



# Access to Mammography Among Indigenous Peoples in North America

Scott J. Adams, MD, Paul Babyn, MDCM, Ivar Mendez, MD, PhD

Addressing racial and ethnic disparities in healthcare is recognized as a top priority for healthcare organizations to improve health equity (1). Among underserved populations, Indigenous peoples have lower health outcomes than non-Indigenous peoples in many parts of the world (2). The reasons for health disparities between Indigenous and non-Indigenous peoples are multifactorial, and likely relate to a combination of socioeconomic, cultural, and historical factors specific to Indigenous peoples (3). Within this context, it is critical to investigate how access to healthcare services, such as breast cancer screening, may promote health equity or widen the gap in health outcomes between Indigenous and non-Indigenous peoples. It is well established that breast cancer screening reduces mortality (4). However, providing breast cancer screening to Indigenous populations, who disproportionately live in rural and remote areas, is complicated by limited geographic access to mammography facilities (5,6).

In this issue of *Academic Radiology*, Roubidoux et al. investigate breast cancer screening adherence in an American Indian population served by a mobile mammography unit—a potential solution to bring care closer to an underserved rural population (7). Over the study period, the mobile mammography unit visited approximately 24 Indian Health Service affiliated clinic sites near or in American Indian reservations in North Dakota, South Dakota, Nebraska, and Iowa. The authors assessed two outcome measures: adherence to screening, defined by having a mammogram 9–27 months prior to the current mammogram, and continued adherence to screening, defined as returning for screening mammography at the mobile mammography unit within 9–27 months. They found that the proportion of women who were adherent to screening in the mobile unit program (38.6%) was substantially lower than the proportion of women who were adherent to screening based on general population data from the American College of Radiology's National Mammography Database (59.0%). The rate of continued adherence to screening among

American Indian women served by the mobile mammography unit was similarly low at only 35.9% (7).

Bringing mammography closer to women's home communities would seem to be a logical solution to increase the participation of American Indian women in breast cancer screening, though in Roubidoux et al.'s study, relying on this solution alone resulted in low adherence rates to recommended screening intervals. Low rates of adherence as seen in Roubidoux et al.'s study suggest there is more to access than having a mammography unit intermittently available close to an individual's home community. A multi-dimensional concept of access which includes more than physical distance to mammography screening facilities is important to investigate low rates of participation in breast cancer screening among American Indian women. Levesque et al. conceptualized access as a dynamic relationship between accessibility of healthcare services and an individual's propensity to seek care (8). In his model, five dimensions of accessibility of healthcare services include approachability, acceptability, availability and accommodation, affordability, and appropriateness. Five corresponding abilities of populations, namely, the ability to perceive, ability to seek, ability to reach, ability to pay, and ability to engage, interact with the dimensions of accessibility to realize access (8). Applying this framework, characteristics of both the mammography service and the American Indian population are helpful to consider when working to improve access and adherence to breast cancer screening.

Roubidoux et al. should be applauded for highlighting the low adherence rate to mammography screening programs among American Indians served by a mobile mammography unit. The low adherence rate is significant, as intermittent participation in breast cancer screening programs has been shown to be associated with a higher risk of breast cancer mortality (9). However, some limitations of the study should be noted. While Roubidoux et al.'s study provides valuable insights regarding women who had at least one mammogram through the mobile mammography unit, the study does not capture women who never engaged with the program and may have never have had a mammogram. As a result, the proportion of patients who were non-adherent to screening may significantly underestimate the proportion of patients who are not receiving benefits provided by screening mammography. Population-based studies are required to truly understand rates of non-adherence to breast cancer screening among American Indians in rural areas in comparison to the

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From the Department of Medical Imaging, University of Saskatchewan, 103 Hospital Drive, Saskatoon, SK S7N 0W8 Canada (S.J.A., P.B.); Department of Surgery, University of Saskatchewan, 107 Wiggins Road, Saskatoon, SK S7N 5E5 Canada (I.M.). Received April 2, 2021. accepted April 5, 2021. **Address correspondence to:** S. J. A. e-mail: [scott.adams@usask.ca](mailto:scott.adams@usask.ca)

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population as a whole. Additionally, the accuracy of the rate of continued adherence to screening is limited as the dataset used by the authors does not capture mammograms which were performed at facilities other than the mobile mammography unit. Therefore, the rate of continued adherence to screening may be underestimated, and caution should be taken when using these estimates of adherence.

Low rates of screening adherence among patients utilizing mobile mammography units need further exploration. Is it the limited time window in which the mobile mammography unit is in each community that limits patients' opportunities to be screened, and/or is it that the mobile mammography unit serves marginalized populations with multiple barriers to screening? Population-based studies comparing screening adherence rates in communities with permanent mammography facilities compared to communities with only mobile mammography will be important to undertake, controlling for important factors such as race, income, education, and other factors associated with decreased mammography screening participation (10).

Many parallels can be made to our experience in Saskatchewan, Canada, a province in which 16% of the population is Indigenous and 87% of the population in the northern part of the province is Indigenous (11). The population in northern Saskatchewan is dispersed over many small communities, with a population density per square kilometre of 0.1, compared to 1.9 for the province as a whole (11). This creates challenges in the provision of and access to medical imaging. In Saskatchewan, a population-based mobile mammography screening program has been in place since the early 1990s (12). When a mobile mammography unit visited the northern, Indigenous community of Pelican Narrows for the first time in 2007, almost 50% of all eligible women were screened, including approximately one-third of women who had never had a prior mammogram (13). Cultural sensitivity was critical to a successful roll-out. During the mobile screening period, a community feast was hosted to celebrate women's health, a snack was provided to screening participants, and a video titled *Nanakatawithimiso* (Cree for "take care of yourself") featuring First Nations women discussing the importance of regular mammograms and Pap tests was developed to support screening participation (13). These activities supported acceptability and approachability of breast cancer screening services and enhanced potential screening participants' ability to perceive the need to participate in screening, important dimensions of access to care based on Levesque et al.'s framework (8).

New creative technologies of providing imaging services to Indigenous, rural, and remote populations are also required. Advances in robotic and telecommunication technologies can provide a pathway to provide healthcare services to underserved communities. At the University of Saskatchewan, we have investigated remote presence technologies to better serve patients in northern, remote regions of the province. These technologies allow patients to access the care they need whenever they need it, minimizing the need to

travel to a larger city or wait for a specialist or other healthcare provider to travel to their home community (14). We have focused on telerobotic sonography, a technology which allows a sonographer or radiologist to manipulate an ultrasound probe via a robotic arm, thereby remotely performing a diagnostic ultrasound exam (15–17). This technology proved to be very useful during the current COVID-19 pandemic, when we launched a telerobotic sonography clinic in the northern Saskatchewan community of La Loche, the epicentre of the first wave of the COVID-19 pandemic in our province (18). This technology allowed patients to stay in their home community for urgent ultrasound exams, minimizing the spread of COVID-19. Patients found telerobotic sonography to be a culturally-safe technology, as it allowed patients to receive care in their home community. Innovative technologies such as telerobotic sonography have the potential to make a significant impact in the provision of diagnostic services to disadvantaged populations across the globe. Our experience in Saskatchewan indicates that such technologies are welcomed and accepted by Indigenous populations as individuals can access timely diagnostic services without leaving their community.

Further research and action in partnership with patients and communities will be important to improve breast cancer screening participation and breast health outcomes. Community-based participatory research and patient-oriented research paradigms will be important to better understand and subsequently improve mammography services in a way that is culturally appropriate and meaningful to Indigenous peoples. In a study in Kansas and Missouri, Daley et al. found that community leaders and healthcare providers identified the need for culturally-appropriate mammography education, Native elders as patient navigators, and prioritization of preventive care (19). These ideas are echoed by a study among Indigenous peoples in Australia, in which breast cancer screening education delivered by respected Indigenous women, culturally appropriate promotion, and the provision of care and support from other women in the community were cited as potential enablers to support increased participation in breast cancer screening (20).

In conclusion, there are a number of key messages and implications which can be drawn from Roubidoux et al.'s important work. Most notably, the article highlights the challenges associated with providing mammography services for a rural population and the significant disparities that exist between Indigenous and non-Indigenous patients. Second, despite the significant potential of solutions such as mobile mammography to improve access to care for underserved populations, it is important to critically examine the impacts of such programs in a process of continuous quality improvement and to understand how well patients are actually served. Third, access to breast cancer screening must be considered as a multi-dimensional construct, considering characteristics of both the mammography service and the population. Increasing geographic proximity through a mobile mammography unit alone may not achieve desired outcomes if other needs

of the population, such as cultural acceptability, are not met. Creative new ways of providing imaging services, such as innovative technologies implemented in close collaboration with patients and leaders of Indigenous communities, will be critical to improve breast cancer screening services to these populations. This combination of respectful collaboration and the use of advanced technologies is fundamental to achieve health equity.

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