable populations.

Objectives: 1) To describe the community outreach patterns of a county-sponsored mobile mammography unit, 2) To characterize the follow-up patterns for women with abnormal screening mammograms, and 3) to identify reasons why women screened on mobile units seek follow-up care outside of the safety-net system.

Methods: We prospectively followed women aged ≥ 40 years who received mobile mammograms using electronic records and medical chart review, and surveyed women who had no evidence of diagnostic follow-up. We also reviewed administrative records to determine outreach patterns of the mobile mammography units.

Results: Seventy-five percent of mobile visits were with community-based organizations or community health centers. At least one quarter of women chose to follow-up outside of the safety-net for evaluation of abnormal screening mammograms. Of these, nearly 40% reported having insurance or a private physician as the primary reason for having diagnostic evaluation outside of the public hospital system.

Conclusions: Despite serving primarily community-based facilities, self-referral for mobile mammography may not optimally target medically underserved women most in need of breast cancer screening.

Key words: breast cancer ■ mammography ■ women's health ■ preventive care

© 2007. From the Division of General Internal Medicine, The University of Chicago (Peek, assistant professor) and Division of General Internal Medicine, Rush University Medical Center (Han, assistant professor), Chicago, IL. Send correspondence and reprint requests for *J Natl Med Assoc.* 2007;99:398-403 to: Dr. Monica E. Peek, Assistant Professor, The University of Chicago, Division of General Internal Medicine, 5841 S. Maryland Ave., MC 2007, Chicago, IL 60637; phone: (773) 702-2083; fax: (773)834-2238; e-mail: mpeek@medicine.bsd.uchicago.edu

INTRODUCTION

Research has shown that medically underserved women have higher breast cancer mortality rates, a fact which has been largely attributed to underscreening and disproportionate rates of late-stage disease at diagnosis.¹⁻³ An excess of late-stage breast cancer has been reported among several groups at risk for poor preventive and diagnostic care, such as low-income women, immigrants, African Americans and some groups of Hispanics, native Americans and Asians.⁴⁻⁷ Mobile mammography can reduce many of the barriers to breast cancer screening faced by medically underserved women, and population studies have found them to be effective at increasing rates of breast cancer screening.^{8,9} For example, mobile mammography can address the transportation and logistical barriers that underserved urban women face and eliminate geographic barriers for rural women, migrant farm workers and native Americans. Mobile units are useful because they provide on-site healthcare services in familiar, non-medical settings such as churches and community centers and are usually free or low cost. Many state programs utilize mobile mammography as part of a comprehensive public health strategy that includes health educators and nursing staff.¹⁰ Mobile mammography programs typically target women who lack access to preventive healthcare due to geographical, financial or insurance constraints, or from lack of a regular source of medical care. However, there are unique challenges facing mobile mammography, including difficulty in communicating results to patients and tracking the follow-up of abnormal screening tests, lack of an adjunct clinical breast examination (CBE), cost and the required maintenance of radiological equipment.¹¹⁻¹³

Despite the general acceptance of mobile screening programs, there is a need for more research into the public health impact of these programs. It is not currently known whether community-initiated self-referral is the optimal strategy to reach the most medically underserved populations. Few data exist about the outreach patterns of mobile programs or the follow-up patterns of care for

women with abnormal screening results from mobile vans. This paper begins to address some of these public health questions. Using a mixed methodology approach, we describe the community outreach locations served by a county-sponsored mobile mammography unit over a three-year period, characterize the follow-up patterns for women with abnormal screening mammograms, and identify reasons why women screened with mobile mammography seek follow-up care outside of the healthcare safety-net system. The “healthcare safety net” is usually defined as a network of institutions that provide healthcare to the uninsured and underinsured, and typically include public hospitals, community and migrant health centers, rural health clinics, school-based health clinics

and hospitals providing a substantial proportion of charity care.¹⁴ For the purposes of this paper, we are defining the healthcare safety net as the Cook County Bureau of Health Services (CCBHS), the largest public safety-net health system in Illinois.

METHODS

The mission of the CCBHS mobile mammography unit is to provide free screening mammography to women in the urban and suburban areas of Cook County. It operates five days per week, granting requests on a first-come, first-served basis to community sites. Patient exclusion criteria include: age <40 years, current breast symptoms (mass, galactorrhea, pain), a history of

Figure 1. Mobile mammography unit site visits

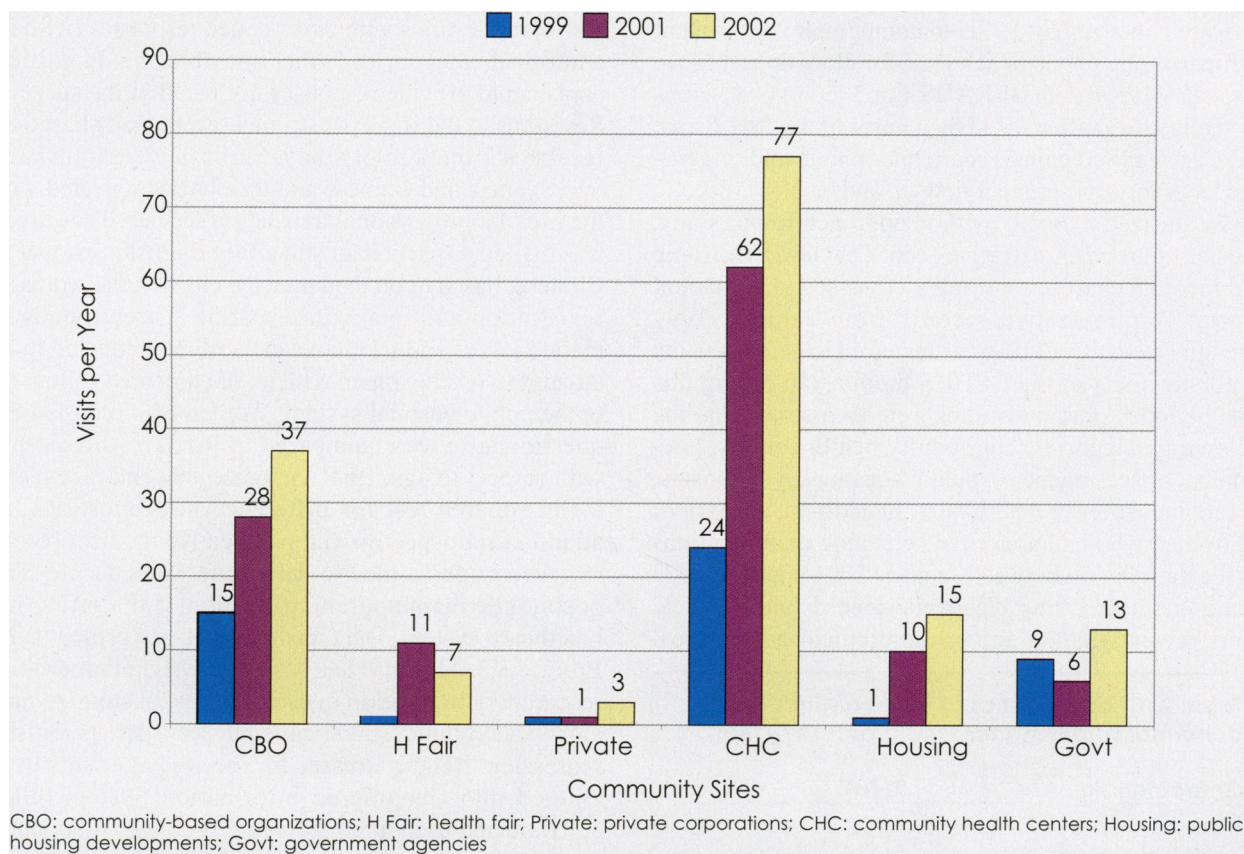


Table 1. BI-RADS™ classification system for mammograms*

Category	Interpretation
BI-RADS 0	Incomplete examination; follow-up images needed
BI-RADS 1	Negative
BI-RADS 2	Benign finding
BI-RADS 3	Probably benign finding; short-term follow-up mammography suggested (4–6 months)
BI-RADS 4	Suspicious abnormality; biopsy should be considered
BI-RADS 5	Highly suggestive of malignancy; biopsy or appropriate action recommended

* Adapted from American College of Radiology. Breast imaging reporting and data system (BI-RADSTM), Third Edition. Reston, VA: American College of Radiology, 1998

breast cancer or breast biopsy, or a mammogram within the past 12 months. Women are not required to have a primary care physician (PCP), but, if they do, they are asked to provide the name and contact information of their regular doctor. Insurance information is not collected, and no payment is requested. The mobile mammography machines are accredited by the American College of Radiology, and all films are interpreted at the John Stroger Hospital (JSH) of Cook County (formerly Cook County Hospital).

All patients and their healthcare providers are mailed reports of their mammogram results within 14 days of the procedure. Women with a BI-RADS 3 report (probably benign) are informed by mail that a possible abnormality was found and advised to follow-up at JSH or with their PCP for further evaluation within 4–6 months (Table 1). Women with a BI-RADS 0 report (incomplete examination) are contacted by a JSH mammography department staff person by phone to schedule a follow-up test at the hospital. Women with BI-RADS 4 or 5 report (suspicious for malignancy) are tracked by a nurse in the JSH Breast and Cervical Screening Program by phone and/or certified letter for appropriate follow-up and biopsy.

We utilized a mixed method approach to our study, consisting of administrative record review, electronic and medical chart review and a cross-sectional patient survey. Administrative records from January 1999 through December 2001 were reviewed to generate a list of all site visits of the CCBHS mobile van during this time period. Community sites were then sorted into the following categories: community health centers, government offices/agencies, public housing developments, private industries or health fairs. In addition, a listing of all women who had abnormal screening mammograms on the mobile unit between January 2001 and July 2002 was generated. Using electronic records and medical chart review, demographic, radiological and clinical

variables were collected. Women were prospectively followed for 12–24 months for evidence of diagnostic imaging within the two public hospitals where diagnostic breast evaluations were performed (JSH and Provident Hospital).

Women with no documented follow-up at the county's public hospitals were mailed surveys to determine whether follow-up had been obtained elsewhere. Women with diagnostic evaluation outside the safety-net system were queried about their final disposition and the reasons for not accessing the public hospitals for follow-up care. Items in this cross-sectional survey were developed based on a systematic review of the literature. Content validity was obtained through consensus of an expert panel, consisting of breast specialists, breast surgeons, community outreach workers and survey research methodologists. The survey consisted of a series of questions with close-coded responses (with an additional category of "other" in which study participants could provide responses not listed in the survey). Revisions to the survey instrument were made based on feedback from a pilot study. Surveys were translated into Spanish and Chinese and then back-translated with the use of a professional translation service. The survey was mailed to participants in either English, Spanish or Chinese, based upon the language cited on the woman's registration and intake information. Three rounds of mailed letters and telephone calls were conducted in an attempt to reach women with no documented follow-up in the public hospital system. Women who returned the questionnaire were compared to women who did not with respect to age, BI-RADS category and race using a Chi-squared test for difference in proportions. In addition, retrospective and prospective medical record review was performed to determine women's pre- and postmobile mammogram utilization of the safety-net healthcare system. Data analysis was performed using EpiInfo 3.3.¹⁵ EpiInfo is a software system that enables researchers to develop questionnaires, customize data entry and conduct statistical analyses, such as logistic regression.¹⁵ The addresses for the study patients were entered into Geographic Information System (GIS) software and used to create maps of patient subpopula-

Table 2. Characteristics of women with abnormal screening mammograms (n=636)

Characteristic	% (n)
Race	
African American	55.0 (350)
Hispanic	19.3 (123)
Asian	10.7 (68)
Caucasian	12.3 (78)
Other	2.7 (17)
Age (Years)	
40–50	38.8 (247)
51–70	52.4 (333)
≥71	8.8 (56)
BI-RADS Category	
0	31.0 (197)
3	64.0 (407)
4	4.7 (30)
5	0.3 (2)

Table 3. Healthcare utilization patterns (n=636)

Diagnostic Follow-Up	% (n)
Safety-net hospital system	20.0 (127)
Nonsafety-net site	23.0 (146)
No diagnostic follow-up obtained	14.5 (92)
Unknown status of follow-up care	42.5 (270)
Safety-Net Utilization Patterns	
Prior healthcare visit	32.7 (208)
Prior mammogram	0.9 (6)
Subsequent healthcare visit	53.9 (343)

tions within Cook County by patient variable (i.e., women compliant with follow-up mammography versus noncompliant).

RESULTS

Sample

Among women utilizing the mobile van between January 2001 and July 2002, 636 were found to have abnormal screening results. Of these, 508 women did not have diagnostic follow-up results documented in the electronic medical record database or medical chart. Of these women without documented follow-up, 420 had accurate mailing addresses and/or working phone numbers; 233 of the 420 women contacted by mail or phone (55.5%) responded to the survey. Responders and nonresponders did not significantly vary with respect to age, BI-RADS category or geographic distribution, but did vary by race/ethnicity. Hispanics and Asians were less likely to complete the questionnaires in comparison to African Americans or whites.

The women in this study were predominantly from racial/ethnic minority groups (Table 2). More than half of the women were over aged >50, and the majority of abnormal mammogram findings consisted of BI-RADS 0 (31.0%) and BI-RADS 3 (64.0%) results.

Mobile Mammography Community Site Visits

Of the 321 site visits made between 1999 and 2002, community health centers constituted 163 visits (50.8%), community-based organizations (CBOs) had 80 visits (24.9%), government agencies had 28 visits (8.7%), public housing developments had 26 visits (8.1%), community health fairs comprised 19 visits (5.9%), and private companies used the mobile van for five visits (1.6%) (Figure 1).

Patterns of Care for Diagnostic Follow-Up

Of the 636 women with abnormal screening mammograms, we documented that 20% obtained follow-up testing through the safety-net healthcare system, and 23% chose to seek diagnostic services at other sites (Table 3). Interestingly, 17% of women with no documented diagnostic evaluation (ultrasound, mammogram or biopsy) reported having had follow-up within the Cook County health system. Additional survey feedback indicated that some women interpreted a routine physician office visit as adequate diagnostic evaluation after an abnormal screening mammogram. Among women who reported having follow-up at noncounty sites, 29.5% consulted with a private physician and 54.1% sought care at another hospital outside of the safety-net health system. Reasons for follow-up at non-safety-net sites included: adequate insurance coverage

and/or concerns about health plan regulations (i.e., out-of-network care) (16.4%), proximity to another facility (20.5%), established provider at a different facility (46.6%), logistical and bureaucratic barriers in obtaining a county hospital appointment (12.3%), and preference for care outside of the safety-net system (19.9%).

Safety-Net Healthcare Utilization Patterns

More than one-third (32.7%) of the women in our study accessed healthcare services within the safety net prior to their mobile mammogram, predominantly for urgent or emergent visits; <1% of women had received a mammogram at a public hospital prior to their mobile mammogram. Among women who had never had a healthcare visit in our public system, 37.9% subsequently accessed services there, either for diagnostic follow-up or unrelated medical care. Ultimately, more than half of the patients (53.9%) in our study with abnormal mobile screening mammograms sought healthcare services within the safety net, including emergent, inpatient and outpatient primary care services.

DISCUSSION

Data about site visits from the mobile mammography unit revealed that the majority of granted requests for service were for community-based organizations and community health centers, institutions that typically serve low-income populations who have low rates of mammography utilization. Very few site visits involved the private sector, where employees may be more likely to have insurance, private physicians and better access to screening mammography. Despite this, however, our study provides evidence that a significant number of women outside of the target population may be electing to have their mammograms on the county-sponsored mobile unit. For example, many women with abnormal screening mammograms had their follow-up care outside of the public safety net, reflecting established healthcare access and resources. Of those who completed our survey, 61% had follow-up testing elsewhere, usually with a visit to a private physician or diagnostic breast imaging at an outside nonsafety-net hospital. When asked why they chose to follow-up outside of the public hospital system, nearly 40% reported having insurance or a regular physician outside of the safety net as their primary reason. Thus, despite serving primarily community-based organizations and health centers, the strategy of community-initiated self-referral for mobile mammography services can result in the screening of women who already have access to preventive healthcare through private insurance and established healthcare providers. Given that limited public health resources are prioritized to the medically underserved, mobile mammography programs should develop strategies to identify communities in highest need of breast cancer screening and implement mechanisms to ensure that the most vulnerable populations are being served. This will

maximize limited healthcare resources intended for the underserved and minimize redundancy of services.

We found that one-third of women screened on the mobile unit had been to the county's main public hospital previously for medical care (including outpatient, emergent and inpatient services), but only 1% had had a prior mammogram at the hospital. This suggests that the mobile unit is indeed reaching a particularly vulnerable population—uninsured women who access JSH for emergent and urgent care but not routine preventive health services such as breast cancer screening. Of the women who had never been to JSH previously, 38% returned to the hospital after their mobile mammogram for some form of healthcare service. This suggests that among medically underserved women, community outreach through mobile mammography may act as an important linkage to future healthcare utilization and ongoing comprehensive healthcare within an integrated health delivery system. Studies have shown that large hospital delivery systems can be overwhelming and difficult to navigate for vulnerable populations, particularly in the presence of language and cultural barriers.¹⁶⁻¹⁸ Providing first contact in a safe, community environment through mobile health outreach may be a way of facilitating the entry of at-risk individuals into ongoing healthcare utilization.

We also found that nearly 20% of women preferred not to follow up at the public hospital because of administrative difficulties (i.e., obtaining appointments, getting their mammogram results), perceived and/or experienced "bad encounters" within the public health system or concerns about neighborhood safety. Some of these women reported not receiving any follow-up care, largely due to barriers to accessing care within the public hospitals. Public health systems are often constrained and overburdened by discordance between available resources and patient needs. Consequently, accessing safety-net systems is often difficult and may serve as an additional barrier to the healthcare utilization of the very populations these health systems seek to serve.

This study has several limitations. First, we do not have data on socioeconomic status. The CCBHS mobile mammography unit does not routinely collect information about income, education level or insurance status. As such, we cannot fully characterize the women who received screening mammograms on the mobile unit. Second, despite multiple attempts to reach women by phone and mail, the survey response rate was 55.5%. It is possible that questionnaire results do not reflect those of the most medically underserved since these women may have been more likely to have not responded to the survey or have missing contact information. There is research, however, documenting that response rates of $\geq 50\%$ can provide an adequate sample of the study population.¹⁹ The inherent difficulty in contacting this population is reflected in similar response rates of other surveys (approx-

mately 60%) of women screened with mobile mammography.¹² A comparison of survey responders and nonresponders found no differences in age and BI-RADS category. Moreover, GIS mapping of these two groups showed no notable differences in geographical location, which can be used as a proxy for socioeconomic status. There was, however, a statistical difference between survey responders and nonresponders based on race. Hispanics and Asians were less likely to complete the questionnaires, which may reflect language and cultural barriers, although surveys were sent in Spanish and Chinese (the predominant Asian language in our population).

CONCLUSION

Mobile mammography can be an important mechanism by which medically underserved women receive breast cancer screening and can serve as a segue into comprehensive medical care within an integrated healthcare delivery system. However, community-initiated self-referral for mobile mammography can result in the suboptimal utilization of scarce public health resources, as women with private insurance and established medical homes will also utilize mobile mammography services. Rather than relying on community-initiated mechanisms, mobile mammography programs should develop strategies to identify communities at highest risk for mammography underutilization and target these neighborhoods for screening mammography.

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