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# Adherence to cervical and breast cancer programs is crucial to improving screening performance

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## ABSTRACT

**Introduction:** Cervical and breast cancer are the most common malignancies among women worldwide. Effective screening can facilitate early detection and dramatically reduce mortality rates. The interface between those screening patients and patients most needing screening is complex, and women in remote areas of rural counties face additional barriers that limit the effectiveness of cancer prevention programs. This study compared various methods to improve compliance with mass screening for breast and cervical cancer among women in a remote, rural region of Brazil.

**Methods:** In 2003, a mobile unit was used to perform 10 156 mammograms and Papanicolaou smear tests for women living in the Barretos County region of São Paulo state, Brazil (consisting of 19 neighbouring cities). To reach the women, the following

community outreach strategies were used: distribution of flyers and pamphlets; media broadcasts (via radio and car loudspeakers); and community healthcare agents (CHCAs) making home visits.

**Results:** The most useful intervention appeared to be the home visits by healthcare agents or CHCAs. These agents of the Family Health Programme of the Brazilian Ministry of Health reached an average of 45.6% of those screened, with radio advertisements reaching a further 11.9%. The great majority of the screened women were illiterate or had elementary level schooling (80.9%) and were of 'poor' or 'very poor' socioeconomic class (67.2%).

**Conclusions:** Use of a mobile screening unit is a useful strategy in developing countries where local health systems have inadequate facilities for cancer screening in underserved populations. A multimodal approach to community outreach strategies, especially using CHCAs and radio advertisements, can improve the uptake of mass screening in low-income, low-educational background female populations.

**Key words:** Brazil, breast cancer, cancer screening, cervical cancer, early detection, early diagnosis, mobile unit.

# Introduction

Cervical and breast cancer are the most common malignancies among women worldwide and their incidence is rising steadily with an annual estimated 468 000 and 999 000 new cases, and 233 000 and 375 000 deaths, respectively[1,2]. Tragically, half of these occur in the women of developing countries where cervical and breast cancers are the leading tumours in incidence and mortality, a mortality rates are usually higher[3-6].

Regular breast and cervical cancer screening interventions facilitate early detection and can dramatically reduce mortality rates from these cancers. However, in developing countries effective screening and treatment programs are unavailable to the majority of the population. Without early detection patients present in an advanced stage, reducing the opportunity for efficient treatment[7,8].

Success in prevention involves effective public health programs and procedures, such as screening. To reduce mortality and morbidity, cancer screening requires persistent professional efforts that are efficient, effective, target the population at risk, and ensure that those identified can receive the necessary care. Data must be interpreted precisely to guide the process[9,10].

The women at highest risk have characteristics that complicate screening. Those at high risk for cervical and breast cancer morbidity and mortality have a low education level, low income, and low health literacy; they also have the sociodemographic characteristics that most complicate screening and care. Women aged 50 years and over are more likely to be out of reach to conventional office-based cancer screening programs[11,12].

The interface between those screening patients and the patients most needing screening is also complex. Cultural beliefs and misunderstandings of health behaviours are just two problem areas. In addition, a great number of women at risk of breast and cervical cancer are uninsured or under-insured.

Breast and cervical cancer are complex diseases involving a variety of genetic and environmental risk factors that can complicate a realistic and specific primary prevention strategy for the general population. Screening procedures vary for the two diseases. Mammography screening is a specific, essential step in identifying and treating of breast cancer. However the effective control of cervical cancer

depends on the early detection of precancerous lesions using the Papanicolaou (Pap) test, an apparently simple test but one that depends on a range of socioeconomic variables (schooling, number of sexual contacts, parity etc) and technical complexities, including adequate preparation and reading of smear slides[13,14].

Successful screening programs depend not only on participants' perceptions of the healthcare community, but also the healthcare resources available. Women from remote, rural areas face barriers that include insufficient medical services. Cancer mortality in rural areas is higher and referral occurs later than in urban areas, indicating different patterns of care for rural populations[15]. It was recently shown that patients travelling more than one hour had lower admission rates to a specialist cancer centre. With travel of more than 3 hours they usually found the cancer hospital facility nearest their home address but were admitted for significantly fewer days than all other groups[15]. This is an obvious concern for population and public health authorities.

In this context, mobile healthcare units can offer a superior screening strategy. Women from remote areas can use them to access medical care and screening tests, and for clinical examinations. Outreach health personnel in mobile units can increase awareness of cancer prevention and early detection, and also offer health education while supporting the local healthcare system[16]. For more than a decade, cervical and breast cancer early detection has significantly benefited from the use of mobile units in remote zones[17]. However, strategies to improve the uptake of both screening tests have had a poor result among lower-income, lower-educational background and older non-compliant women[18,19].

Therefore, the aim of this study was to indentify strategies to improve compliance with mass screening for breast and cervical cancer in a remote, rural female population aged 20 years and over using the Mobile Unit of the Barretos County Cancer Screening Project (BCCSP). This appears to be the first report on the use of mobile units to improve mammogram uptake in South America.

# Methods

The BCCSP was a designed breast and cervical cancer screening project aiming to reach women in the Barretos County region, São Paulo state, Brazil. In this region, which consists of 19 neighbouring cities mainly located in large rural areas controlled by the 9th Regional Health Administration Office (9th RHAO), there were approximately 124 000 women in the target age group. This study reports the results of the project's first year (2003–2004).

## *Ethics approval*

Written informed consent was obtained from all participants and the study was approved by the Committee of Ethics on Research of the Cancer Hospital. Descriptive analyses were used where applicable.

## *Awareness of the prevention cancer strategies*

The chief nurses of local facility units for each district health system had a key role in the program, being responsible for publicising the screening program. The strategies they used throughout the target areas included broadcasts by radio and loudspeaker cars, distributing flyers, pamphlets and advertising posters to local public health facilities, GP notifications and home visits by community healthcare agents (CHCAs; especially trained at a nationwide family health program of the Brazilian Ministry of Health Public Health Service). Members of the organising team met regularly with these nurses to assess screening progress and adapt strategies for use in specific cities prior to the mobile screening visits.

Before individual screening, women were interviewed and filled out a questionnaire to assess their:

- level of knowledge of breast and cervical cancer prevention

- prior experience of screening
- educational and socioeconomic background.

Educational background was classified as: none (illiterate); elementary (basic and middle); high school; or graduate level. Socioeconomic status was classified as: very poor; poor; middle; upper-middle; or upper class, according to the Brazilian Society of Marketing Research classification. This classification uses features such as housing, furniture, appliances, hygienic and sanitary conditions, shopping activities and leisure, which are regarded as easier to evaluate by questionnaire than expenses and income alone[20].

### *The mobile unit*

The mobile unit had two rooms for gynaecological examinations, a room for mammogram fitted with GE Senograph™ 700T equipment, and a darkroom for film development. A satellite wireless information system database updated Cancer Hospital data in real time. This avoided screening duplication in either the mobile unit or the hospital out-patient clinic before a two-year recall interval.

On chief-nurse recommendations the mobile unit spent 2 to 5 days in each city (according to the population to be screened), and returned every 3 months. On detection of a suspicious cervical lesion, palpable breast abnormality, abnormal mammogram or Pap test, the woman was referred to the Cancer Hospital for further investigation.

## Results

A total of 10 156 examinations were performed, comprising 7192 mammograms (71%) and 2964 Pap tests (29%). The age, educational and socioeconomic background of the screened women are provided (Table 1). A total of 3065 (43.7%) and 200 (6.7%) women had never undergone breast and cervical screening, respectively; and 1395 (19%) and 306 (10.3%) women had not been screened for more than 3 years.

Home visits by CHCAs accounted for 45.6% of all attendances, while the remainder were mostly due to radio (11.9%) and neighbourhood notifications (9.3%). Table 2 shows the overall attendance according to information strategy. Few of the cities had established Public Health Service Family Health Programme personnel or CHCA assistance. Some strategies failed to reach participants in some cities. Attendances for BCCSP breast and cervical screening according to the information strategy are detailed (Tables 3 and 4, respectively).

Of all screened women, 6643 (92%) and 2905 (99.8%) had no signs or symptoms of either breast or cervical disease, respectively. Complementary breast examinations were carried out in 431 participants (6%) and 105 (1.4%) underwent biopsy, resulting in 22 diagnosed breast cancer cases. Among the 2964 women who underwent Pap testing, 15 (0.5%) were found to have the following cytological changes: three (0.10%) atypical squamous cells of undetermined significance (ASCUS); four (0.13%) cervical intraepithelial (CIN) 1; three (0.10%) CIN 2; three (0.10%) CIN 3; and two cases of invasive squamous cell carcinoma (0.07%) diagnosed as IA2 and IB1 clinical stages). Both breast and cervical cancers were classified as clinically early-stage tumours in 45% and 100% of cases, respectively. The percentage of women effectively screened for the estimated population was higher for the mammogram group (13%) than the Pap-test group (2.5%) (Table 5).

## Discussion

In this study, 45% and 100% of breast and cervical cancer cases, respectively, were identified at early stages, and this is similar to other screening programs[21] (pers. comm., Incentivo do Programa Agente Comunitário de Saúde da Família, 9 January 2009).

**Table 1: Age, educational and socioeconomic background distribution of screened women in the Barretos County Screening Project**

| Demographic feature | Group *n* (%) | |
|---|---|---|
| | Mammogram (*n* = 7.192) | Pap test (*n* = 5.759) |
| Age range (years) | | |
| 20-29 | – | 654 (22.1) |
| 30-39 | – | 1054 (35.6) |
| 40-49 | 3360 (46.7) | 577 (19.5) |
| 50-59 | 2491 (34.6) | 439 (14.8) |
| 60-69 | 1341 (18.6) | 240 (8) |
| Education background | | |
| Illiterate | 645 (9) | 117 (3.9) |
| Elementary | 6164 (85.7) | 2056 (69.4) |
| High-school | 259 (3.6) | 614 (20.7) |
| Graduate | – | 109 (3.7) |
| Did not answer | 124 (1.7) | 68 (2.3) |
| Socioeconomic classes | | |
| Upper middle | 124 (1.7) | 89 (3) |
| Middle | 1900 (26.4) | 921 (31.1) |
| Poor | 4061 (56.5) | 1634 (55.1) |
| Very poor | 875 (12.2) | 252 (8.5) |
| Did not answer | 232 (3.2) | 68 (2.3) |

**Table 2: Source of acquired information about screening in the Barretos County Screening Project, according to screening test**

| Source of information | Screening test | | | | | | |
|---|---|---|---|---|---|---|---|
| | Mammogram | | | Pap test | | | Average (both tests) |
| | *n* (%) | Range % | | *n* (%) | Range % | | |
| | | Lower | Upper | | Lower | Upper | |
| CHCA | 3410 (47.4) | 2.6 | 98.8 | 1295 (43.7) | 1.5 | 98.6 | 45,6 |
| Radio | 946 (13.2) | 0.0 | 65.9 | 316 (10.7) | 0.0 | 66.8 | 11.9 |
| Neigh | 635 (8.8) | 1.0 | 18.8 | 291 (9.8) | 0.0 | 25.3 | 9.3 |
| SF | 546 (7.6) | 0.4 | 37.1 | 235 (7.9) | 0.0 | 66.7 | 7.8 |
| GP | 501 (7) | 0.0 | 20.7 | 222 (7.5) | 0.0 | 20.1 | 7.2 |
| LSC | 256 (3.6) | 0.0 | 81.6 | 161 (5.4) | 0.0 | 63.4 | 4.5 |
| Others | 898 (12.5) | 0.0 | 31.8 | 444 (15) | 0.0 | 30.9 | 13.7 |

CHCA, community healthcare agent; LSC, loudspeaker car and other informative devices; neigh, neighbour; radio, radio advertisement; SF, scheduled follow up.

**Table 3: Source of acquired information on breast cancer screening (mammogram) by city in the Barretos County Screening Project**

| City | Information strategy for breast cancer screening *n* (%) | | | | | | |
|---|---|---|---|---|---|---|---|
| | CHCA | Radio | Neigh | SF | GP | LSC | Others |
| Altair | 15 (7.5) | 2 (1) | 4 (2.0) | 4 (2) | 3 (1.5) | 164 (81.6) | 9 (4.5) |
| Barretos | 609 (44.6) | 72 (5.3) | 160 (11.7) | 57 (4.2) | 235 (17.2) | 9 (0.7) | 223 (16.3) |
| Bebedouro | 315 (43.3) | 27 (3.7) | 53 (7.3) | 186 (25.5) | 16 (2.2) | 5 (0.7) | 126 (17.3) |
| Cajobi | 148 (51) | 12 (4.1) | 39 (13.4) | 23 (7.9) | 12 (4.1) | 30 (10.3) | 26 (9) |
| Colina | 237 (78.2) | 0 | 19 (6.3) | 15 (5) | 0 | 0 | 32 (10.6) |
| Colombia | 169 (96) | 0 | 4 (2.3) | 0 | 0 | 0 | 3 (1.7) |
| Embauba | 122 (91) | 1 (0.7) | 5 (3.7) | 1 (0.7) | 0 | 4 (3) | 1 (0.7) |
| Guaira | 22 (3) | 487 (65.9) | 75 (10.1) | 34 (4.6) | 11 (1.5) | 2 (0.3) | 108 (14.6) |
| Guaraci | 195 (73.3) | 6 (2.3) | 50 (18.8) | 3 (1.1) | 4 (1.5) | 3 (1.1) | 5 (1.9) |
| Jaborandi | 297 (98.7) | 0 | 0 | 2 (0.7) | 1 (0.3) | 0 | 1 (0.3) |
| Mt. Azul Paulista | 8 (2.6) | 43 (14.2) | 31 (10.3) | 112 (37.1) | 12 (4) | 0 | 96 (31.8) |
| Olimpia | 50 (5.2) | 293 (30.3) | 173 (17.9) | 24 (2.5) | 200 (20.7) | 6 (0.6) | 221 (22.9) |
| Severenia | 193 (78.5) | 0 | 4 (1.6) | 26 (10.6) | 2 (0.8) | 11 (4.5) | 10 (4.1) |
| Taiacu | 237 (98.8) | 0 | 1 (0.4) | 1 (0.4) | 1 (0.4) | 0 | 0 |
| Taiuva | 192 (96) | 2 (1) | 2 (1) | 2 (1) | 0 | 0 | 2 (1) |
| Taquaral | 74 (72.5) | 0 | 2 (2) | 7 (6.9) | 0 | 16 (15.7) | 3 (2.9) |
| Terra Roxa | 168 (88) | 0 | 4 (2.1) | 13 (6.8) | 0 | 2 (1) | 4 (2.1) |
| Viradouro | 194 (82.2) | 1 (0.4) | 2 (0.8) | 20 (8.5) | 1 (0.4) | 0 | 18 (7.6) |
| Vista Alegre do Alto | 165 (80.5) | 0 | 7 (3.4) | 16 (7.8) | 3 (1.5) | 4 (2) | 10 (4.9) |
| Total | 3.41 (47.4) | 946 (13.2) | 635 (8.8) | 546 (7.6) | 501 (7) | 256 (3.6) | 89 (12.5) |

CHCA, community healthcare agent; LSC, loudspeaker car and other informative devices; neigh, neighbour; radio, radio advertisement; SF, scheduled follow up.

**Table 4: Source of acquired information on cervical cancer screening (Pap test) by city in the Barretos County Screening Project**

| City | Information strategy for cervical cancer screening *n* (%) | | | | | | |
|---|---|---|---|---|---|---|---|
| | CHCA | Radio | Neigh | SF | GP | LSC | Others |
| Altair | 17 (11.1) | 4 (2.6) | 6 (3.9) | 4 (2.6) | 0 | 97 (63.4) | 25 (16.3) |
| Barretos | 242 (30.4) | 26 (3.3) | 63 (7.9) | 103 (12.9) | 104 (13.1) | 12 (1.5) | 246 (30.9) |
| Bebedouro | 52 (43) | 3 (2.5) | 5 (4.1) | 28 (23.1) | 1 (0.8) | 1 (0.8) | 31 (25.6) |
| Cajobi | 69 (51.1) | 0 | 20 (14.8) | 14 (10.4) | 4 (3) | 11 (8.1) | 17 (12.6) |
| Colina | 85 (74.6) | 0 | 11 (9.6) | 7 (6.1) | 4 (3.5) | 0 | 7 (6.1) |
| Colombia | 145 (98.6) | 0 | 1 (0.7) | 1 (0.7) | 0 | 0 | 0 |
| Embauba | 30 (90.9) | 2 (6.1) | 0 | 0 | 0 | 1 (3) | 0 |
| Guaira | 3 (1.5) | 131 (66.8) | 30 (15.3) | 10 (5.1) | 1 (0.5) | 1 (0.5) | 20 (10.2) |
| Guaraci | 117 (84.2) | 2 (1.4) | 15 (10.8) | 0 | 0 | 2 (1.4) | 3 (2.2) |
| Jaborandi | 106 (93) | 0 | 1 (0.9) | 2 (1.8) | 1 (0.9) | 0 | 4 (3.5) |
| Mt. Azul Paulista | 1 (8.3) | 2 (16.7) | 0 | 8 (66.7) | 0 | 0 | 1 (8.3) |
| Olimpia | 17 (3.3) | 146 (28.2) | 131 (25.3) | 39 (7.5) | 104 (20.1) | 4 (0.8) | 77 (14.9) |
| Severenia | 84 (89.4) | 0 | 0 | 1 (1.1) | 0 | 5 (5.3) | 4 (4.3) |
| Taiacu | 74 (97.4) | 0 | 0 | 1 (1.3) | 0 | 0 | 1 (1.3) |
| Taiuva | 40 (88.9) | 0 | 4 (8.9) | 1 (2.2) | 0 | 0 | 0 |
| Taquaral | 22 (52.4) | 0 | 0 | 3 (7.1) | 0 | 15 (35.7) | 2 (4.8) |
| Terra Roxa | 89 (90.8) | 0 | 0 | 2 (2) | 0 | 6 (6.1) | 1 (1) |
| Viradouro | 39 (86.7) | 0 | 2 (4.4) | 3 (6.7) | 1 (2.2) | 0 | 0 |
| Vista Alegre do Alto | 63 (73.3) | 0 | 2 (2.3) | 8 (9.3) | 2 (2.3) | 6 (7) | 5 (5.8) |
| Total | 1295 (43.7) | 316 (10.7) | 291 (9.8) | 235 (7.9) | 222 (7.5) | 161 (5.4) | 444 (15.0) |

CHCA, community healthcare agent; LSC, loudspeaker car and other informative devices; neigh, neighbour; radio, radio advertisement; SF, scheduled follow up.

**Table 5: Effectively screened population according to city and screening test**

| City | Mammogram | | Pap smear | |
|---|---|---|---|---|
| | No. Estimated | Screened n (%) | No. Estimated | Screened n (%) |
| Altair | 410 | 201 (49) | 963 | 153 (15.9) |
| Barretos | 15.648 | 1.365 (8.7) | 32.853 | 796 (2.4) |
| Bebedouro | 10.438 | 728 (7) | 22.720 | 121 (0.5) |
| Cajobi | 1.229 | 290 (23.6) | 2.657 | 135 (5.1) |
| Colina | 2.267 | 303 (13.4) | 4.892 | 114 (2.3) |
| Colombia | 697 | 176 (25.3) | 1.655 | 147 (8.9) |
| Embauba | 332 | 134 (40.4) | 723 | 33 (4.6) |
| Guaira | 4.689 | 739 (15.8) | 10.555 | 196 (1.9) |
| Guaraci | 1.132 | 266 (23.5) | 2.513 | 139 (5.5) |
| Jaborandi | 871 | 301 (34.6) | 1.861 | 114 (6.1) |
| Mt. Azul Paulista | 2.542 | 302 (11.9) | 5.712 | 12 (0.2) |
| Olimpia | 6.704 | 967 (14.4) | 14.007 | 518 (3.7) |
| Severenia | 1.515 | 246 (16.2) | 3.795 | 94 (2.5) |
| Taiacu | 755 | 240 (31.8) | 1.630 | 76 (4.7) |
| Taiuva | 811 | 200 (24.7) | 1.620 | 45 (2.8) |
| Taquaral | 362 | 102 (28.2) | 790 | 42 (5.3) |
| Terra Roxa | 1.048 | 191 (18.2) | 2.242 | 98 (4.4) |
| Viradouro | 2.077 | 236 (11.4) | 4.603 | 45 (1) |
| Vista Alegre do Alto | 711 | 205 (28.8) | 1.502 | 86 (5.7) |
| Total | 54.238 | 7.192 (13.3) | 117.293 | 2.964 (2.5) |

The home visits by CHCAs were most effective in improving the number of women screened, and this was most successful when performed by a local agent who was well known in the community. Local agents have the advantages of shared culture, class and language which promotes understanding, even among low educational background women[22]. This result is similar to the findings of other studies[23,24].

The intervention strategy of using popular radio broadcasts was also found useful in our study, reaching a great number of women who encouraged their neighbours to attend. This was the main method for attendance for screening in three of the 19 cities visited. This finding is different from that of a South African study where the use of radio had little impact on screening rates[25].

A combination or modification of successful strategies may be even more beneficial. For instance, the combination of a mobile unit visit that is publicised by community or lay health representatives and radio information may be quite powerful. In small cities or areas with a low population density, motorcycles equipped with a loudspeaker system may be better than radio or car broadcasts.

The coordination of screening with follow-up clinical and surgical activities was a strong point of the intervention strategy. This clustering of services presented fewer barriers to treatment than single modalities would have.

Response to screening can also involve local access issues. Mammograms are more difficult to obtain than Pap tests, and this may explain the greater number of breast rather than cervical screenings in this study[26-28]. Local access can encourage or discourage screening. Those screened in this study did not attribute screening to the efforts of their GPs in basic health units, who may be too busy provide information about screening. In Brazil, GP activities are related to a complex governmental program of family health, which involves prevention, diagnosis and treatment, with a focus on infectious diseases and nutrition. While cervical and breast cancer screening are within the scope of GP activities, one physician (with a nurse and 12 community agents) is

responsible for the care of up to 3550 people, which can impose serious limitations on the medical care available.

The county determines which programs to implement, with many variables impacting on these decisions. The rationale for the existence of a program is to avoid overloading hospitals, but access barriers to programs still exist (eg http://www.saudeprev.com.br/psf/saopaulo/GM-648.htm). For this reason, mobile unit activities are encouraged. However, without a basic health access plan that integrates the various programs and providers, screening efforts may be complex.

Studies of screening effectiveness are important to the policy decision of whether to invest scarce funding in tertiary treatment or prevention and screening. When funding is less available, the decision may be more difficult. According to World Bank figures, health expenditure per capita in the year 2000 was US$262 in Latin America and the Caribbean compared with US$4499 in USA and US$1924 in the European Union[29].

# Conclusion

Ultimately solutions to health access, public health, and health screening issues involve coordination at all levels – patient, community, practitioner, system, and referral hospital. There are many obstacles to overcome and, for women, some of the greatest involve disregarding their own health status and need for care[20,30,31]. To avoid unacceptable health risk, well-conducted programs must bring education, testing, and the best advice possible to those in need of care. This can be accomplished by the use of mobile units coordinated with public health and an oncologic hospital.

In low-income, low-educational background female populations, a multimodal approach to community outreach strategies, especially using CHCAs and radio advertisements, can improve the uptake of mass screening.

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