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ABM Clinical Protocol #34: Breast Cancer and Breastfeeding

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Abstract

A central goal of The Academy of Breastfeeding Medicine is the development of clinical protocols for managing common medical problems that may impact breastfeeding success. These protocols serve only as guidelines for the care of breastfeeding mothers and infants and do not delineate an exclusive course of treatment or serve as standards of medical care. Variations in treatment may be appropriate according to the needs of an individual patient.

Background

Breast cancer is the most common malignancy in women worldwide, with 1 in 20 women developing the disease during her lifetime.[1] It represents the leading cause of cancer deaths and disability-adjusted life-years among women.[1] In addition, breast cancer imparts significant morbidity to women and children through its impacts on breastfeeding.

Breast cancer treatments may affect breastfeeding in multiple ways. Breastfeeding women diagnosed with breast cancer may require medications or therapies that decrease milk production or are contraindicated during lactation. Women treated for breast cancer before or during pregnancy may have reduced lactational capacity due to surgical removal of breast tissue and/or irreversible effects of prior therapies. Given these unique challenges and the multitude of health risks associated with not breastfeeding,[2] women with a new or remote breast cancer diagnosis require unique support of lactation.

The aim of this protocol is to guide clinicians in the delivery of optimal care of breastfeeding women as it relates to breast cancer, from screening to diagnosis, treatment, and survivorship. Throughout this protocol, the quality of evidence, based on the Oxford Centre for Evidence-Based Medicine 2011 Levels of Evidence[3] (Levels 1–5), is noted in parentheses.

Recommendations

Screening breastfeeding women for breast cancer

Limited evidence exists regarding breast cancer screening in the breastfeeding population (Box 1). The American College of Radiology recommends continuation of routine screening depending on the anticipated duration of breastfeeding and the individual's lifetime risk of breast cancer[4] (Level 4). However, guidelines for routine breast cancer screening of nonlactating women vary between nations, and controversy exists regarding screening eligibility, method, and interval[5] (Level 1).

Expert consensus guidelines have been published for breast cancer screening of breastfeeding women at increased risk of breast cancer due to deleterious *BRCA* mutations[6] (Level 4). These guidelines advise that women planning to breastfeed for at least 6 months continue routine screening, whereas those anticipating a shorter duration of breastfeeding may elect to defer mammography and/or magnetic resonance imaging (MRI) until 6 to 8 weeks after weaning.

Mammography, breast ultrasonography, and contrast-enhanced breast MRI are safe during lactation[7] (Level 4). Lactating breasts have several physiologic differences relative to nonlactating breasts that impact their radiographic appearance: these include hypervascularity, dense parenchyma, and dilated lactiferous ducts containing residual breast milk[8] (Level 4). Such differences may make interpretation of screening studies more challenging and increase the risk of false-positive results, thereby requiring additional imaging studies and biopsies[4] (Level 4).

Breastfeeding or expressing breast milk immediately before the imaging examination reduces these differences and facilitates detection of abnormalities[9] (Level 4). Utilization of supplemental imaging modalities can further optimize breast cancer screening in this population. Specifically, ultrasonography may offer the highest sensitivity[9] (Level 4) and digital breast tomosynthesis (''3D mammography'') may be superior to conventional mammography[4] (Level 4).

Breastfeeding management in women with a history of breast cancer

As breast cancer treatments may reduce lactational capacity, women with a history of breast cancer who would like

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Box 1. Screening Breastfeeding Women for Breast Cancer: Key Points and Recommendations

- Breastfeeding women do not need to abstain from routine breast cancer screening due to lactational status, but may decide to defer screening if they plan to wean in a few months.
- The decision to screen breastfeeding women should be individualized, and related to personal lifetime risk of breast cancer.
- All radiologic modalities used for breast cancer screening are safe during lactation.
- The lactating breast has a unique radiographic appearance.
- Breastfeeding or expressing breast milk before a screening study is recommended to reduce density and improve examination sensitivity.
- Supplemental imaging may be beneficial during lactation.

Box 2. Types of Oncologic Breast Surgical Procedures

- Total mastectomy: removal of >95% of breast parenchyma
  - *Simple mastectomy*: removal of breast parenchyma, nipple areolar complex (NAC), and overlying skin, leaving a flat chest wall
  - *Skin-sparing mastectomy*: removal of breast parenchyma and NAC, with preservation of a skin envelope for reconstruction purposes
  - *Nipple-sparing mastectomy*: removal of breast parenchyma with preservation of NAC and skin for cosmetic and reconstruction purposes
- Partial mastectomy (alternatively referred to as segmental mastectomy, lumpectomy, or breast conservation surgery): removal of a portion of breast parenchyma containing the malignancy as well as a margin of healthy tissue

to breastfeed will benefit from anticipatory counseling and close postpartum management by a breastfeeding medicine expert.

The antepartum visit should include review of past and current breast cancer treatments, including surgery, radiation, chemotherapy, and endocrine therapy. In addition, providers should discuss plans for continued disease surveillance during pregnancy and the postpartum period. They also should explore breastfeeding goals, and reassure women that breastfeeding has not been shown to increase the risk of recurrent disease[10] (Level 4). Survivors who wish to utilize galactogogues to augment milk production should understand that many of these substances are phytoestrogens. Although phytoestrogens may be safe for dietary consumption, they could, in concentrated supplement form, promote tumorigenesis or decrease endocrine therapy efficacy[11] (Level 3). In addition, domperidone and other medications that promote prolactin secretion may be inadvisable given the associations between elevated prolactin levels and increased breast cancer risk[12] (Level 1).

Women with a history of total mastectomy should plan for unilateral breastfeeding. Total mastectomy is a broad term describing a procedure that removes >95% of the breast parenchyma: it includes simple mastectomy, skin-sparing mastectomy, and nipple sparing mastectomy (Box 2). In cases of nipple areolar complex (NAC) preservation, the patient should understand that the NAC will not be functional for breastfeeding. Some residual breast tissue may be present that can hypertrophy during pregnancy and/or lactation and give the appearance of functionality. However, residual parenchyma nevertheless should be minimal and no normal lactation expected. Any woman who experiences significant hypertrophy or milk production should consult with her oncology team for discussion of oncologic risk of residual tissue.

Women with a history of breast conservation therapy—the combination of partial mastectomy (Box 2) and whole-breast radiation therapy—should expect significantly reduced milk production on the affected side for several reasons[13] (Level 4). Oncologic breast surgery not only removes parenchyma but also may damage nerves essential for a normal milk ejection reflex. Radiation causes irreversible histopathologic changes including fibrosis[14,15] (Level 3), which may preclude ductal proliferation during pregnancy. Infants may refuse to drink breast milk from the previously radiated breast due to altered taste[16,17] (Level 5) and/or may have difficulty extracting milk due to radiation-induced inelasticity of the nipple areola complex. Given these potential challenges, these women also may plan for unilateral breastfeeding.

A single breast can produce sufficient milk for healthy infant growth; however, providers should follow dyads closely in the postpartum period to ensure adequate infant weight gain (Box 3). Mothers may benefit from expressing milk in addition to breastfeeding to increase milk production. As women with a history of chemotherapy receipt may have reduced milk production in the remaining breast[15] (Level 3), these dyads warrant especially close monitoring and may require donor milk supplementation.

Patients whose breast cancers express hormone receptors—including the estrogen receptor and the progesterone receptor—generally are recommended to complete 5 to 10 years of adjuvant endocrine therapy. As tamoxifen and aromatase inhibitors are contraindicated during pregnancy[18] (Level 4), some women may elect to interrupt endocrine therapy

Box 3. Breastfeeding Management in Women with a History of Breast Cancer: Key Points and Recommendations

- As breast cancer survivors have multiple risk factors for reduced milk production, breastfeeding dyads require close monitoring to ensure adequate infant growth.
- No adequate milk production should be expected from the affected side after a total mastectomy, irrespective of technique.
- Reduced milk production from the affected breast is likely after breast conservation therapy (partial mastectomy and radiation).
- Diminished milk production from both breasts may occur after chemotherapy.
- Ongoing research is examining the oncologic safety of interrupting adjuvant endocrine therapy for childbearing with and without breastfeeding.

for childbearing. The lactational safety of tamoxifen is unknown[10] (Level 4). Aromatase inhibitors may impact estrogen metabolism in the infant and, therefore, breastfeeding is contraindicated[10] (Level 4). European guidelines support prolonged interruption of tamoxifen therapy to allow for breastfeeding after a successful pregnancy[19] (Level 4). A prospective randomized controlled trial (POSITIVE) is underway to obtain higher level data on the safety of interrupting endocrine therapy for up to 2 years for childbearing and breastfeeding.[20]

Breastfeeding management in pregnant women diagnosed with breast cancer

A multidisciplinary team including surgical oncologists, medical oncologists, radiation oncologists, high-risk obstetricians, and neonatologists will manage women diagnosed with breast cancer during pregnancy. As treatments for pregnancy-associated breast cancer (PABC) may impact not only the developing fetus but also future fertility and breastfeeding[18] (Level 4), multidisciplinary discussion should include a breastfeeding medicine expert. Although maternal and fetal survival remain the utmost priority, breastfeeding support is nevertheless critical (Box 4). Indeed, women diagnosed with PABC or other cancers during pregnancy who have difficulty meeting breastfeeding milestones may suffer from persistent significant psychologic distress[21] (Level 3). Psychologist inclusion on the multidisciplinary team, therefore, is recommended[22] (Level 4).

Oncologic breast surgery. Treatment of breast cancer during pregnancy depends on the trimester in which the malignancy is diagnosed, as well as cancer stage and tumor characteristics. In general, breast surgical therapy consists of a total mastectomy when PABC is diagnosed in the first trimester; breast conservation surgery may be an option for malignancies diagnosed in the second or third trimesters, with deferment of adjuvant breast radiation therapy until the postpartum period[18] (Level 4). Antenatal counseling of women with PABC should include discussions about unilateral breastfeeding and potential for decreased milk production on the affected side secondary to radiation, similar to counseling of breast cancer survivors. Women interested in contralateral prophylactic mastectomy should understand that this procedure offers no improvement in survival[23] (Level 1); surgeons can defer this operation as well as contralateral breast reduction/lift until breastfeeding is complete.

In select cases, women with PABC may undergo oncologic breast surgery during the postpartum period[24] (Level 4). For example, postpartum surgery may be appropriate for women with early stage disease diagnosed late during pregnancy or for patients who completed neoadjuvant chemotherapy during pregnancy. Obstetricians will help direct the exact timing of surgery, but likely will recommend proceeding at least 2 weeks after delivery. Therefore, patients may breastfeed from both breasts during the immediate postpartum period[25] (Level 4).

No evidence exists to demonstrate harm from ingestion of breast milk from a breast containing cancer. Providers should counsel patients that preoperative weaning is not required and may not decrease the risk of milk fistula[10] (Level 4). Milk fistula is rare, reported as zero in a PABC cohort[26] (Level 3) and 2.5% in a mixed cohort (Level 3). Although milk fistula represents a self-limited and minor complication of a breast procedure[27] (Level 4), it theoretically may delay adjuvant therapy.

Patients who wish to breastfeed from the affected breast after breast conservation surgery should discuss this preoperatively with the multidisciplinary team, and anesthesiologists should participate in a perioperative care plan[28] (Level 4). An incision very close to the NAC may prove challenging for both latch and milk expression[10] (Level 4). No data exist regarding safety of breastfeeding after intradermal injection of blue dye or radiotracers used for sentinel lymph node biopsy; however, the Society of Nuclear Medicine and Molecular Imaging and the European Association of Nuclear Medicine suggest a 24-hour breastfeeding interruption after receipt of the latter[29] (Level 4). After recovery from surgery, patients who would like to breastfeed from the affected breast during radiation therapy should understand that this may potentiate risks of skin breakdown[10] (Level 4).

Chemotherapy. Patients who receive chemotherapy during pregnancy demonstrate markedly reduced lactational ability, particularly when they receive therapy earlier during pregnancy and/or when they complete more cycles[30] (Level 3). Chemotherapy is contraindicated during the first trimester and generally is paused 3 to 4 weeks preceding delivery[24] (Level 4). Therefore, many PABC patients who require chemotherapy will receive part of their therapy during pregnancy, and the remainder postpartum to complete a standard 4- to 6-month course. Breastfeeding during chemotherapy is contraindicated[31] (Level 4), but patients should be able to breastfeed for the immediate postpartum period before resumption of chemotherapy. It should be noted that infants who were exposed to chemotherapeutic agents in utero are recommended to have a comprehensive examination at birth, as

Box 4. Breastfeeding Management in Pregnant Women Diagnosed with Breast Cancer: Key Points and Recommendations

- Pregnancy-associated breast cancer (PABC) treatments likely will impact breastfeeding.
- Breastfeeding medicine experts represent valuable members of the multidisciplinary team caring for PABC patients.
- Women who require oncologic breast surgery during pregnancy may be reliant on a single breast for breastfeeding, either anatomically or functionally; contralateral surgical procedures should be deferred until breastfeeding is complete.
- Postpartum oncologic breast surgery does not require preoperative weaning.
- Tracers used for sentinel lymph node biopsy may require a breastfeeding interruption of up to 24 hours; during this time, milk should be expressed and discarded to maintain milk production.
- Reduced breast milk production should be expected in women who require chemotherapy during pregnancy.
- Women with PABC who require postpartum chemotherapy may be able to maintain milk production, but expressed milk is not safe for infant consumption.
- Breastfeeding is not recommended during adjuvant anti-HER2 or endocrine therapy.

Table 1. Half-Lives and Breast Milk Elimination Properties of Common Chemotherapeutic Agents Used for Breast Cancer

Chemotherapy agent	*Serum half-life*	*Recommended minimum waiting period between drug administration and breastfeeding*[a]
Doxorubicin (Adriamycin)	24–36 hours	7–10 days
Cyclophosphamide (Cytoxan)	7.5 hours	72 hours
Paclitaxel (Taxol)	13–52 hours	6–10 days
Docetaxel (Taxotere)	11 hours	4–5 days
Carboplatin (Paraplatin)	>5 days	Cessation of breastfeeding or monitoring of platinum levels in breast milk.
Fluorouracil (5-FU)	16 minutes	24 hours
Capecitabine (Xeloda)	38–45 minutes	24 hours

[a]Recommendations from the InfantRisk Center, Texas Tech University Health Sciences Center. In clinical practice, individualized recommendations should be made by the multidisciplinary team including an oncology pharmacist, as multiple factors influence drug metaboilsm, transfer into breast milk, and elimination including medication dose, properties of the drug's metabolites, and the patient's kidney and liver function.

well as surveillance for short- and long-term toxic effects throughout childhood[22] (Level 4).

Patients may maintain milk production by expressing throughout systemic treatment, but volumes likely will decrease due to the effects of chemotherapy on milk production[15] (Level 3). Chemotherapeutic agents may pass readily into breast milk and cause infantile neutropenia, so expressed milk should not be fed to infants[31] (Level 4). Patients may resume breastfeeding after their circulation clears of potentially harmful metabolites (Table 1)[32] (Level 5). Providers should share with patients' opportunities to participate in research studies examining transfer of drugs into breast milk, such as those that the InfantRisk Center conducts.[33] When discussing a plan to express and discard milk, providers should counsel patients about the potential for complications such as mastitis during chemotherapy. Patients also should understand the possibility that the infant may not return to the breast after a prolonged breastfeeding interruption. If a mother would like to breastfeed very intermittently during specific intervals that may be safe as determined by an oncology pharmacist, she should consider whether her infant will be interested in the breast in a restricted manner.

Alternatively, PABC patients who require postpartum chemotherapy may elect to breastfeed for a few weeks after delivery and then cease lactation. As limited preclinical data suggest that abrupt weaning may promote tumorigenicity[34] (Level 3), women should gradually decrease milk production or utilize medications such as cabergoline[25] (Level 4). Until their milk production stops, mothers should be closely monitored for mastitis and other complications, especially when neutropenic.

Adjuvant targeted therapy and endocrine therapy. Women with tumors that overexpress the human epidermal growth factor receptor HER2 are candidates for targeted therapy with monoclonal antibodies such as trastuzumab and/or pertuzumab. As these therapies are contraindicated during pregnancy, patients must undergo this treatment postpartum[18] (Level 4). Although these large molecules likely do not transfer into breast milk, breastfeeding is not recommended during trastuzumab or pertuzumab therapy as there are no data confirming lactational safety[24] (Level 4). In addition, oncologists generally administer these agents in combination with chemotherapy.

As already discussed, women with hormone receptor-positive breast cancers who require adjuvant endocrine therapy will be unable to breastfeed during this treatment. It should be emphasized that the aforementioned POSITIVE trial is not designed to evaluate the safety of deferring *initiation* of endocrine therapy, but rather *interruption* of therapy after at least 18 months of adherence.[20]

Breastfeeding management in postpartum women diagnosed with breast cancer

Postpartum breast cancer, diagnosed within 5 years of childbirth, is increasingly recognized to be more virulent than other presentations of the malignancy[35] (Level 3). Postpartum women who are breastfeeding at the time of their breast cancer diagnosis will require oncologic treatments that affect lactation (Box 5). Similar to women with PABC, a multidisciplinary team that includes a breastfeeding medicine expert should manage breastfeeding women with postpartum breast cancer.

Box 5. Breastfeeding Management in Postpartum Women Diagnosed with Breast Cancer: Key Points and Recommendations

- Breast cancer diagnosed up to 5 years postpartum is generally more aggressive than other presentations of this malignancy.
- Breastfeeding medicine experts should participate in multidisciplinary discussions about breastfeeding women diagnosed with postpartum breast cancer.
- Most radiologic staging studies are compatible with breastfeeding; nuclear medicine studies may require a brief period of limited contact, but expressed milk can be safely fed to the infant during this time.
- Chemotherapy, targeted anti-HER2 therapy, and endocrine therapy likely require discontinuation of breastfeeding.
- Cabergoline and other medications can be used for lactation cessation.
- Women who elect to wean should be informed of options for obtaining donor milk.

Radiologic staging studies. After pathologic examination of a tissue sample confirms the diagnosis of breast cancer, an oncology team will determine the clinical stage to inform treatment plans. In addition to clinical examination, many patients will undergo radiologic staging studies. Computed tomography with intravenous contrast or MRI with gadolinium contrast does not require an interruption in breastfeeding[36] (Level 4). Positron emission tomography and bone scintigraphy may require brief separation of the dyad—for 12 hours or up to 4 hours, respectively—during which time breast milk can be expressed and safely fed to infants[36] (Level 4). These guidelines reflect the fact that radiotracers used in these studies are excreted in limited quantities into breast milk, but organs themselves will remain radioactive for a short period of time.

Breast cancer treatment. Principles of breastfeeding management in women with postpartum breast cancer are consistent with those already detailed for PABC patients who require postpartum oncologic breast surgery, chemotherapy, adjuvant anti-HER2 therapy, or adjuvant endocrine therapy. Patients who require therapies that are contraindicated during lactation and elect to wean may benefit from dopamine agonists such as cabergoline. They may require psychosocial support that focuses not only on their new cancer diagnosis but also on the emotional impact of undesired weaning[10] (Level 4). Providers should assist patients who express an interest in obtaining donor milk[25] (Level 4).

Recommendations for Future Research

Recommendations for future research related to the intersection of breast cancer and breastfeeding include the following:

- Establishment of a repository of breast milk from women with breast cancer to enable biospecimen studies.
  - Retrospective analyses may identify substances shed into breast milk that are associated with cancer recurrence or mortality and inform further research efforts focused on these biomarkers.
  - Specimens from newly diagnosed women can be compared with milk from women without breast cancer to improve understanding of the early events in breast cancer pathogenesis.
  - Evaluation of milk samples from women who elect to express during and after chemotherapy, targeted anti-HER2 therapy, or endocrine therapy. In addition to enhancing knowledge about transfer of specific medications into breast milk, such studies can aid in determining the optimal time at which breastfeeding can safely resume after therapy completion.
  - Microbiota can be compared before and during chemotherapy to explore whether mastitis risk differs.
- Observational studies of breastfeeding women who undergo oncologic breast surgery to evaluate potential associations between degree of milk production at the time of surgery and the risk of milk fistula, as well as associations between preoperative weaning attempts and risk of fistula and other wound complications such as surgical site infections.

Annotated Bibliography

For more information, please see the Supplementary Data with an annotated bibliography for breast cancer and breastfeeding.

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Supplementary Material

Supplementary Data

References

1. Fitzmaurice C, Akinyemiju TF, Al Lami FH, et al. Global, regional, and national cancer incidence, mortality, years of life lost, years lived with disability, and disability-adjusted life-years for 29 cancer groups, 1990 to 2016: A systematic analysis for the global burden of disease study. *JAMA Oncol* 2018;4:1553–1568.
2. Stuebe A. The risks of not breastfeeding for mothers and infants. *Rev Obstet Gynecol* 2009;2:222–231.
3. OCEBM Levels of Evidence Working Group. The Oxford 2011 levels of evidence. Oxford centre for evidence-based medicine. Available at www.cebm.net/index.aspx?o=5653 (accessed May 15, 2019).
4. diFlorio-Alexander RM, Slanetz PJ, Moy L, et al. ACR appropriateness criteria® breast imaging of pregnant and lactating women. *J Am Coll Radiol* 2018;15(11S):S263–S275.
5. Gotzsche PC, Jorgensen KJ. Screening for breast cancer with mammography. *Cochrane Database Syst Rev* 2013: CD001877.
6. Carmichael H, Matsen C, Freer P, et al. Breast cancer screening of pregnant and breastfeeding women with BRCA mutations. *Breast Cancer Res Treat* 2017;162:225–230.
7. Johnson HM, Lewis TC, Mitchell KB. Breast cancer screening during lactation: Ensuring optimal surveillance for breastfeeding women. *Obstet Gynecol* 2020;135:194–198.
8. Vashi R, Hooley R, Butler R, et al. Breast imaging of the pregnant and lactating patient: Physiologic changes and common benign entities. *AJR Am J Roentgenol* 2013;200: 329–336.
9. Sabate JM, Clotet M, Torrubia S, et al. Radiologic evaluation of breast disorders related to pregnancy and lactation. *Radiographics* 2007;27 Suppl 1:S101–S124.
10. Johnson HM, Mitchell KB. Breastfeeding and breast cancer: Managing lactation in survivors and women with a new diagnosis. *Ann Surg Oncol* 2019;26:3032–3039.
11. Duffy C, Cyr M. Phytoestrogens: Potential benefits and implications for breast cancer survivors. *J Womens Health (Larchmt)* 2003;12:617–631.
12. Wang M, Wu X, Chai F, et al. Plasma prolactin and breast cancer risk: A meta-analysis. *Sci Rep* 2016;6:25998.
13. Leal SC, Stuart SR, Carvalho HeA. Breast irradiation and lactation: A review. *Expert Rev Anticancer Ther* 2013;13: 159–164.
14. Schnitt SJ, Connolly JL, Harris JR, et al. Radiation-induced changes in the breast. *Hum Pathol* 1984;15:545–550.

15. Moore GH, Schiller JE, Moore GK. Radiation-induced histopathologic changes of the breast: The effects of time. *Am J Surg Pathol* 2004;28:47–53.
16. Green JP. Post-irradiation lactation. *Int J Radiat Oncol Biol Phys* 1989;17:244.
17. Guix B, Tello JI, Finestres F, et al. Lactation after conservative treatment for breast cancer. *Int J Radiat Oncol Biol Phys* 2000;46:515–516.
18. Shah NM, Scott DM, Kandagatla P, et al. Young women with breast cancer: Fertility preservation options and management of pregnancy-associated breast cancer. *Ann Surg Oncol* 2019;26:1214–1224.
19. Cardoso F, Loibl S, Pagani O, et al. The European Society of Breast Cancer Specialists recommendations for the management of young women with breast cancer. *Eur J Cancer* 2012;48:3355–3377.
20. Pagani O, Ruggeri M, Manunta S, et al. Pregnancy after breast cancer: Are young patients willing to participate in clinical studies? *Breast* 2015;24:201–207.
21. Henry M, Huang LN, Sproule BJ, et al. The psychological impact of a cancer diagnosed during pregnancy: Determinants of long-term distress. *Psychooncology* 2012;21:444–450.
22. Amant F, Berveiller P, Boere IA, et al. Gynecologic cancers in pregnancy: Guidelines based on a third international consensus meeting. *Ann Oncol* 2019;30:1601–1612.
23. Carbine NE, Lostumbo L, Wallace J, et al. Risk-reducing mastectomy for the prevention of primary breast cancer. *Cochrane Database Syst Rev* 2018;4:CD002748.
24. Shachar SS, Gallagher K, McGuire K, et al. Multidisciplinary management of breast cancer during pregnancy. *Oncologist* 2017;22:324–334.
25. Gergerich E, Garling-Spychala B. A case of breastfeeding with active breast cancer. *Clin Lactation* 2019;10:136–140.
26. Dominici LS, Kuerer HM, Babiera G, et al. Wound complications from surgery in pregnancy-associated breast cancer (PABC). *Breast Dis* 2010;31:1–5.
27. Valente SA, Grobmyer SR. Mastitis and breast abscess. In: The Breast: Comprehensive Management of Benign and Malignant Diseases, 5th ed., Bland KI, Copeland EM, Klimberg VS, Gradishar WJ, eds. Philadelphia, PA: Elsevier, 2018, pp. 93–103.e102.
28. Rieth EF, Barnett KM, Simon JA. Implementation and organization of a perioperative lactation program: A descriptive study. *Breastfeed Med* 2018;13:97–105.
29. Giammarile F, Alazraki N, Aarsvold JN, et al. The EANM and SNMMI practice guideline for lymphoscintigraphy and sentinel node localization in breast cancer. *Eur J Nucl Med Mol Imaging* 2013;40:1932–1947.
30. Stopenski S, Aslam A, Zhang X, et al. After chemotherapy treatment for maternal cancer during pregnancy, is breastfeeding possible? *Breastfeed Med* 2017;12:91–97.
31. Pistilli B, Bellettini G, Giovannetti E, et al. Chemotherapy, targeted agents, antiemetics and growth-factors in human milk: How should we counsel cancer patients about breastfeeding? *Cancer Treat Rev* 2013;39:207–211.
32. Anderson PO. Cancer chemotherapy. *Breastfeed Med* 2016;11:164–165.
33. The InfantRisk Center. Texas Tech University Health Sciences Center. https://www.infantrisk.com/research (accessed December 7, 2019).
34. Basree MM, Shinde N, Koivisto C, et al. Abrupt involution induces inflammation, estrogenic signaling, and hyperplasia linking lack of breastfeeding with increased risk of breast cancer. *Breast Cancer Res* 2019;21:80.
35. Callihan EB, Gao D, Jindal S, et al. Postpartum diagnosis demonstrates a high risk for metastasis and merits an expanded definition of pregnancy-associated breast cancer. *Breast Cancer Res Treat* 2013;138:549–559.
36. Mitchell KB, Fleming MM, Anderson PO, et al. ABM clinical protocol #30: Radiology and nuclear medicine studies in lactating women. *Breastfeed Med* 2019;14:290–294.

ABM protocols expire 5 years from the date of publication. Content of this protocol is up-to-date at the time of publication. Evidence-based revisions are made within 5 years or sooner if there are significant changes in the evidence.

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