Breast Imaging Basics

Module 7 Transcript
Breast Imaging Basics: Module 7 – Patient Care

1. **Breast Imaging Basics – Patient Care**
   Welcome to Module 7 of Breast Imaging Basics – Patient Care. This module was written by Erin C. Zubia, R.T.(R)(M)(QM) and Maria C. Ramirez-Arambula, R.T.(R)(M).

2. **License Agreement and Disclaimer**

3. **Module Objectives**
   After completing this module, you will be able to:
   - Know the incidence of breast cancer.
   - List controllable and uncontrollable risk factors for breast cancer.
   - Describe how to perform breast self-examination.
   - Differentiate between screening and diagnostic mammography.
   - Explain the process and importance of obtaining a patient’s thorough medical history.
   - Discuss common signs and symptoms reported from breast self-examination (BSE) and clinical breast examination (CBE).
   - Describe how to address special needs patients who are receiving mammograms.

4. **Introduction**
   Patient care is a critical component of breast imaging. As the health care providers who have the closest contact with patients, mammographers play a central role in that care. Mammographers not only must have good communication and interviewing skills, but they also must be able to assess a variety of patient conditions and make appropriate adjustments to the mammographic examination. Mammographers are responsible for producing the highest quality mammographic images, and they also can be the difference between patients experiencing a pleasant or unpleasant examination.

5. **Epidemiology of Breast Cancer**
   The goal of mammography is to detect breast cancer during its early stages when the disease can be treated most effectively. According to the National Cancer Institute, about 226,870 cases of breast cancer are diagnosed in women each year, and more than 39,000 women die annually from the disease. Over the past 20 years, advances in diagnosis and treatment have led to improved outcomes. As of 2009 more than 2.5 million women were alive who had a history of breast cancer. Overall, survival rates for women with breast cancer are higher than they are for women with other cancers.

   Men have a much lower risk of the disease. Approximately 2,100 breast cancer cases are diagnosed in men each year and about 450 of those men die from the disease.

   Most breast cancers are invasive, or infiltrating, carcinomas that originate in the ducts or lobules of the breast. According to the American Cancer Society (ACS), 90% of breast cancers start in the breast ducts, whereas 10% occur in the lobes of the breast. To confirm a breast cancer diagnosis, microscopic analysis of the breast tissue determines whether a cancer is in situ or invasive and where the cancer originates.
6. **Breast Cancer Incidence**

Breast cancer incidence increases with age, and a woman's risk of cancer in her lifetime is higher by age 60. The median age at breast cancer diagnosis is about 61 years, and the median age at death from breast cancer is about 68 years. Detection of breast cancer in the U.S. rose about 20% from 1973 through 1990, largely because of the increased use of mammography screening. Findings of breast cancer began to level off after 1990 and decreased slightly through 2005. This decline is believed to correspond to a decrease in the use of hormone replacement therapy (HRT) by many postmenopausal women.

Breast cancer incidence varies by geographic region and race or ethnicity, and some imaging facilities may gather demographic data for research purposes. Black women have the highest incidence of breast cancer, followed by white women. Asian women have the lowest incidence of the races and ethnicities recorded by the National Cancer Institute. Some ethnic groups are more prone to hereditary risk factors. For example, women of Ashkenazi Jewish heritage have a much higher incidence of genetic mutations that predispose them to breast cancer than other U.S. ethnic groups.

Other factors can influence breast cancer detection, stage at diagnosis and risk of death. For example, socioeconomic factors that affect women's ability to have screening mammograms might contribute to higher rates of advanced-stage breast cancers and resulting deaths.

7. **Breast Cancer Risk Factors**

Breast cancer is associated with several risk factors that may or may not be within the patient’s control. Risk factors such as age, personal and family history of breast cancer, some types of hormone exposure and inherited genetic mutations are considered uncontrollable. Other conditions such as alcohol use and lack of exercise are individual lifestyle choices that contribute to increased risk.

One example of a controllable risk factor is obesity, which has been correlated with increased breast cancer risk. In particular, excessive weight gain after menopause has been linked to a higher risk of developing breast cancer. Once a woman reaches menopause, her ovaries no longer produce estrogen, but fat cells likely produce the hormone. However, the exact relationship between obesity and breast cancer risk is not clearly understood.

The mammographer must document in the patient history any risk factor that will help the radiologist accurately interpret the mammographic examination. We’ll discuss risk factor documentation later in the module.

8. **Screening Guidelines**

Screening guidelines have evolved over time. In 1980 ACS recommendations stated all women should have a baseline mammogram between the ages of 35 and 40. The ACS also changed the screening interval for women ages 40 to 49 from every 1 to 2 years to once a year.

The ACS currently recommends that women older than age 40 have annual screening mammograms. Women who are at high risk for breast cancer should have a screening mammogram every year, and those at low or moderate risk should discuss screening options with their physician. Women in their 20s and 30s should have a clinical breast examination (CBE) from a health professional every 3 years, and women 40 years and older, annually. The ACS also
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recommends that women understand the risks and benefits of breast self-examination (BSE), which they can begin in their 20s.

Over the years, differences in screening guidelines from the ACS and other organizations have led to uncertainty. Recent U.S. Preventive Services Task Force recommendations suggested that women younger than age 50 no longer needed to have annual screening mammograms, but should have mammograms every other year. The changes have left women and breast imaging professionals wondering whether annual screening mammograms are still covered by insurance. Some breast imaging practices began receiving calls from women who wanted to cancel their scheduled annual mammogram.

9. **Screening Mammography**
Standard screening mammography consists of 4 projections: 2 craniocaudal (CC) images and 2 mediolateral (MLO) images of the right and left breasts. Supplemental or modified projections occasionally are used for screening examinations to better display all of the breast anatomy (such as for women with implants) or to accommodate a patient’s body habitus or condition. If the radiologist sees an area that is questionable or unclear, he or she may ask for additional projections.

10. **Diagnostic Mammography**
Diagnostic mammography is intended for patients who have signs or symptoms of breast disease. The signs or symptoms may be first identified by the patient during BSE, by a health care provider during CBE or on a screening mammogram or other imaging. Diagnostic mammography requires physician referral and should be performed under the guidance and direct supervision of a radiologist. Patients who are being treated for breast cancer or are having short-term follow-up also might have diagnostic mammography. Regardless of whether the purpose of the examination is screening or diagnostic, the breast imaging process begins with scheduling the exam.

11. **Communication**
Good communication is important during each step of breast imaging. Communication helps to improve patient satisfaction and aids in early detection and effective treatment of breast cancer. Several people are involved with patient communication: scheduler, registration personnel, mammographer and radiologist.

A patient first communicates with breast imaging staff when scheduling an examination. This step is as important as conversations that take place once the patient arrives at the imaging facility. The scheduler needs to identify whether the examination is screening or diagnostic mammography. Registration personnel have the initial face-to-face contact with the patient and verify essential patient information such as insurance coverage.

The mammographer plays a significant role in taking the patient's history for the radiologist. A complete history helps alert the radiologist to any changes the patient might be experiencing or to family history that would be relevant in interpreting the mammogram. Finally, the radiologist is responsible for communicating examination results to the referring physician and patient.

12. **Pre-exam Instructions**
When calling to confirm an appointment, the scheduler should remind the patient to wear a two-piece outfit the day of the examination. The patient should also be instructed not to wear deodorant, powders, lotions or perfume. These items may contain aluminum, which can cause artifacts on the mammogram. The artifacts could mimic calcifications and result in a misdiagnosis. Before the exam, the patient is asked to remove all jewelry and clothing above the waist and is given a gown that opens in the front.

13. Pre-exam Instructions
Once the patient arrives for the mammography examination, the mammographer and other staff must focus on patient rapport. Establishing good rapport makes gathering the information needed for a thorough patient history easier and helps to put the patient at ease.

A calm, clear and gentle voice is reassuring to a patient who may be scared or nervous; however, avoid sounding patronizing. Patients should be asked how they would like to be addressed, such as first name or title and last name. Avoid using endearing terms that can be considered condescending or derogatory and avoid the use of jargon. Maintaining eye contact lets the patient know the mammographer is listening. Special care should be taken with patients who are receiving their first mammogram.

The mammographer should explain the importance of compression to patients having their first mammogram. Many patients are afraid breast compression will be painful. However, adequate compression has many benefits: It reduces radiation exposure including scatter radiation, patient motion, superimposition of breast structures, and helps distribute breast tissue more uniformly. Explaining why compression is used can help ease the patient’s fears, and a patient is more likely to cooperate if she has an understanding of the procedure.

Mammographers should answer all the patient’s questions before the start of the exam. Remember to smile and keep the conversation pleasant during the examination. If a patient is particularly worried, the mammographer can ask the radiologist to speak with her.

14. Psychological and Emotional Support
Mammographers should remain sensitive to the significance of the mammographic examination for the patient. Patients can be nervous about having mammograms, particularly those experiencing their first examination. Diagnostic mammography and follow-up breast imaging can indicate a potential cancer, and patients become understandably anxious about the outcome of the exam. It is very helpful for the radiologist to speak to the patient after diagnostic examinations are completed.

Mammographers should have pamphlets available to hand to patients regarding screening and diagnostic mammograms and brochures that contain information on BSE. When answering questions about mammography, breast imaging professionals should be truthful and empathetic but always remember that diagnosis is beyond their scope of practice.

15. Breast Self-examination (BSE)
Patient education is within the mammographer’s scope of practice. Education includes emphasizing the need for regular breast screening according to established guidelines, including mammography, BSE and clinical breast examination (CBE). Breast self-examination is a physical examination of the breasts. Typically, a gynecologist or other primary care physician teaches BSE
to women and reminds them of BSE schedules. However, the mammographer should be prepared to explain the benefits and limitations of BSE. Let’s talk about BSE in more detail.

16. Importance of BSE
When patients perform monthly BSE, they become more familiar with their normal breasts and can more easily note differences and changes. A woman should examine her breasts about one week after her menstrual cycle. If a woman is postmenopausal, she should try to establish the habit of examining her breasts on the same day of every month. Performing regular BSE helps patients discover lumps or other signs of breast disease, such as dimpling, indentations or nipple inversions and discharge. There are several steps that comprise a thorough BSE and a mammographer should be able to describe each of these steps for her patient.

17. BSE Technique
To begin a breast self-exam a woman stands in front of a mirror. The breasts should be thoroughly examined with the arms in three different positions: arms at her side, hands on the hips, and with her arms above the head while simultaneously contracting the chest muscles. A woman should pay particular attention to any changes in color, skin texture or nipple appearance. It is normal for breasts to be different sizes but drastic changes in size might be cause for concern.

18. BSE Technique
With one arm placed behind the head, a woman will use the pads of her fingers to examine the entire breast and the armpit. The ACS recommends that 3 levels of pressure or touch (light, medium and firm) are used.

19. BSE Technique
In addition to the three levels of pressure, three specific patterns are recommended: the circular, the up-and-down, and the wedge. A woman should use the pattern that feels most comfortable for her but the same pattern should be used for every BSE. After each breast is examined, a woman should gently squeeze each nipple to check for discharge.

20. BSE Technique
The final step in the BSE is to examine both breasts while lying down. The arm should be behind the head and a pillow placed under the shoulder blade. The woman should examine each breast using her preferred pattern and the 3 levels of pressure. Explain to your patient that any changes should be reported to a physician immediately however most changes are not a result of breast cancer.

Mammographers should know the most recent recommendations from the ACS and make sure they are capable of providing current resources and detailed information to any patient that asks about BSE.

21. Knowledge Check
Identify the following risk factors as controllable or uncontrollable.

22. Knowledge Check
Answer the following question.
23. **Knowledge Check**
   Answer the following question.

24. **Clinical Breast Examination (CBE)**
    In general, women should start having clinical breast examinations at the age of 20 and continue throughout their lifetimes. Experienced health care providers should perform the CBE, and ideally, the examination should be performed before a mammogram is ordered to determine whether a diagnostic mammogram is needed. The most recent CBE performed should be documented on the history questionnaire.

25. **Exam Appropriateness**
    The mammographer participates in a triage process that ensures the patient receives the appropriate mammographic examination. Performing the wrong exam wastes time, delays diagnosis, exposes the patient to additional radiation and can create problems with reimbursement from the insurance company. The mammographer uses information provided by the referring health care provider and interviews the patient to determine whether the appointment is for a diagnostic or screening mammogram. When clinical signs indicate the wrong exam has been ordered, the mammographer should consult with the radiologist.

26. **Medical History and Clinical Findings Documentation**
    Documentation must meet the Mammography Quality Standards Act (MQSA) standards and clinical guidelines. Mammographers are responsible for verifying orders from the referring health care provider. In addition, they should communicate and document any concerns regarding new information discovered at the time of the patient's appointment. Mammographers also must ensure that verbal orders and instructions are clearly documented in the patient's health record, including the rationale for additional projections or imaging. A large part of the documentation is the facility's information form and health history questionnaire.

27. **The Health History**
    Every breast imaging facility has a unique health information form and history questionnaire, along with policies and procedures for completing the form. In general, the mammographer must document all findings related to the patient's breast health and mammography visit, including findings the mammographer observes visually, as reported by the patient or through breast palpation.

    Depending on the facility, the patient may complete the form before the appointment begins. Questions on the form may include items such as age, previous surgeries, childbirth and menstrual history, and other information that can indicate risk for or symptoms of breast cancer. With electronic medical records, the mammographer may need only to review and update information since the previous mammogram. Regardless of the format, the mammographer should briefly interview the patient and answer any questions the patient has, along with acquiring patient history information.

28. **Patient History**
    The mammographer plays an important role in gathering and documenting adequate health history information before the examination. The patient history questionnaire provides the radiologist with important facts that can assist in interpreting results. The specific questions and
form – whether paper or electronic – should follow the breast imaging facility's protocols. Most facilities are careful to base their interviews and questionnaires on guidelines established by MQSA, the American College of Radiology (ACR) and the Joint Commission.

29. **History — Age and Sex**
Being a woman is the leading risk factor for breast cancer, followed closely by age. Although younger women can have aggressive forms of breast cancer, the risk of breast disease increases with age. For example, a woman age 20 has a 0.06% chance of receiving a breast cancer diagnosis, compared with a 3.74% risk for women 70 years old.

The mammographer should verify the patient’s age and date of birth. Verifying the patient’s age presents an opportunity to discuss changes in screening recommendations or simply as a reminder to follow guidelines as risk increases. Verifying the patient’s date of birth assures the mammographer is imaging the correct patient.

30. **History — Menses**
Breast cancer risk correlates to a woman's lifetime exposure to estrogen. Estrogen, which can be found in the ovaries, placenta and possibly the adrenal cortex, stimulates cellular proliferation within the breast ducts. As a result, a woman's age at her first menstrual cycle and last menstrual cycle are important indicators of risk. If a woman was younger than age 12 at menarche or who reached menopause after age 55, has an increased breast cancer risk.

The patient history should include detailed information regarding a woman's menstrual history. In particular, the history should include the woman's age when she had her first menstrual period, date of her last cycle, whether she has had a hysterectomy or oophorectomy, or whether the woman has reached menopause.

31. **History — Reproduction**
Childbearing also affects lifetime exposure to estrogen. Studies have shown that nulliparity, which is never giving birth to a child or carrying a pregnancy to full term, contributes to the risk of breast cancer.

A woman’s age when she first gives birth to a child also affects risk. Women who have their first pregnancy after the age of 30 are believed to have higher breast cancer risk than those who have their children at a younger age. The exact relationship between pregnancy, childbirth and breast cancer risk is not clearly understood, but most likely relates to estrogen exposure.

Because of these risk factors, the mammographer should ask the number of live births the woman has had and the age at which she gave birth to her first child. Finally, if the patient is within child-bearing age, the mammographer should verify pregnancy status.

32. **History — Hormone Replacement Therapy**
Studies have demonstrated that hormone replacement therapy using estrogen (and sometimes combined with progesterone) increases the risk of developing breast cancer, even after only 2 years of use. Estrogen-only HRT increases risk the longer the patient has used the hormone. Studies have shown slightly increased breast cancer risk after 10 years of use. A patient with a history of HRT may have increased glandular tissue compared with the normal tissue makeup for her age.
Estrogen is sometimes combined with progesterone in hormone replacement therapy. Progesterone is a natural antiestrogen and is believed to be an active principle of the corpus luteum. Progesterone stimulates cellular proliferation in the breast's lobules. In women, both the adrenal glands and ovaries produce testosterone. Testosterone can change to estrogen during certain times of women's lives.

33. **History — Other Medications**

The medical history should include all medications that can affect the mammographic appearance of the breast or increase breast cancer risk. The use of anabolic steroids may increase the risk of male breast cancer and has been associated with breast tissue changes that can make tissue appear denser on the mammogram. Certain classes of immunosuppression drugs, such as antirejection medication used after a liver or kidney transplant, can alter tissue densities within the breast and affect the mammographic appearance of tissue.

34. **History — Estrogen Inhibitors**

Medications used to help prevent and treat breast cancer can affect breast tissue because the drugs interact with the body's hormones. Tamoxifen, luteinizing hormone-releasing hormone (LH-RH) agonists and aromatase inhibitors are estrogen inhibitors used to prevent or treat hormone receptor-positive cancers.

Tamoxifen has been used for more than 30 years to treat early-stage breast cancer. It also can be used to treat metastatic breast cancer and to prevent recurrence. Women with atypical hyperplasia and a family history of breast cancer are at a higher risk for breast cancer and may be prescribed tamoxifen as a preventive measure.

LH-RH agonists are injectable medications that prevent the ovaries from producing estrogen. Aromatase inhibitors may be given to women who are postmenopausal to prevent the body from producing estradiol.

The mammographer should include any use of estrogen inhibitors in the patient history.

35. **History — Breast and Other Cancers**

Women with a personal history of breast cancer face the risk of their breast cancer recurring, and should be encouraged to follow surveillance mammography recommendations to screen for recurrence or second breast cancers. Women with previously diagnosed breast cancer have a 3-fold to 4-fold higher risk of developing a new cancer in the ipsilateral or contralateral breast. According to the ACR, women who have been diagnosed with breast cancer at an early age also are at increased risk of ovarian and uterine cancer because of similar risk factors.

When a woman has a personal history of ovarian cancer, primary peritoneal or fallopian tube cancer, she likely has a genetic mutation that increases the risk of breast and other cancers, such as colon cancer or pancreatic cancer. The personal health history should document any previously diagnosed breast cancer and any history of ovarian cancer, primary peritoneal or fallopian tube cancer.

36. **History — Family History of Breast Cancer**
Having a first-degree relative (mother, daughter, sister, brother, son or father) diagnosed with breast cancer increases a person’s risk of developing a breast malignancy. Additional family history risk factors also are important to consider, such as:

- How many of the patient’s first-degree relatives have breast cancer.
- The age of the relative at diagnosis; the younger the age, the greater the risk.
- Having one first-degree relative increases the risk by 1.8%.
- Having two first-degree relatives increases the risk by 3%.

Genetic testing is recommended for patients who have 2 first-degree relatives diagnosed with breast cancer or a first-degree male relative with breast cancer. The mammographer should document the relative who has or had breast cancer, whether the relative was on the patient’s maternal or paternal side of the family and the age of the relative at diagnosis.

37. **History — Genetic Predisposition**

Genetic risk factors account for about 5 to 10% of all breast cancers, and of these familial cancers, breast cancer gene 1 and breast cancer gene 2 (BRCA1 and BRCA2) mutations are the most common and likely account for 15 to 20% of inherited breast cancers. Today, researchers believe the BRCA mutation can cause up to a 10 times increase in relative risk of breast cancer.

Other genetic factors can contribute to breast cancer risk:

- The inherited mutation of the p53 gene is a rare cause of breast cancer and has been associated with an increased risk of several other cancers, such as brain tumors, leukemia and sarcomas.
- The PTEN gene is a cell growth regulator that increases risk for benign and malignant breast tumors. This rare mutation also causes tumors in the thyroid, uterus, ovaries and digestive tract.
- ATM is a DNA-repairing gene linked to high breast cancer rates in some families.
- In addition to causing gastric cancer, CDH1 mutations also are associated with an increased risk of invasive lobular breast cancer in women with the mutation.

If the patient has undergone genetic testing, the mammographer should document the results in the patient history.

38. **Knowledge Check**

Answer the following question.

39. **Knowledge Check**

Answer the following question.

40. **History — Other Conditions**

Radiation exposure during childhood or adolescence has been shown to increase the risk of breast cancer because breast tissue is developing until age 20. Women who were treated for childhood malignancies such as Hodgkin lymphoma carry the highest radiation-related risk of breast cancer.

Diethylstilbestrol, or DES, is a synthetic estrogen hormone that was used to prevent miscarriages in women from 1940 through 1971. Exposure to DES in utero is associated with a
slightly increased risk of breast cancer. Experts believe that DES increases breast cancer risk by disrupting the endocrine system during fetal development.

The mammographer should note whether the patient received radiation therapy and for what type of cancer. In addition, patients whose mothers might have taken DES during their pregnancy should be asked about potential exposure to the hormone.

41. **History — Previous Biopsies**

The mammographer should document dates and results of all known previous biopsies as accurately as possible. Biopsies can change breast architecture and leave scars; therefore, knowing the biopsy location helps the radiologist determine whether an observed abnormality results from scarring or pathology. About half of patients have no mammographically detected breast changes following biopsy. The biopsy outcome also should be recorded in the patient’s history. Biopsy methods include excisional, core or cyst aspiration biopsies.

Excisional biopsies can cause skin changes, edema or even hematoma immediately following biopsy. The dates, locations and types of previous biopsies should be noted for the radiologist. Some mild skin thickening can persist for indefinite periods of time. Core biopsies are less invasive than surgical excision, but any percutaneous biopsy can cause edema of the skin at the entrance site immediately after the biopsy.

A scar may not always be visible following a cyst aspiration, so it’s important to document the date, which breast and pathology results on the history form.

42. **History — Previous Biopsies**

A woman who has benign breast disease can have a biopsy free of malignancy but nonetheless reported as abnormal. Abnormal biopsy findings place a woman at higher risk of malignancy.

There are 3 categories of benign breast biopsy results:

1. Nonproliferated lesion. A nonproliferated lesion has no overgrowth of breast tissue and little or no increased risk of breast cancer.
2. Proliferated lesion without atypia. There is an overgrowth of cells in the breast tissue’s lobules or ducts, which represents only a small increased risk for breast cancer.
3. Proliferated lesion with atypia. The greatest risk for developing breast cancer comes from proliferated lesions with atypia. These lesions have excessive growth of abnormal cells in the ducts or lobules.

It is important that the breast imaging facility keep detailed records of any previous benign breast biopsies. The information may help in future biopsy evaluations or imaging interpretations. In addition, atypical lesions need to be monitored closely.

43. **History — Previous Breast Surgeries**

Some breast surgeries, such as breast reconstruction or augmentation and breast reduction, cause changes to the breast. These changes may include skin thickening or retraction, architectural distortion or hematoma. Documenting the location of surgical scars on the history form’s breast diagram assists the radiologist with interpretation and the final report. The mammographer should also mark any scars or changes to the breast with skin markers before beginning the examination.
44. **History — Breast Augmentation**
Breast augmentation involves subpectoral or subglandular implantation of a prosthetic breast filled with saline or silicone. The procedure is used to reconstruct the breasts following a mastectomy or for changing the size, shape and general appearance of a woman’s breast for cosmetic reasons.

45. **History — Breast Augmentation**
There are several surgical methods for breast augmentation:
- An incision made at the level of the inframammary fold produces a thick, large scar that can mimic architectural distortion or skin thickening.
- A periareolar incision is made around the medial or inferior areola region. The scar is mostly hidden by the nipple but can be seen mammographically.
- The implant might be placed with an axillary incision, which leaves no scar on the breast, but implant insertion is difficult. A second incision may be necessary to insert the implant.

46. **History — Breast Augmentation**
Breast implants do not increase breast cancer risk. Women who have breast augmentation can have screening or diagnostic mammography. MR imaging usually is used to assess implant integrity. It’s important to be aware of the breast imaging facility’s policies and procedures regarding imaging an augmented breast. The mammographer should always document the type of implant and its location and the site of any scarring.

47. **History — Breast Reduction Surgery**
Some women opt to have breast reduction surgery to alleviate neck, back and shoulder pain caused by the weight of their breasts. The mammographer should document on the history questionnaire the locations of the reduction scars, including any changes caused by the surgery, such as dimpling or nipple retraction. The mammographer also may need to mark the woman's breast, depending on facility policies and procedures.

48. **History — Other Breast Surgery**
If the patient has had a mastectomy or lumpectomy, the mammographer should include notes on the history form regarding the breast involved, dates procedures were performed and any scarring. Other treatments such as radiation therapy and any information that might affect the appearance of the breast tissue on the mammogram or increase the patient’s risk for breast cancer should also be noted.

49. **History — Other Landmarks or Surgeries**
Evidence of chest surgeries and some types of landmarks can be seen on mammograms and need to be documented on the history questionnaire. Landmarks also should be identified with a skin marker on the breast.

The types of landmarks that should be marked include:
- Any previous chest or open heart surgery that can affect breast tissue shape and size or result in scarring, including pacemaker and portable catheter insertion.
- Moles that can mimic breast lesions on mammograms. Moles should be marked with a special mole marker to avoid having the patient return unnecessarily for additional images.
The mammographer should check the inframammary fold and axillary areas for any moles that may be hidden.

• Scars that can appear as architectural distortion, spiculations or increased density. In addition to increased mammographic density, microcalcifications can appear near or on the scarred area. The mammographer should verify that the patient has not recently received chemotherapy or radiation to treat an area near the breast. The location of the surgical scar should be marked on the patient history diagram and with a scar marker on the patient's breast.

• Accessory or supernumerary nipples. The nipples, which occur in about 1% of male and female patients, appear along the milk duct line and can extend into the axillary region and along the abdominal region following the inguinal line.

• Unusual landmarks, such as marks from an insect bite or caused by a seat belt during a motor vehicle accident. Prior trauma can appear on the mammogram as a lesion or an increase in density. Tattoos located on or near the breast may have ink that contains metallic specks that can appear on a mammogram. A tangential projection may be useful when imaging breasts with tattoos to determine whether the tattoo is creating an artifact.

50. **Knowledge Check**
   Answer the following question.

51. **Knowledge Check**
   Answer the following question.

52. **Diagnostic Mammography**
   Diagnostic mammography is performed when current signs or symptoms indicate possible breast disease, screening results warrant further study or for biopsy-confirmed breast disease. Remember to capture all signs and symptoms for the radiologist on the patient history form. Some of the clinical findings that should be noted include palpable lumps, dimpling, puckering or indentations of the breast. The mammographer also should note skin thickening, edema, skin retraction, changes in the nipple and areola.

53. **Signs and Symptoms — Lumps**
   The presence of a lump, whether detected by the patient or the health care provider, is an important clinical finding that must be documented before the imaging examination. The mammographer should listen carefully to the patient's description of the lump and should note several important factors, including the lump's location, mobility, length of time since its discovery and any pain.

   Information from the CBE regarding a lump or abnormal finding should be recorded in the patient's history in precise language. The mammographer should document physical findings, particularly any discrepancies between the CBE, patient statements and the mammographer's own physical assessment of the breasts. Although the characteristics of a lump cannot be determined through palpation alone, some important characteristics can be noted through palpation, such as its shape, whether the mass feels soft or firm, or whether it is superficial or located deep in the tissue.

   Nomenclature for lumps varies. Generally, a mass is a collection of tissue that has no specific shape, and a nodule is a small, solid amount of tissue, much like a knot. The term lesion usually
refers to an abnormality that is well-defined and circumscribed. After describing the lump and its size and location, the mammographer should mark the palpable lump with a radiopaque marker that will identify the location on the mammogram.

54. **Signs and Symptoms — Lumps**
The mammographer uses a patient history diagram to note as accurately as possible the location of a lump before the imaging examination. This description should be based on clock position, with the breasts divided into quadrants. The abnormality also is categorized into anterior, middle and posterior depths (e.g., A for anterior, B for middle depth and C for close to the chest wall).

55. **Signs and Symptoms — Lumps**
Mobility refers to whether the lump moves when palpated and is seen in the same location on 2 projections. Benign lesions tend to be mobile; malignant lesions are often immobile. The mammographer should pay close attention to a lump's mobility under compression. Often, an ultrasonography examination follows mammography to determine whether the lump is solid, fluid-filled or a mixture of both.

56. **Signs and Symptoms — Lumps**
When performing diagnostic mammography, the mammographer should ask several questions with respect to how long the lump has been present. It’s important to know when the patient or health care provider first detected the lump. If the lump only appears or increases in size during the patient’s menstrual cycle and then disappears or becomes smaller following her cycle, the lump likely is a benign cyst that is associated with hormonal changes.

It also is helpful to ask whether the patient had a recent trauma to the breast that may have caused a hematoma or has noticed a recent bug bite or pimple on her breast. If the breast also is hot to the touch, has redness or swelling, there could be an infection such as an acute abscess or cellulitis.

57. **Signs and Symptoms — Pain**
Breast pain, which may be called mastalgia or mastodynia, rarely is connected with breast cancer. If the pain cannot be explained, however, the patient should see a health care provider as soon as possible. Several factors may contribute to breast pain.

Breast pain is common 1 to 2 weeks before menstruation begins because of fluctuating estrogen and progesterone levels. Certain foods can exacerbate breast pain during menstruation. For example, caffeine contains a chemical called methylxanine that is a vasodilator.

Stress and medications such as birth control pills that contain hormones can contribute to unusual breast pain. Pain also can be caused by a fibroadenoma, mastitis, injury to the breast, an abscess in the breast or a fluid-filled cyst.

58. **Signs and Symptoms — Pain**
Breast pain can be cyclic or noncyclic. Cyclic pain is likely to affect both breasts. It occurs during normal monthly hormonal fluctuation and may be caused by fibrocystic changes in the breast. It can begin with ovulation and increase until a woman begins menstruating. Patients may feel a heaviness and fullness or a dull ache during this time and may describe a radiating pain in both
breasts. This type of pain also affects women who are on HRT. Patients should be concerned if the pain lasts longer than 1 month.

Noncyclic pain doesn’t change with hormonal fluctuations. Patients describe it as sharp, intermittent pain in 1 area of a single breast. The mammographer should clearly document a patient's description of breast pain.

59. **Signs and Symptoms — Pain**
The location of a patient's pain should be documented as specifically as possible on the patient history diagram using clock position. The mammographer should include information regarding how long the patient has experienced the pain. The duration of the pain is correlated with information on the patient's menstrual cycle.

60. **Signs and Symptoms — Edema and Erythema**
Bilateral swelling, or edema, of the breasts is considered a normal part of a woman’s menstrual cycle as the breast responds to fluctuating hormone levels. The soft tissue swells because of excess fluid. Swelling may not be displayed on the mammogram: however, a patient’s description of edema should be noted on the history form, along with recent menstrual cycle information.

Patients should be familiar with the normal shape of their breasts. Most women have 1 breast that is consistently larger than the other, and the mammographer should reassure patients that this is a normal variant, while helping them note any changes in the normal shape and size of a breast.

Erythema, or red inflammation of the skin, combined with edema can indicate inflammatory breast cancer. These findings should be documented and communicated to the interpreting radiologist.

61. **Signs and Symptoms — Thickening**
Skin thickening can be an indicator of breast cancer if the skin is thicker than the surrounding breast tissue upon clinical examination. However, mammographers can reassure women that soft thickening in both breasts is normal during menstrual cycles. Usually, thickening is not a sign of concern unless it is asymmetrical and dominant.

Areas of skin thickening should be noted on the patient history breast map. Skin thickening also should be noted as a mammographic finding; thickened skin appears much denser, just under the surface line of the skin on a mammogram. Skin thickening may be displayed on any projection.

62. **Signs and Symptoms — Skin Changes**
Cosmetic skin changes are common but still need to be documented. Mammographers should observe and record all information related to changes in the breast's skin. The breast skin may have dry patchy areas, pimple-like lesions, dimpling or indentations, discoloration and flaking.

63. **Signs and Symptoms — Skin Irritation**
Skin changes can include redness, rashes or bumps. The changes associated with irritation sometimes can be seen more easily on digital mammograms than on film-screen images. The
mammographer should note any bulging of the skin, protruding areas that change the shape of the breast, or any swelling and dimpling.

64. **Signs and Symptoms — Dimpling**
When a woman lifts her breast, dimpling can appear as skin retraction, which might indicate breast tissue is tethered or pulled inward. Dimpling also refers to the type of edema in which hair follicles look similar to indentations within the swollen skin, a condition known as peau d’orange. The skin takes on the appearance and texture of an orange peel. Mammographers should learn to recognize dimpling from retraction and peau d’orange. Both of these signs are related to inflammatory breast cancer.

65. **Knowledge Check**
Answer the following question.

66. **Knowledge Check**
Answer the following question.

67. **Signs and Symptoms — Nipple and Areola Changes**
Any change in the nipples or areolae can be an indication of breast disease. These signs can include nipple retraction, ulceration, color changes and unexplained irritation such as burning, pain or itching. The skin around the nipple or areola might take on an appearance similar to eczema.

Patients also can have a rare benign tumor called a nipple adenoma. A mammographer should look for indentations, retractions and dimpling in the nipple and areola region. The nipple adenoma should be visible on a mammogram; if the nipple can’t be seen on the CC and MLO projections, obtaining a profile projection might make it more visible.

68. **Signs and Symptoms — Nipple Retraction**
Nipple retraction is an important finding that should be documented, along with how long the retraction has been present. Flattening or retraction of the nipple, along with warm spots on the breast or a peau d’orange appearance, can be signs of inflammatory breast cancer. Nipple retraction is usually visualized on the mammogram.

69. **Signs and Symptoms — Nipple Discharge**
Nipple discharge is fairly common, but rarely is a sign of breast cancer. A woman's nipples can discharge fluid up to 2 years after she breast-feeds if she stimulates the discharge. Normally, if the discharge is elicited and occurs in both nipples and from multiple ducts, it is a benign condition. Unilateral nipple discharge is of more concern than is discharge from both nipples. Often, a bloody nipple discharge can mean a diagnosis of DCIS. Any spontaneous discharge from either breast requires further investigation.

A radiologist may recommend a galactogram, which involves injecting contrast media into the discharging duct before performing mammography. It is used to determine whether there is a blockage or a small lesion in the duct. Sonography can help determine whether the ducts are dilated. An intraductal papilloma is a small tumor in the milk duct that usually is accompanied by a spontaneous, reddish-brown discharge only in the affected nipple; some papillomas are too small to be demonstrated on ultrasound images.
Mammographers should record as much information as possible from the CBE, patient interview and physical observation regarding onset of the discharge, whether it is spontaneous or induced, whether it is from 1 or both breasts and the color of the discharge.

70. Other Signs and Symptoms
Diagnostic mammography may be performed to distinguish possible breast cancer from benign breast disease.

A number of benign conditions produce symptoms that mimic malignancy:
- Mastitis occurs when a woman is breast-feeding. It is an infection of the ducts caused by bacteria entering the breast through the nipple. The patient may experience pain, fever and flu-like symptoms. Mastitis can be treated with antibiotics; if left untreated, the woman can develop an abscess.
- A breast abscess is a collection of pus that becomes painful and warm to the touch. Abscesses are treated with antibiotics or can be surgically lanced to force drainage.
- Cellulitis is an infection in the deep layers of the skin. Symptoms start with tenderness, redness and swelling and the skin is warm to touch. Cellulitis also can be treated with antibiotics.
- Fungal infection can occur at the inframammary fold region and appears as redness and irritation. It can be treated with antifungal medications.
- An oil gland called the Montgomery gland found around the nipple and areola can become clogged or infected. It first appears as a white pimple.

71. Knowledge Check
Match the following conditions with the correct description.

72. Assessing Your Patient
Before beginning the examination, the mammographer also must assess a variety of factors that might affect patient positioning or the outcome of the exam. Each patient is unique. Women’s anatomy varies widely, and mammographers must make adjustments to take into account factors such as the patient’s height, breast size and other physical characteristics. In addition, individual patients might have unique conditions that merit special consideration. Always be sensitive to the patient and treat each patient as an individual.

73. Patients With Special Needs
Mammographers may not often encounter patients with special needs, but when they do, these conditions can be challenging. Each situation is different and may require extra time, unique positions, additional staff or other considerations. We’ll look at working with patients who have kyphosis, are wheelchair-bound, have implanted ports or pacemakers, are morbidly obese or have mental or physical disabilities. We’ll also discuss how to work with male patients.

74. Patient With Kyphosis
Kyphosis is a severe curvature of the spine’s thoracic region that results in a rounded upper back. Although a kyphotic patient may be able to stand, she may prefer to sit for the mammogram depending on her range of motion and stability. Regardless of whether the patient stands or sits, the mammographer must make sure that the patient’s shoulder, hair, chin or ears are not in the image before making the exposure.
For the CC projection, the mammographer can ask the patient to turn her palm up with her elbow by her waist to relax her shoulder and move it out of the image. The mammographer should be aware of the location of the patient’s earlobe to avoid superimposition of the ear over the breast tissue. Using the field light, the mammographer should look for shadows on the breast caused by the ear or other anatomy in the image area.

A patient with extreme kyphosis should sit in an armless chair. Placing a pillow behind her back can help the patient to sit up straighter. This adjustment can be used for CC and LMO projections. If an MLO projection can’t be taken, the mammographer should attempt to acquire a lateromedial oblique (LMO) projection. LMO projections require the patient to have a good range of motion in the shoulder on the side being imaged.

75. **Wheelchair-bound Patients**

Patients with disabilities may require help with changing clothes before and after breast imaging. Mammographers first should ask the patient if assistance is needed.

When imaging patients in wheelchairs, the mammographer should determine whether the wheelchair’s arms are detachable. If the arms can’t be removed, the patient will need to be transferred to a chair without arms. Depending on patient mobility, 2 or more staff members may be needed to assist with the transfer. In addition, it may be necessary to have a staff member hold the patient in position while the mammographer makes the exposure. Placing a pillow or sponge behind the patient’s back helps with posture and brings the patient closer to the image receptor.

If the patient arrives with a caregiver, the caregiver may be able to comfort the patient if necessary. Caregivers also may be familiar with the patient’s abilities and needs and may be able to answer the mammographer’s questions.

For safety reasons, the mammographer should lock the brakes on the wheelchair before applying compression to the patient’s breasts.

76. **Patients With Ports or Pacemakers**

The mammographer should document if the patient has an implanted port or pacemaker and mark the location on the breast diagram in the patient questionnaire. The mammographer also should ask when the device was implanted.

Mammographers should review facility protocols for implanted devices with the radiologists. To assure safe practices and consistency, protocols should be updated regularly and readily available. The protocol should include when a mammogram can be performed following surgery to implant a port or pacemaker.

The patient with an implanted device may experience pain and discomfort during breast compression. The mammographer may consider starting with automatic compression and switching to manual compression once the paddle can hold the breast in place. When imaging patients with implanted devices, it’s important to check the first image when using the automatic exposure control (AEC). The AEC must be placed under the most glandular area of
breast tissue to avoid underexposed or overexposed images. If this occurs, the mammographer must use a manual technique instead of the AEC or move the AEC location.

The mammographer should continue to ask the patient if she is comfortable and if the compression is tolerable.

77. Morbidly Obese Patients
Imaging the breasts of morbidly obese patients can pose a challenge for any mammographer. There should be a facility protocol for tiling the mammograms of patients with large breasts to ensure consistency among a facility's mammographers and in image display. The consistency also helps ensure better image comparison when the patient returns for subsequent mammography.

78. Sample CC Protocol
The following example is a suggested protocol for the CC projections:

• The first CC image should include all the medial aspect of the breast and skin in the cleavage area.
• The second image should include the lateral aspect of the breast, but should overlap the lateral aspect of the first image. Overlapping the images assures that all breast tissue is displayed.
• If the patient has extremely large breasts, a third CC image should include the anterior portion of the breast with the breast's nipple in profile if possible. If a skin fold is present in the axillary region, the mammographer should attempt to place the patient’s palm facing up toward the ceiling and her elbow on her hip region to relax her shoulder area.
• Each tile of the mammogram must display the CC marker in the lateral portion of the image.

79. Sample MLO Protocol
For the MLO projections, the suggested protocol includes the following images:

• The first image should include the axillary, upper superior portion of the breast.
• The second image should include the inframammary fold, which can be obtained by fanning the lower breast upward and outward.
• The third image should include the anterior portion of the breast with the nipple in profile when possible.
• If any tissue is missing, the mammographer should acquire an extra projection of the missing tissue.
• Each tile of the mammogram must display the MLO marker in the upper portion of the image.

80. XCC Projections
Morbidly obese patients also may have extra breast tissue in the axillary region. If there are wrinkles or overlapped tissue on the CC projection, the mammographer can attempt exaggerated craniocaudal (XCC) projection to make sure the area is compressed flat and taut. Fanning the breast upward and outward might cause overlap of upper axillary breast tissue and require 2 images under compression. The first image should include the axillary and superior aspect of the breast. An anterior full compression projection to the nipple region can be performed if there is drooping of the anterior nipple region. The mammographers should help the patient lift her breast off of the image receptor after each exposure to avoid skin tears.
81. **Cultural Barriers**

Cultural considerations are important for any patient who comes to a breast imaging facility. Much has been written about disparities in care for breast cancer patients of various ages, races and income levels. Often, research focuses on how cultural barriers affect a woman’s access to screening mammography. Cultural barriers also affect communication with patients.

A patient’s cultural background influences issues such as modesty, physical contact and breast cancer treatment. For example, many older women have been brought up to fear trauma to the breast area. The mammographer should carefully explain the procedure, the need for compression and the need to touch the breast during positioning. Mammographers who move to a different area of town or a different city or state should become familiar with local cultural norms. No two patients will react the same way to a mammogram; therefore, remember that each patient should be treated with empathy, kindness and respect.

82. **Patients With Disabilities**

Disability encompasses a range of physical and mental health conditions. Patients may have physical mobility limitations, developmental and learning disabilities, sensory disabilities, mental health conditions, disabilities caused by chronic diseases and other disabilities or special needs. Regardless of the patient’s specific disability, the mammographer should remember that the patient is a person first and his or her disability is of secondary importance.

The mammographer must watch and listen to a patient’s responses during the introduction to determine if the patient can understand questions and follow instructions. A patient's caregiver can assist with the interview, but the mammographer should resist the temptation to focus all her attention on the caregiver instead of the patient.

The mammographer should avoid being condescending to a patient with a disability and should maintain eye contact when possible. Breast imaging professionals also should not assume that the patient cannot help herself. The mammographer should recognize any changes in body language, temperament or the patient’s breathing. Remember that examinations of patients with a disability may take more time.

83. **Male Patients**

Men who undergo mammography usually have a family history of breast cancer. They are just as anxious about the possible outcome as women and are usually embarrassed about having the examination. Breast imaging professionals should take extra care to help maintain male patients' dignity. If possible, after changing into a gown the male patient should be taken into a separate waiting room.

The mammographer should explain the procedure and make sure that the patient understands the examination before proceeding. The presence of hair on the man’s breast should be noted on the patient history questionnaire because it can appear as an artifact on the images. It sometimes is necessary to shave excessive hair from the chest area to prevent the breast slipping out from under the compression paddle. Shaving the medial side of the breast for the MLO projection and the superior aspect for the CC projection should help keep the male breast compressed on the receptor.

84. **Mammographic Findings**
Physicians consider several factors when assessing a mass found in a patient’s breast. A mass is described as a lesion occupying a space in the breast in 2 different images or projections.

A lump that is round or oval usually is benign, whereas an irregular mass is more likely to be malignant. A lobular mass generally is of intermediate concern. A circumscribed mass is more likely to be benign, whereas the spiculated mass is considered malignant. All lumps or masses require follow-up; diagnosis only can be made through a biopsy.

85. **Lump Shapes and Margins**
The radiologist documents the size of the lump, which can vary greatly from smaller than 5 mm (nearly occult on a mammogram) to larger than 1 cm. This table lists various shapes and margins a lump can have on a mammogram.

86. **Knowledge Check**
Answer the following question.

87. **Breast Imaging Reporting and Data System (BI-RADS)**
The ACR has established the Breast Imaging Reporting and Data System (BI-RADS) to standardize the reporting of mammography results.

The categories are:
- Category 0 – Need additional imaging evaluation.
- Category 1 – Negative.
- Category 2 – Benign finding.
- Category 3 – Probably benign finding (short interval follow-up suggested).
- Category 4 – Suspicious abnormality (biopsy should be considered).
- Category 5 – Highly suggestive of malignancy (appropriate action should be taken).

Imaging reports sent to patients and referring physicians generally reference the assigned BI-RADS category.

88. **Communicating Results**
After completing the examination, the mammographer should inform the patient that the facility will send a letter reporting results. Breast imaging facilities have set policies and procedures for communicating results based on MQSA regulations.

Under MQSA, a written report must be sent to the patient's referring health care provider no later than 30 days following the examination. If the radiologist finds an area is suspicious or highly suggestive of malignancy and that biopsy should be considered (BI-RADS categories 4 or 5), the facility should make a reasonable attempt to communicate directly with the referring health care provider as soon as possible or within 3 days of mammography interpretation.

Each patient must receive a written report within 30 days of the mammography examination. The report summary should be written in lay terminology. If the findings are BI-RADS assessment category 4 or 5, the facility should make a reasonable effort to contact the patient within 5 working days of interpretation or sooner.
Facilities also should send a written report within 30 days to self-referred patients who do not name a health care provider. If the assessment is BI-RADS category 0, 3, 4 or 5, the communication should be within five working days.

89. Communicating Results
The radiologist should speak to the patient with a BI-RADS category 4 and 5 assessment before the patient leaves the facility; in addition, these patients should receive a certified or registered letter with examination results. A breast imaging facility should consider maintaining a list of health care providers for self-referred patients whose assessments require follow up. The radiologist's dialogue with the patient and all written communication regarding results, along with attempts at communication, should be documented.

All records and reports should follow Health Insurance Portability and Accountability Act (HIPAA) regulations to protect patient privacy.

90. Conclusion
Although the mammographer's primary role in breast imaging is to produce the highest quality images to aid in diagnosis, mammographers also are responsible for delivering excellent patient care during the examination. To provide this care, they must have effective communication and interviewing skills and be able to assess a variety of patient conditions. Establishing good patient rapport and gathering a complete medical history help the mammographer make the necessary adjustments to the examination and meet the unique needs of each patient.

91. Conclusion
This concludes Module 7 of Breast Imaging Basics – Patient Care.

You should now be able to:
• Know the incidence of breast cancer.
• List controllable and uncontrollable risk factors for breast cancer.
• Describe how to perform breast self-examination.
• Differentiate between screening and diagnostic mammography.
• Explain the process and importance of obtaining a patient’s thorough medical history.
• Discuss common signs and symptoms reported from breast self-examination (BSE) and clinical breast examination (CBE).
• Describe how to address special needs patients who are receiving mammograms.

92. Bibliography

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94. Development Team

95. Module Completion
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