Various clinical and treatment factors differently affect sexual minorities with breast cancer.

Clinical Considerations of Risk, Incidence, and Outcomes of Breast Cancer in Sexual Minorities
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Background: Breast cancer is a leading cause of cancer-related mortality in women. Limited research exists on the impact of sexual orientation on overall risk of and mortality from breast cancer. We sought to summarize the medical literature on breast cancer in sexual minority women and identify possible disparities in this population.

Methods: A comprehensive literature search was conducted for English-language studies in peer-reviewed medical journals that referenced breast cancer and sexual minority, lesbian, bisexual, or transgender individuals. Articles published between January 2000 and November 2015 were included. They were reviewed for relevance to breast cancer risk stratification, breast cancer mortality, breast reconstruction, and transgender issues.

Results: Behavioral risks, reproductive risks, and risks associated with decreased access to health care may all affect outcomes for sexual minorities with breast cancer. Limited studies have mixed results regarding mortality associated with breast cancer in sexual minorities due to an inconsistent reporting of sexual orientation.

Conclusions: Overall, the research examining breast cancer in sexual minority women remains limited. This finding is likely due to limitations in the reporting of sexual orientation within large databases, thus making broader-scale research difficult.

Introduction
For American women, breast cancer remains the most common cancer and second most common cause of cancer-related mortality. In 2016, the estimated incidence of new breast cancer cases will be 246,660, or 29.0% of all new cancer cases, and 72,160 cancer-related deaths are estimated to be due to breast cancer. Approximately 1 in 8 women (12.3%) will be diagnosed with breast cancer during their lifetime, and nearly 3 million women in 2012 were living with breast cancer in the United States. Research has been performed on racial disparities in the screening, diagnosis, treatment, and survival rates of breast cancer, as well as disparities due to insurance status and socioeconomic position. Disparity in the risk and mortality rates of breast cancer are likely to continue until we better understand the underlying reasons for the divergence.

According to US Census data, 1.2 million individuals live in a household with a same-sex partner. The Surveillance, Epidemiology, and End Results (SEER) Program collects demographical data, including age, race, sex, income, education, and geographical location, but it does not collect data on sexual orientation. This fact makes research on the disparities in breast cancer among women who identify as lesbian, bisexual, or sexual minority women difficult. Sexual minority women are infrequently the focus of stud-
ies in breast cancer, and controversy exists on whether sexual minority women are at increased risk for breast cancer compared with women in the general population.6

Methods
The goal of this article is to provide health care professionals with a discussion framework for their patients who are sexual minorities. This is a general overview of the limited published research on breast cancer in sexual minority patients focusing on clinical considerations. Within the medical literature we identified recent and comprehensive studies to address the following clinical questions:

- Are sexual minority women at increased risk for developing breast cancer?
- Do sexual minority women have an increased frequency of breast cancer related to a potential increase in risk factors?
- Can health care professionals influence patient behavior to mitigate the risk of breast cancer in these sexual minority patients?
- Does any identified increased risk lead to a difference in outcomes for sexual minority women, specifically breast cancer–related mortality?
- How do sexual minority women react to breast reconstruction after completing their course of treatment?
- How does the risk of breast cancer change in the transgender population, specifically when taking cross-sex hormone therapy?

Risk Factors
Risk factors for breast cancer have been extensively researched, and studies evaluating risk factors for breast cancer in sexual minority women have been published. However, whether sexual minority women are at an increased risk of breast cancer is still a controversial topic. For example, Cochran et al7 reviewed data from 7 surveys of women who have sex with women and self-reported bisexual women 18 to 75 years of age and compared their responses to 2 large national surveys of women similar in age (N = 19,000). Case et al8 also examined sexual orientation and general health risk factors, comparing self-reported sexual minority women to heterosexual female participants in a prospective cohort of 116,671 registered nurses 25 to 43 years of age who were followed with biennial surveys starting in 1989. Sexual orientation was added to the surveys in 1995, and demographic information was collected as well as risk factors for breast cancer, other cancers, and cardiovascular disease. Sexual orientation was reported by 98% of respondents, of whom 0.8% identified as lesbian and 0.3% identified as bisexual — thus making the sexual minority respondents a smaller subset of the larger cohort.8 It is difficult to generalize data as all the respondents were premenopausal registered nurses, and their work likely affected their interaction with the health care system and may not have been reflective of other sexual minority women.

Breast cancer is much more common in persons as they age, and a premenopausal cohort does not give a complete picture of breast cancer either in sexual minority or heterosexual women.7 In 2012, Austin et al9 used the same prospective cohort data as Case et al8 to estimate risk of breast cancer in premenopausal women using a modified Rosner–Colditz risk model and compared sexual minority women with heterosexual women. Similar to the Gail model, which uses current age, age of menarche, age at first birth, family history, previous benign results on breast biopsy, history of biopsy with atypia, and race to estimate risk of breast cancer, the Rosner–Colditz model also includes subsequent births following first live birth, type and age of menopause, height, current weight, weight at 18 years of age, and alcohol consumption. Austin et al9 calculated a 1-year breast cancer incidence rate per 100,000 person-years and compared sexual minority women with the heterosexual group.

However, these studies have limitations. The self-reported nature of sexual orientation makes objective study inherently difficult. Oftentimes sexual orientation is not included in large databases of breast cancer research.10 Sexual minority women may be less likely to disclose sexual orientation to their health care professional for fear of discrimination.11 As the stigma of sexual minority status has lessened over the decades, it is likely that, as the years go on, more respondents than those who initially self-reported would have come forward as a sexual minority in large national surveys of women. For health care professionals, understanding the risk of breast cancer in sexual minority women could help them to educate their patients, thereby improving rates of screening for breast cancer, or to modify behaviors that could have numerous impacts on patient health in general.

From these studies, the risk factors examined can be categorized as behavioral risks (obesity, alcohol use, tobacco use), reproductive risks (parity, use of oral contraceptives), and access to health care (health insurance status, screening).7–9 A summary of selected increased risks in sexual minority women are outlined in the Table.7–9

Behavioral Risks
Obesity is associated with an increased risk of breast cancer in postmenopausal women and a higher risk of breast cancer recurrence in premenopausal and postmenopausal women.12 Cochran et al7 observed that 28% of sexual minority women were classified as obese, suggesting that a significantly larger percentage of sexual
minority women were obese than expected ($P < .05$). Despite this, sexual minority women were significantly less likely to consider themselves obese than women in the general population ($P < .05$).\(^7\) Compared with heterosexuals, lesbians and bisexuals have higher prevalence rates of obesity (50% and 40%, respectively),\(^8\) and both premenopausal groups have a significantly higher mean body mass index ($P < .0001$ and $P = .0004$, respectively).\(^9\) These data suggest that sexual minority women are more likely than heterosexual women to have challenges with obesity, which is a risk factor for breast cancer as well as other health problems.

Evidence also suggests that smoking can cause breast cancer.\(^13\) Cochran et al\(^7\) reported that sexual minority women were more likely to be current or previous smokers than those in the general population ($P < .05$). Case et al\(^8\) found that lesbians and bisexuals reported higher rates of former smoking (60% and 50%, respectively), and twice as many sexual minority women were current smokers. Increased smoking in women, including sexual minority women, likely increases their risk for breast cancer as well as other medical conditions.\(^1\)

Alcohol has been considered a carcinogen to humans and has been shown to increase the risk of many cancers, including female breast cancer.\(^14\) Cochran et al\(^7\) did not note any significant differences in current alcohol use among sexual minority women compared with heterosexual women, but they did find an increased prevalence of alcohol-related problems, such as

<table>
<thead>
<tr>
<th>Author</th>
<th>Range</th>
<th>Age, y</th>
<th>Type of participant</th>
<th>Risk factor</th>
<th>Body mass index</th>
<th>Alcohol intake</th>
<th>Current smoker, %</th>
<th>Former smoker, %</th>
<th>Nulliparity</th>
<th>History of OCP use, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cochran(^7)</td>
<td>1986–1997</td>
<td>18–75</td>
<td>Heterosexual women = 19,000</td>
<td>Heterosexual</td>
<td>18.3 kg/m(^2)</td>
<td>4.0%(^c)</td>
<td>16.1</td>
<td>20.1</td>
<td>Pregnancy(^h): 66.7%; Live birth(^i): 56.9%</td>
<td>79.7</td>
</tr>
<tr>
<td>Case(^8)</td>
<td>1989–1995</td>
<td>25–43</td>
<td>Heterosexual women = 89,812</td>
<td>Lesbian</td>
<td>27.7 kg/m(^2) (P &lt; .05)</td>
<td>12.4%(^c)</td>
<td>21.2 (P &lt; .05)</td>
<td>34.0 (P &lt; .05)</td>
<td>Pregnancy(^h): 28.1%</td>
<td>36.2 (P &lt; .05)</td>
</tr>
<tr>
<td>Austin(^9)</td>
<td>1989–2005</td>
<td>25–42</td>
<td>Lesbian = 694</td>
<td>19.8%(^a) PR: 1.0</td>
<td>9.2%(^d) PR: 1.9 (95% CI: 1.5–2.3)</td>
<td>3.56 g(^e) (P &lt; .0001)</td>
<td>23.28 kg/m(^2) (P &lt; .0001)</td>
<td>23.11 kg/m(^2) (P &lt; .0004)</td>
<td>—</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Bisexual = 317</td>
<td>22.1% PR: 1.0</td>
<td>11.2%(^d) PR: 2.7 (95% CI: 2.1–3.5)</td>
<td>6.18 g(^e) (P &lt; .0001)</td>
<td>19.8% PR: 1.4 (95% CI: 1.1–1.6)</td>
<td>5.18 g(^e) (P &lt; .0001)</td>
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<td></td>
<td>22.04 kg/m(^2)</td>
<td>28.1% PR: 1.5 (95% CI: 1.4–1.7)</td>
<td>3.56 g(^e) (P &lt; .0001)</td>
<td>23.28 kg/m(^2) (P &lt; .0001)</td>
<td>23.11 kg/m(^2) (P &lt; .0004)</td>
<td>—</td>
<td>—</td>
</tr>
</tbody>
</table>

\(^a\)BMI ≥ 30.0 kg/m\(^2\) compared with < 25.0 kg/m\(^2\).
\(^b\)Mean BMI premenopause.
\(^c\)History of self-reported alcohol-related problems.
\(^d\)Alcohol intake ≥ 15 g/d vs none.
\(^e\)Alcohol intake/d (g) during premenopause.
\(^f\)Current smoker vs never smoker.
\(^g\)Former smoker vs never smoker.
\(^h\)History of pregnancy.
\(^i\)History of live birth.

BMI = body mass index, CI = confidence interval, NA = not applicable, OCP = oral contraceptive pills, PR = prevalence ratio.
as history of alcoholism, in sexual minority women compared with heterosexual women ($P < .05$). By contrast, 2 other studies found significantly increased rates of alcohol consumption: Twice as many sexual minority women drank at least 15.0 g of alcohol every day, and a significantly greater mean daily intake of alcohol during premenopause was seen among lesbians ($P < .0001$) and bisexuals ($P < .0001$) compared with heterosexual women. Nevertheless, increased alcohol intake in sexual minority women increases the potential risk of breast cancer as well as other health problems in this population.1

**Reproductive Risks**

Nulliparity has been associated with an increased risk of breast cancer, and increased parity can reduce a woman’s risk of breast cancer, particularly $HR$-positive breast cancer.15 Cochran et al7 demonstrated that sexual minority women had lower lifetime rates of pregnancy and live births when compared against national data ($P < .05$ for both). Furthermore, subsequent studies demonstrate that nulliparity is 3 times more likely in lesbians and twice as likely in bisexual women, with significantly reduced number of births in lesbian and bisexual women compared with heterosexual women ($P < .0001$ for both).8,9 These data suggest that sexual minority women are significantly more likely to be nulliparous, thus increasing their risk of breast cancer.

If sexual minority women did have children, Case et al9 found that they were twice as likely to have given birth before 19 years of age, a factor associated with a decreased risk of breast cancer,16 conferring up to a 50% risk reduction compared with nulliparous women.17 However, Austin et al9 found no significant difference in age at first birth between lesbian and bisexual women compared with heterosexual women. This is a confounding factor when attempting to elucidate reproductive risk factors for breast cancer in sexual minority women.

Use of oral contraceptives is associated with a decreased risk of $HR$-positive breast cancer.15 Cochran et al7 noted that sexual minority women reported significantly lower rates of oral contraceptive pill use than the general female population ($P < .05$). Although Austin et al9 did not specifically look at this factor, they did study age of menarche and found a 20% increase rate of menarche at 11 years of age or younger in lesbian women; however, subsequent data found no significant difference between lesbian and bisexual women compared with heterosexual women. Thus, these reproductive risk factors deserve further study.

**Access to Health Care**

Health insurance status is important when discussing preventive care such as screening for breast cancer. At the time of publication, most sexual minority women are unable to marry their partners by law and may have had impaired access to a partner's employer health insurance.7 Cochran et al7 indicated lower prevalence rates of health insurance coverage ($P < .05$) among sexual minority women compared with standardized estimates, and sexual minority women had lower rates of previous mammograms when standardized for demographics across all age groups ($P < .05$). Current health insurance coverage was associated with a positive history for mammography among sexual minority women in their 40s, with 77% of insured sexual minority women vs 64% of uninsured sexual minority women having undergone mammography at least once ($P < .05$).7 This finding suggests that health insurance coverage could improve access to screening mammography in sexual minority women, and that sexual minority women are less likely to have health insurance coverage. However, Case et al9 found no significant difference between sexual minority women compared with heterosexual women in regard to history of mammography. Likely, this is an evolving issue. With the recent legalization of same-sex marriage, access to employer-sponsored health care insurance may change for sexual minority women.

Despite the increased individual risk factors for breast cancer described in sexual minority women, no definitive studies have demonstrated an increased prevalence of breast cancer in sexual minority women.7,9 Using the Rosner–Colditz risk model, Austin et al9 predicted an incidence rate of breast cancer significantly elevated in both lesbian and bisexual women ($P < .0001$ for both), and this rate was consistently predicted across all age groups. Regression analysis found lesbian and bisexual women were more likely to be at higher risk than heterosexual women of similar age, race, geography, and income.

However, sexual minority women have not been shown to have an increased rate of breast cancer when compared with the general population. Cochran et al7 were unable to link sexual minority women with an increased prevalence of breast cancer compared with US women in general. A self-reported history of breast cancer among sexual minority women was 0.9%, which was concordant with expected standardized estimates, and no statistically significant difference in self-reported prevalence of breast cancer between the study sample of sexual minority women and US estimates for women was observed.7 Therefore, sexual minority women may not have an increased incidence or prevalence rate of breast cancer despite their increased predicted risk.

**Modulating Risk**

Based on identified individual risk factors, attempts are warranted by health care professionals to modify pa-
tient behavior in the hopes that doing so will improve the health of sexual minority patients. It is important to note that many of the risk factors for breast cancer identified in sexual minority women are modifiable behavioral risks.7-9,12,14

Bowen et al18 attempted to modulate risk by increasing screening participation in sexual minority women using group counseling. This prospective study randomized sexual minority women to a counseling (n = 69) or control group (n = 81). The intervention included psychosocial counseling with education, group discussion, and skills training during 4 weekly 2-hour sessions led by a trained health counselor specializing in sexual minority women. Weekly sessions had themes that included a personalized breast cancer risk assessment, discussions of mammography, recommendations for self-examinations and clinical breast examination, stress management, progressive muscle relaxation and guided imagery, and social support in 4 main areas (emotional, informational, instrumental, and companionship) focused on devising strategies for increasing support where needed.18

At 6 and 24 months, participants were evaluated on perceived risk of breast cancer, worry of cancer, mental health, “outness,” and identification with the lesbian community.18 At 24 months, the intervention group reported a higher rate of breast cancer screening in the past 2 years compared with the control group (87% vs 75%; P < .05). The intervention group also had a significantly higher rate of breast self-examinations at 6 (P < .01) and 24 months (P < .05) than the control group.18 The intervention group changed more over time in perceived risk (P < .001), cancer worry (P < .001), and mental health (P < .01).18 Regression analysis showed identification with the lesbian community and feelings of outness were predictors of participation in screening mammography and a feeling of outness was also a significant predictor of performing a breast self-examination.

With education and group counseling structured for sexual minority women, these researchers demonstrated that trained health counselors can successfully increase participation of sexual minority women in breast cancer screening.18 However, it is worth noting that this study has limitations because it studied 1 volunteer group in a single community, thus making it difficult to generalize to all sexual minority women.

It is encouraging to think that an intensive, demographically directed counseling intervention can improve the participation of sexual minority women in breast cancer screening.18 However, without a heterosexual, cohort, it is difficult to know whether behavior modification is specific to sexual minority women or generalizable to others. Although it is not reasonable to assume that a health care professional would have the resources to educate his or her sexual minority patients to such a degree that this study entails, improving participation in breast cancer screening for sexual minority women is important. Sexual minority women have consistently lower lifetime prevalence rates of screening mammography than expected across all age groups, although this is likely confounded by their decreased access to health care.7

Improving the participation rates of breast cancer screening among sexual minority women are important, but opportunities still exist to modulate other modifiable high-risk behaviors identified in sexual minority women, such as alcohol intake, obesity, and smoking.7-9 Health care professionals should be aware of these modifiable risk factors associated with breast cancer and other health problems, as they may present an educational opportunity to promote healthy behaviors. Clinicians should also be encouraged that intensive education is successful at promoting behavioral change in sexual minority women and improving their participation with breast cancer screening.18

Mortality
The goals of reducing risk and modifying behavior should be to lower the mortality rate associated with breast cancer and promote healthy living. Cochran and Mays8 examined the mortality risk of breast cancer among sexual minority women using the National Health Interview Survey, which is an annual population-based, household interview of married or cohabitating women 18 to 80 years of age that was conducted between 1997 and 2003. Of the 155,427 respondents, 693 reported having female partners (0.5%).6 Sexual minority women were younger (P < .001), had higher levels of education (P < .001) and higher family incomes (P < .05), were less likely to have health insurance (P < .05), and were more likely to be in a cohabitating relationship rather than be married (P < .001).6 The mortality rate of breast cancer was identified using the National Death Index: Of the 4,396 identified deaths, 274 (3.1%) were attributed to death from breast cancer.6 Age, race, education, family income, and health insurance coverage were strongly associated with death from any cause (P < .001 for all).6 After adjusting for confounding variables, sexual minority women were not at increased risk of overall mortality; however, sexual minority women had an elevated risk for breast cancer–related mortality compared with heterosexual women (P < .05).6 Overall, sexual minority women were 3 times more likely to die from breast cancer after adjusting for age, although the researchers did not evaluate the prevalence of breast cancer in the sexual minority population. The data are limited because they only include women who were in a defined relationship and, thus, the data cannot be generalized to sexual minority women without partners.

In interpreting potential reasons for this difference in mortality rates, a review of the risk fac-
tors previously discussed is important. Is there an increased rate of incidence or prevalence of breast cancer not yet identified in sexual minority women because of reproductive and behavioral risks that leads to this increased mortality risk of breast cancer? Perhaps the increased mortality risk of breast cancer among sexual minority women could be due to later diagnoses because of decreased access to health care due in part to lack of insurance or decreased rates of screening.

Cochran and Mays\textsuperscript{9} attempted to validate their findings by reviewing mortality risks associated with sexual orientation both in women and in men using data from the General Social Surveys and comparing mortality status using the same National Death Index. Respondents were interviewed face-to-face in their household and then were self-administered questionnaires or computer-assisted self-interviews; these responses were matched to National Death Index records.\textsuperscript{19} Sexual orientation was classified based on lifetime numbers of male or female sexual partners and the gender of those sexual partners in the year prior to the interview. Of the 17,886 respondents who completed the interview/questionnaire, 853 (4.8\%) reported a history of same-sex partners. Results were then subdivided by race, education, income, geographical region, overall self-rated health status, and generalized self-reported happiness. Similar to the previous study, sexual minority women were younger and reported higher education;\textsuperscript{6} however, in this cohort, sexual minority women had lower household incomes and, geographically, more sexual minority women lived in western states.\textsuperscript{19} All-cause mortality among women was significantly associated with older age, non-white race, and lower education ($P < .001$ for all), but sexual minority status was not significantly correlated with all-cause mortality or breast cancer, even after multivariate survival analysis (all-cause mortality, $P = .72$; breast cancer mortality, $P = .27$).\textsuperscript{19} Overall, 9.1\% of sexual minority women died from breast cancer vs 4.4\% of heterosexual women.\textsuperscript{9} Thus, Cochran and Mays\textsuperscript{9} were unable to replicate their 2013 findings,\textsuperscript{6} and it is unclear whether sexual minority women have an increased risk of mortality from breast cancer.

The later study benefited from a much broader definition of sexual orientation (it included lifetime partners), which helped capture people not in current same-sex relationships.\textsuperscript{19} However, sexual orientation remains difficult to objectively measure due to inherent self-reporting bias in identifying sexual minority status. Overall, the later study reported more same-sex partners (4.8\% vs 0.5\%), but this is still a relatively low percentage of respondents — possibly underpowering the study.\textsuperscript{6,19} Thus, further research is necessary.

**Breast Reconstruction**

A unique aspect of the treatment for female breast cancer is the impact that surgery, including breast reconstruction, can potentially have on a patient's self-identity.\textsuperscript{20} In general, breast cancer treatment is dictated by tumor biology, particularly with regard to systemic therapy; sexual orientation has no impact on chemotherapeutic or hormonal therapy recommendations.\textsuperscript{1} However, surgery for breast cancer is the cornerstone of breast cancer management in many American women.\textsuperscript{1} Decision-making regarding breast reconstruction in these patients is not well understood, but it has the potential for disparate care among women.\textsuperscript{20}

In particular, breast reconstruction is scrutinized because of the presumed heterosexual focus of the breast, as well as an example of health care access.\textsuperscript{20} A paucity of literature exists on use of reconstruction options in sexual minority women. It is possible that sexual orientation and self-identity could have significant impact on decisions regarding type of oncological surgery and whether or not a patient would desire reconstruction. Sexual minority women may perceive that health care professionals are not always considering sexual orientation when making recommendations for surgery or reconstruction.

The scientific literature on sexual minority women and their decisions to undergo breast reconstruction is limited: A single, retrospective, qualitative study has explored decisions by sexual minority women for or against reconstruction.\textsuperscript{20} A total of 15 self-reported sexual minority women diagnosed with nonrecurrent and nonmetastatic breast cancer who completed invasive treatment within the past 5 years completed demographic surveys and a disclosure scale. These participants were separated into breast reconstruction and no breast-reconstruction groups. Semi-structured interviews covered diagnosis, treatment course, treatment decision-making, sources of social support, and adjustment; participants identified support persons who were then interviewed covering similar topics. Comparisons of demographics, clinical stage, receipt of adjuvant therapy, and time since diagnosis revealed that the groups were similar. All support persons were female, and the majority of support persons were partners. Mastectomy was recommended for some, whereas others opted for mastectomy to avoid radiotherapy; one-half of participants underwent breast conservation before undergoing mastectomy.\textsuperscript{20} Of those in the reconstruction group ($n = 8$), 3 had autologous reconstruction, 5 had implant-based reconstruction, 3 received chemotherapy, 3 received radiotherapy, and 6 received hormonal therapy; of those in the no-reconstruction group ($n = 7$), 4 received chemotherapy, 2 received radiotherapy, and 4 received hormonal therapy.\textsuperscript{20}

The researchers discovered that breast size was a consideration among the participants when deciding
whether to accept or reject reconstruction. Sexual minority women with small breasts felt more comfortable rejecting reconstruction, whereas sexual minority women with larger breasts feared being unbalanced and having a heavy prosthesis. Both groups mentioned the importance of the breast for their self-image but emphasized physical functioning and body strength over aesthetics. Sexual minority women emphasized that their sexual minority status contributed to them not being defined by the presence of their breasts, and they noted a discrepancy between their values and body image and those of mainstream society — this was especially true when communicating with specialists in breast cancer. Sexual minority women who decided against reconstruction emphasized strength, long-term health, and survival; they complained less of physical problems but did discuss having to adjust to their changed body shape; they did not voice doubts or regrets about their choice. Their partners emphasized body image and their value system as motivators, and they confirmed the same satisfaction with respect to body image. They characterized making the decision jointly, and they reported attraction and desire being present as before.

Sexual minority women who underwent reconstruction reported physical issues, including numbness and limited range of motion; 1 woman reversed her reconstruction completely. The group expressed doubt or regret about their choice and lack of information about potential complications. Some opted for reconstruction to cover the physical effects of the cancer and regain a “normal” appearance, although some chose to forego formal nipple reconstruction. Their partners confirmed that outcomes of the reconstruction had not been thoroughly explained by the plastic surgeon, and they echoed doubts about reconstruction; their partners were characterized as more passive in the decision-making process, and these couples displayed discordance in values and body image. Women without a partner at the time of their decision were influenced by their relationship status, and support persons not in a partner relationship were more reluctant to express reconstructive preferences.

Overall, sexual minority women who underwent reconstruction expressed doubt and regret; by contrast, sexual minority women who elected against reconstruction did not, and this finding was echoed by their support persons. However, this study has limitations, including its small convenience sample, retrospective recall bias, and, thus, low applicability to the general population. This study also has no comparison to a heterosexual control, making it difficult to define the themes as unique to sexual minority women, but it did outline potential themes that may arise for sexual minority women as they embark on their decision for or against reconstructive surgery.

It is also worth underscoring that the notion that women may regret undergoing reconstruction after mastectomy may not be limited to the sexual minority community. Metcalfe et al prospectively followed patients after mastectomy with and without delayed breast reconstruction and found that psychosocial functioning improves over time in patients following mastectomy. During the long-term follow-up, women with delayed breast reconstruction had significantly higher levels of total distress (P = .01), obsessiveness (P = .03), and cancer-related distress (P = .02) compared with those who underwent mastectomy alone, although no differences were seen in quality of life between the 2 groups. Metcalfe et al published another report that demonstrated no difference in body image for women with mastectomy alone compared with mastectomy and immediate breast reconstruction. They further found that women with delayed breast reconstruction had higher levels of body stigma (P = .01), body concerns (P = .002), and concerns regarding the obviousness of mastectomy-related changes in appearance (“transparency”; P = .001) than mastectomy alone or mastectomy with immediate reconstruction. Another study reported on women who underwent breast-conserving surgery, mastectomy alone, and mastectomy with reconstruction, and it found that women who underwent mastectomy with reconstruction had greater mood disturbance and poorer well-being (P = .002 for both) compared with those who underwent mastectomy alone. This finding persisted up to 18 months after surgery.

All of these studies suggest the potential for selection bias for women who undergo breast reconstruction — in particular, delayed breast reconstruction — as pursuing that option because of their underlying distress regarding their body image. It is difficult to generalize this information to sexual minority women, but these issues of dissatisfaction may not be unique to either population. It is important for health care professionals to understand that sexual minority women may have a different perspective on breast reconstruction after mastectomy regardless of their surgical choice for or against reconstruction.

Boehmer et al described sexual minority women as not being defined by having breasts, emphasizing body strength and physical functioning over aesthetics, and “otherness,” described as a discrepancy of values and body image among sexual minority women when compared with the general population. Overall, health care professionals must be aware of a patient’s sexual orientation and include the patient’s support persons or partners in discussions regarding treatment. Health care professionals should also consider how the presence or absence of the breast may affect the patient’s body image, understanding that sexual minority women may not feel emotionally attached to the physical image.
presence of their breasts. Health care professionals should also discuss physical functioning after breast reconstruction and not limit the discussion to aesthetics alone. Reconstructive options should be clearly and comprehensively presented, elucidating realistic expectations for patients.

**Transgender Persons**

The term *transgender* defines a person whose self-identity does not conform to gender norms, and many patients may choose to use medical or surgical means to live as another gender. The risk of breast cancer is particularly relevant due to cross-sex hormone therapy for many patients who desire to feminize or masculinize their appearance.

In general, research on breast cancer in the transgender community is limited, and our understanding is also limited with regard to how hormonal therapy affects a person's risk of breast cancer. Sattari et al.\(^{23}\) summarized the cases of male-to-female transgender patients with breast cancer published in the literature since 1968. The authors identified 10 cases of breast cancer in male-to-female transgender persons, all of whom received long-term cross-sex hormone treatment; 7 of the cases had *ER* status reported (n = 5 negative, n = 2 positive).\(^{23}\) Thus, breast cancer in general appears to be rare among male-to-female transgender persons, although it is difficult to make any generalizations about the risks of cross-sex hormone therapy in this transgender population.

Understanding the risk of breast cancer in female-to-male transgender persons who take testosterone for masculinization is important, because it is likely different from the risk of breast cancer in male-to-female transgender persons. Circulating testosterone is converted to estradiol by aromatase enzyme, and higher levels of circulating testosterone could increase peripheral estrogen. Shao et al.\(^{24}\) described 2 cases of female-to-male transgender persons, both of whom took testosterone for masculinization. One patient was postmenopausal (aged 48 years) when testosterone was initiated, was also taking an aromatase inhibitor for symptoms of endometriosis, and was diagnosed with breast cancer 5 years later; the other case patient was premenopausal (aged 21 years) when testosterone was initiated and then diagnosed with breast cancer 6 years later. Both patients had *ER*-positive breast cancer, and both tested negative for a deleterious *BRCA* mutation.\(^{24}\) These cases are worth noting, but they do not provide conclusive evidence for an increased risk of breast cancer in transgender persons receiving cross-sex hormone therapy.

A study by the US Veterans Health Administration (VHA) is the largest and most comprehensive research on breast cancer in the transgender community (as of publication).\(^{25}\) This research has evaluated the incidence of breast cancer in transgender men and women treated within the VHA. Using encounter and prescription data from 1996 to 2013, transgender-related diagnosis and breast cancer events were identified within the VHA system.\(^{25}\) Medical records were reviewed for any patients with both a transgender-related diagnosis and a breast cancer event; cross-sex hormone therapy prescribed by a VHA physician was classified as androgen/anabolic or estrogen. The incidence rates of breast cancer were compared with Surveillance, Epidemiology, and End Results data from 2007 to 2011 using overall observed and expected rates.\(^{25}\)

Of approximately 6 million veterans seen every fiscal year, 5,135 had a transgender-related diagnosis, 1,579 were female at birth, and 3,556 were male at birth.\(^{25}\) No statistically significant difference was observed in breast cancer incidence among women, men, and in the overall population. For the entire sample, 10 confirmed cases of breast cancer were found in transgender veterans (0.2%), 7 in female-to-male veterans, 2 in male-to-female veterans, and 1 in a natal male veteran with transvestic fetishism.\(^{25}\) The average age at diagnosis was 63.8 years and all participating veterans racially self-identified as non-Hispanic white. Breast cancer surgery was performed in 8 transgender veterans; 4 patients died. Of those patients not receiving cross-sex hormone therapy, breast cancer was diagnosed in 3 transgender men and 1 transgender woman. For those patients receiving cross-sex hormone therapy breast cancers occurred in 3 transgender women, and 3 cases of female breast cancer occurred in transgender veterans who received cross-sex hormone therapy many years following their diagnosis of breast cancer.\(^{25}\)

More than one-half (52%; n = 2,645) of transgender veterans received at least 1 prescription for cross-sex hormone therapy, with the average duration of treatment being 6.5 years and the average age at initial treatment being 48.9 years.\(^{25}\) None of the males prescribed cross-sex hormone therapy developed breast cancer, suggesting that male breast cancer is rare in the transgender population receiving cross-sex hormone therapy. Breast cancers occurred in 3 transgender female veterans receiving cross-sex hormone therapy (n = 2 received estrogen products, n = 1 received testosterone products) prior to diagnosis.\(^{25}\) In general, no significant difference was observed for transgender patients receiving estrogen, testosterone, or cross-sex hormone therapy when compared with the overall cohort.\(^{24}\) Transgender veterans receiving cross-sex hormone therapy had no increased risk of breast cancer, and the overall incidence of breast cancer in transgender persons was low; however, late presentations in the 3 male patients with breast cancer and the high mortality rate seen in transgender veterans are concerning.\(^{25}\)

Clinicians should consider breast and chest examinations and possible mammography, if indicated, in this
subset of patients. History of chest-contouring surgery or mastectomy does not preclude the development of breast cancer, as observed in 1 female-to-male transgender patient in this study.25 This study did not include gene mutation data because they were not readily available, but it is the largest series of transgender patients with breast cancer reported in the literature to date.25 Interpretation of the use of cross-sex hormone therapy may be limited because the study required that at least 1 prescription was obtained through the VHA system to identify the patient as receiving cross-sex hormone therapy.24 For example, if a patient received cross-sex hormone therapy outside of the VHA system, then the therapy may not have been recorded.25

Typically, male breast cancer is hormonally sensitive (92%).2,26 As data have emerged and are now associating female breast cancer with use of perimenopausal estrogen-based hormone replacement therapy, concern exists about the potential risks of estrogen therapy in male-to-female transgender persons.27 However, male breast cancer is rare in the transgender population.25 At this time, the evidence is insufficient to support an increased incidence of breast cancer in transgender male-to-female persons, even when taking cross-sex hormone therapy.

Risk of breast cancer may be different in the female-to-male transgender population compared with the general population. In female-to-male persons receiving testosterone cross-sex hormone therapy, theoretical concern of breast cancer is extrapolated from the data on perimenopausal estrogen-based hormone therapy.22 The theory postulates that the metabolism of testosterone could increase peripheral estrogen levels, and, as reported in Shao et al.,24 2 such patients both developed ER-positive breast cancer. However, only 1 female-to-male patient receiving testosterone cross-sex hormone therapy in the VHA transgender cohort developed breast cancer.25 Although transgender females are at an increased risk of breast cancer due to their sex at birth compared with male-to-female transgender patients, the data are lacking for us to conclude whether an increased risk of breast cancer exists in transgender female-to-male patients receiving cross-sex hormone therapy compared with the general female population.

Moreover, the data do not support an increased incidence of breast cancer in transgender persons receiving cross-sex hormone therapy, and, in general, breast cancer in transgender persons is rare or under-reported.23 However, the scientific research related to transgender persons is lacking, making conclusions difficult to draw. It does highlight the fact that more research is needed.

Conclusions
Breast cancer is the most common cancer and second most common cause of cancer-related death in American women.1 Given the pervasive nature of breast cancer, many researchers have looked into specific groups of women in an effort to identify and reduce disparities in breast cancer among different populations of women. Numerous racial and socioeconomic disparities have already been identified, but research on sexual orientation and disparities in breast cancer is still limited and the data contradictory.3 Some evidence supports that sexual minority women have higher rates of risk factors associated with breast cancer.5,7 Studies are conflicting on which risk factors are more common in sexual minority women, but such risk factors consistently noted to be increased in sexual minority women include nulliparity, a history of smoking, and increased alcohol consumption.7,9 Published data also showed lower rates of health insurance coverage and decreased rates of breast cancer screening in sexual minority women.6,7 Despite an increase in risk factors, no clear increased incidence or prevalence rate for breast cancer in sexual minority women has been identified,7,9 and research on breast cancer in the transgender population remains limited. Utilizing education and structured support groups for sexual minority women help to improve rates of participation in breast cancer screening,18 and health care professionals should consider breast and chest examinations as well as mammography in transgender patients.

Clinicians should also be aware of the sexual orientation of their patients and the potential associations with disparities in breast cancer and differences in related outcomes. Recent legislation supporting same-sex marriage may improve the documentation of sexual orientation, so health care professionals should be aware of their patient’s sexual orientation and include support persons in treatment discussions, as needed, to ensure they understand the patient’s goals while counseling them on treatment options, including breast reconstruction. Consistent documentation of gender preferences as part of the medical record could improve the delivery of personalized care. Large-scale databases should consider adding sexual orientation to their demographic data to allow for more robust research. With these considerations in mind, researchers should consider standardizing terminology regarding sexual minority patients to allow for more cohesive dialogue in the scientific literature.

References

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