Improving Access to Mammography in Rural Areas

Elizabeth A. Krupinski

Department of Radiology University of Arizona Tucson, AZ 85724
Krupinski@radiology.arizona.edu

Abstract. Many rural areas do not have reliable or adequate access to breast cancer evaluation facilities and care. With the advent of digital mammo-graphy it is possible to send high quality mammographic images across teleradiology/-telemedicine networks for interpretation at certified mammo-graphy centers. We have a statewide telemedicine network upon which telemammography is conducted with a number of very rural locations. Strict turn-around times for interpretation are guaranteed in contractual agree-ments. We are also testing the use of ultra-rapid pathology clinics for women with positive mammograms and real-time consultation with oncologists to reduce the time it takes for rural women to receive care.

1 Background

Breast cancer is the most common cancer of women in the United States. It is the second leading cause of cancer deaths. The National Cancer Institute predicted that 213,000 new breast cancer cases would be diagnosed in 2005, with 41,000 estimated deaths. [1] Breast cancer is typically detected during screening that, for the majority of women, relies on mammography and clinical breast exams. It is estimated that over 48 million mammograms are performed every year and the number is increasing. Less than one million (2-5%) require a subsequent biopsy. [2] However, the majority of biopsies (65% to 80%), result in benign diagnoses with malignancy being found in only 1 in 10 women who undergo breast biopsy. [3] In rural, medically underserved areas, mammography rates are lower for a variety of reasons, including lack of dedicated screening facilities and/or personnel, poor compliance and large distances between patients and clinics (making it difficult to return for follow-up care). Telemammography has been found to alleviate significantly this problem in many rural areas.

The entire breast cancer detection process from mammography to clinical consultation with the oncologist is usually about 28 days. Once an abnormal mammogram is diagnosed, a diagnostic biopsy performed at the mammography center or by a surgeon typically follows. The tissue is then processed and read by a pathologist who generates a report and sends it back to the surgeon. If the diagnosis is malignant, the patient schedules a meeting with the medical oncologist for consultation and a treatment plan. The timeframe is even longer for women in rural areas who typically need to travel to an urban hospital for many of these procedures. Whether urban or rural, however, the long wait time between initial diagnosis, pathology results and

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possibly oncology consultation can be extremely stressful for the patient. Telemedicine and digital radiology and pathology are ways to reduce those waiting times and the time it takes for a woman with breast cancer to receive definitive care. We describe here some of the ways that we have developed to help improve breast care for women in both rural and urban areas by reducing the waiting times for various steps in the breast care timeline.

2 Methods

Our telemedicine program (Arizona Telemedicine Program, ATP) has a scalable T-1/ATM (asynchronous transfer mode) broadband telecommunications system that connects over 150 sites using real-time and store-and-forward applications. The network is used for a variety of telemedicine related activities including clinical, educational and administrative. We began providing teleconsultations in May of 1997. Teleradiology represents the most common use of the network, with over 100,000 cases transmitted and interpreted in 2005. In 2005 seven rural sites used the telemammography service, sending over 3,500 cases to the hub for interpretation. Contracts with the sites for telemammography specify a turn-around time (from receipt to generation and transmission of a report back to the site) of no more than 30 minutes. We have tracked turnaround times to verify compliance with the agreements.

Pilot studies were carried out to study the feasibility of establishing ultra-rapid breast clinics. The first study surveyed patients at the university breast clinic to determine if and how much women would be willing to pay for faster pathology results if the needed a biopsy. A 13-question survey (available in both English and Spanish) was distributed to all patients signing in for an exam who agreed to participate (and signed a consent form) over a 2-month period. All questions were Likert-scale responses and non-parametric tests were used to statistically analyze the results.

In a separate investigation we studied digital scanning of pathology specimen slides to insure rapid processing and transmission for interpretation could accomplished. Sixteen benign and 14 malignant surgical breast biopsy cases from an existing database were selected by a referee pathologist and scanned digitally. We used the DMetrix virtual slide processor that samples images at 0.47 microns/pixel to scan a series of breast specimen images for interpretation on a color computer display monitor compared to the original slide images (traditional light microscopy). Diagnostic accuracy and reading times were recorded. Readers (4 board certified pathologists) classified each image as benign, equivocal or malignant and rated image quality as excellent, good, fair or poor.

The final pilot study tested the teleoncology component. Patients requiring a core biopsy were approached sequentially for participation at the breast center. The study was explained to them and if they agreed to participate they entered the Ultra-Clinic arm of the study. To date, eight patients have participated. Following biopsy, tissue was processed by Vacuum Histoprocess and ultra-rapid fixation, converted to a digital image by the DMetrix scanner, and sent via the telemedicine network to be read via