**Hereditary Breast and Ovarian Cancer Syndrome**

***Fact Sheet for Healthcare Professionals***

Hereditary Breast and Ovarian Cancer (HBOC) syndrome is associated with an increased risk for breast, ovarian, and other cancers. HBOC is usually caused by mutations in the *BRCA1* and *BRCA2* genes. *BRCA* mutations are responsible for approximately 3% of all breast cancers and 10% of all ovarian cancers. Identification of individuals with *BRCA* mutations is important to allow them to take advantage of interventions that can significantly reduce their risk of cancer and allow for early detection of cancer if it develops.

**Cancer Risks Associated with *BRCA1* and *BRCA2* Mutations:**

* 45-65% risk of breast cancer by age 70 for women with *BRCA1* or *BRCA2* mutations, compared with a 12-13% risk for women in the general population.
* 10-39% risk of ovarian cancer by age 70 for women with *BRCA1* or *BRCA2* mutations, compared with a 1-2% risk for women in the general population
* Increased risk for tubal, peritoneal, prostate, pancreatic, and male breast cancers
* Increased risk for early onset breast or ovarian cancer (before age 50)

**Individuals Are More Likely to Have a *BRCA1* or *BRCA2* Mutation if They Have a Personal or Family Health History of Any of the Following:**

* Breast cancer diagnosed at age 50 or younger in women
* Triple negative breast cancer diagnosed at age 60 or younger in women
* Epithelial ovarian, fallopian tube, or primary peritoneal cancer
* Two diagnoses of breast cancer or two types of *BRCA*-related cancer in the same person
* Breast cancer at any age in men
* Pancreatic cancer
* Metastatic or high grade (Gleason score ≥7) prostate cancer
* Breast, ovarian, pancreatic, or high grade prostate cancer among multiple blood relatives
* Ashkenazi (Eastern European) Jewish ancestry
* A known *BRCA1* or *BRCA2* mutation in the family

**Note:** The Centers for Medicare and Medicaid Services (CMS) Local Coverage Determination (LCD) on *BRCA1* and *BRCA2* Genetic Testing allows for regional coverage of *BRCA* genetic counseling and testing for individuals with personal histories of breast, ovarian, and other cancers that fit specific criteria for increased risk for a *BRCA* mutation. If this LCD applies to your state, the list above (“Individuals Are More Likely to Have a BRCA1 or BRCA2 Mutation if They Have a Personal or Family Health History of Any of the Following:”) can be replaced with the list in the **Appendix**, which contains the specific criteria for referrals from the LCD.

**Evidence-Based Clinical Recommendations for Identifying Patients at Risk Because of Personal or Family Health History Who Should Be Referred for Genetic Services**

*Recommendation for* BRCA*-Related Cancer: Risk Assessment, Genetic Counseling, and Genetic Testing* *from the U.S. Preventive Services Task Force (USPSTF)* (2019)*1*

The USPSTF recommends that primary care providers screen women with a personal or family history of breast, ovarian, tubal, or peritoneal cancer or who have an ancestry associated with *BRCA* gene mutations with one of several screening tools designed to identify a family health history with an increased risk for potentially harmful mutations in breast cancer susceptibility genes (*BRCA1* or *BRCA2*). These tools include the Ontario Family History Assessment Tool, Manchester Scoring System, Referral Screening Tool, Pedigree Assessment Tool, 7-Question Family History Screening Tool, International Breast Cancer Intervention Study instrument (Tyrer-Cuzick), and brief versions of BRCAPRO. Women with positive screening results should receive genetic counseling and, if indicated after counseling, *BRCA* testing. It is important to note that the screening results from different tools might not be consistent, because the criteria and algorithms used vary among tools. Furthermore, some individuals with *BRCA1* or *BRCA2* mutations might not be identified using these tools.

*Other recommendations*

Recommendations from the National Comprehensive Cancer Network (NCCN) and the American College of Medical Genetics and Genomics (ACMG)/National Society of Genetic Counselors (NSGC) include personal and family health history referral criteria for *BRCA* genetics counseling and testing.

**Genetic Counseling and Testing for HBOC**

*Insurance Coverage*

The Centers for Medicare and Medicaid Services (CMS) Local Coverage Determination (LCD) on *BRCA1* and *BRCA2* Genetic Testing allows for regional coverage of *BRCA* genetic counseling and testing for individuals with personal histories of breast, ovarian, and other cancers that fit specific criteria for increased risk for a *BRCA* mutation. The Recommendation for *BRCA*-Related Cancer: Risk Assessment, Genetic Counseling, and Genetic Testing from the U.S. Preventive Services Task Force (USPSTF) (2019)1 addresses *BRCA* genetic counseling and testing in women who have a personal or family health history of breast, ovarian, tubal, or peritoneal cancer or an ancestry associated with *BRCA* mutations.The Affordable Care Act requires non-grandfathered health plans to cover without cost sharing preventive services with a USPSTF rating of “B” or higher, which includes the *BRCA* testing recommendation. Importantly, genetic counseling, if appropriate, is covered without cost sharing by many health plans under the Affordable Care Act when used in accordance with the USPSTF recommendation. And, the U.S. Department of Health and Human Services has advised insurance companies to also cover the *BRCA* test without cost sharing when used in accordance with the USPSTF recommendation.

*Genetic Counseling*

Genetic counseling helps individuals better understand their risk for hereditary cancer so that they can make informed decisions about genetic testing and follow-up care by:

* Reviewing an individual’s personal and family medical history
* Determining which family member is most appropriate for initial genetic testing in a family
* Reviewing risk for HBOC and the chance of finding a mutation through genetic testing
* Interpreting genetic test results and explaining what they mean for individuals and their relatives
* Outlining medical management implications of a positive or a negative test result
* Providing referrals to medical specialists, support resources, and research opportunities
* Addressing concerns about the privacy and confidentiality of personal genetic information

*Benefits and Risks of Genetic Testing*

* Individuals with a positive test result can take steps to reduce their cancer risk through prophylactic surgery, medications that can prevent the onset of cancer, and earlier, more frequent screening
* Genetic testing may provide a patient’s relatives with useful information, including which mutation relatives should be tested for.
* A negative test result may provide a sense of relief and will help the patient avoid unneeded screens, medications, or surgeries.
* While the benefits of genetic testing greatly outweigh the disadvantages, test results may affect a person’s emotions, family relationships, finances, privacy, and medical choices.
* Genetic information cannot be used to deny someone health coverage or employment, because of a federal law called the Genetic Information Nondiscrimination Act of 2008 (GINA). However, this law does not cover life, disability, or long-term care insurance, and only applies to asymptomatic individuals (*not* those with a personal history of HBOC-related cancer).
* Treatments like prophylactic surgery have risks and possible serious long-term complications.

**Medical Management of Patients with HBOC**

*Several management options exist but the strength of evidence varies across types of interventions*

Interventions noted by USPSTF1 that may reduce risk include:

* Bilateral mastectomy, which reduces breast cancer risk by 90-100%
* Oophorectomy or bilateral salpingo-oophorectomy, which reduces ovarian cancer risk by 81-100%
* Chemoprevention with tamoxifen, raloxifene, or aromatase inhibitors
* Earlier, more frequent, or more intensive cancer screening

In addition, NCCN recommendations include2:

* Patient education about breast awareness and need to promptly report changes
* Annual breast MRI screening with contrast starting at age 25 (possibly earlier if family history of breast cancer before age 30)
	+ If MRI unavailable, mammogram with consideration of tomosynthesis
* Clinical breast exams every 6-12 months starting at age 25
* Consideration of hysterectomy in women having oophorectomy or salpingo-oophorectomy
* Trans-vaginal ultrasound and CA-125 every 6 months starting at age 30-35 years *(not determined to decrease morbidity or mortality*)
* For men
	+ Breast self-exam training starting at age 35
	+ Yearly clinical breast exam starting at age 35
	+ Prostate screening starting at age 45 for men with *BRCA2* mutations, consider for men with *BRCA1* mutations

References

1. U.S. Preventive Services Task Force. Risk Assessment, Genetic Counseling, and Genetic Testing for *BRCA*-Related Cancer: U.S. Preventive Services Task Force Recommendation Statement. *JAMA*. 2019; 322:652-655.
2. National Comprehensive Cancer Network. NCCN Guidelines Version 3.2019 Genetics/Familial High-Risk Assessment: Breast and Ovarian.

**Appendix *(Please see yellow box above to see when and where this information can be included)*:**

**Patients With Any of the Following Personal Histories Should Be Referred for Genetic Counseling and Testing for HBOC:**

* Breast cancer diagnosed at age 45 or younger in women
* Breast cancer diagnosed at age 46–50 in women with at least one close blood relative with breast cancer at any age or limited family health history
* Triple negative breast cancer diagnosed at age 60 or younger in women
* Two breast primaries, with the first diagnosis prior to age 50, or two types of BRCA-related cancer in the same person
* Breast cancer at any age and any of the following:
	+ At least 2 close blood relative with breast cancer at any age
	+ At least 1 close blood relative with breast cancer diagnosed at age 50 or younger
	+ At least 2 close blood relatives with pancreatic cancer or prostate cancer with Gleason score ≥7
	+ A close blood relative with epithelial ovarian, fallopian tube, or primary peritoneal cancer
	+ Ashkenazi (Eastern European) Jewish ancestry
	+ Close male blood relative with breast cancer
	+ A known mutation in a cancer susceptibility gene within the family
* Breast cancer at any age in men
* Epithelial ovarian, fallopian tube, or primary peritoneal cancer
* Pancreatic cancer or prostate cancer with Gleason score ≥7 and at least 1 close blood relative with
	+ Breast cancer before age 50
	+ Invasive ovarian cancer at any age
	+ Pancreatic cancer at any age
	+ Prostate cancer with Gleason score ≥7 at any age
* Pancreatic cancer and Ashkenazi (Eastern European) Jewish ancestry
* Personal or family history of three or more of the following (especially if early onset and can include multiple primary cancers in same individual):\*
	+ Breast cancer
	+ Pancreatic cancer
	+ Prostate cancer (Gleason score ≥7)
	+ Melanoma
	+ Sarcoma
	+ Adrenocortical carcinoma
	+ Brain tumors
	+ Leukemia
	+ Diffuse gastric cancer
	+ Colon cancer
	+ Endometrial cancer
	+ Thyroid cancer
	+ Kidney cancer
	+ Dermatologic manifestations or macrocephaly
	+ Hamartomatous polyps of gastrointestinal (GI) tract

\*Not included in all LCDs