Mutation Rates and Reasons for Declining *BRCA* Genetic Testing Among Women with Breast or Ovarian Cancer

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Background

- 5-10% of breast and ovarian cancers are caused by *BRCA* mutations
- Women with *BRCA* mutations have increased cancer risks, including multiple primary cancers
- Screening, medication and prophylactic surgery can reduce these risks[1]

Many women with cancer who access genetic counseling are motivated by surgical decision making at the time of cancer treatment. Counseling individuals with cancer is also important for family testing strategies that emphasize testing family members with cancer first as a means of obtaining the most informative result. However, genetic testing may not be indicated for all patients, and some patients have internal or external barriers to appropriate testing.

Determining the rate of *BRCA* mutation in the clinical population with cancer as well as understanding the varying reasons for not proceeding with *BRCA* genetic testing is important for Michigan's work promoting genetic counseling and testing for appropriate individuals according to USPSTF[2] and NCCN[3] guidelines.

Methods

The Michigan Department of Community Health collects information on all *BRCA*-related counseling visits provided by 15 clinics with board-certified/eligible genetics providers as part of a cooperative agreement with the CDC. This information includes patient cancer history, family cancer history, *BRCA* tests and results, and reasons for declining testing, if applicable.

Inclusion Criteria

- *BRCA* genetic counseling between Jan. 1, 2008 – Dec. 31, 2012
- Female
- Personal history of breast and/or ovarian cancer
- No testing prior to referral to genetic counseling
- No known familial mutation

A drop-down menu of common reasons for declining testing was created with input from participating providers after consulting the literature.

Reasons for Not Testing Menu

- Needs to arrange life/disability insurance
- Wants to discuss options with relatives
- Does not meet Medicare criteria for coverage
- Does not want to know genetic status
- Inadequate insurance coverage (test co-pay too costly)
- Not a good time
- Not clinically indicated
- Not the best test candidate in the family
- Patient sees no benefit
- Reassured by risk assessment

Frequencies of testing, mutation, and reasons for not testing were calculated among women with a history of breast and/or ovarian cancer, without testing prior to counseling and without a known familial mutation.

Results

From 2008-2012, 5,693 women with a personal breast and/or ovarian cancer history were seen for *BRCA* genetic counseling; 78.6% had testing.

Figure 1. *BRCA* genetic testing among women with cancer presenting for genetic counseling

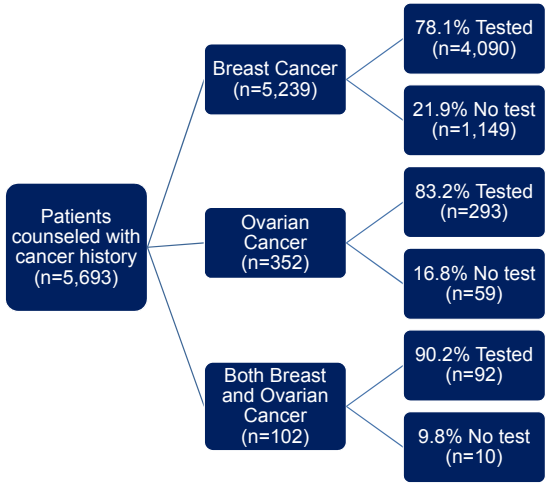

Table 1. *BRCA* Mutation Rates in women presenting for genetic counseling and testing with breast and/or ovarian cancer

BRCA Result	Cancer Type N (%)		
	Breast	Ovarian	Both Breast & Ovarian
Positive (Deleterious Mutation)	265 (6.5)	41 (14.0)	27 (29.4)
Negative (No Mutation)	3,645 (89.1)	237 (80.9)	61 (66.3)
Variant (Unknown Significance)	180 (4.4)	15 (5.1)	4 (4.4)
Total	4,090	293	92

Among women who proceeded with testing, 29.4% with a history of both breast and ovarian cancer, 14.0% with ovarian cancer and 6.5% with breast cancer were *BRCA* positive (Table 1).

A further breakdown of breast cancer mutation rates according to age of diagnosis revealed that 7.8% of those diagnosed at ≤ 50 years of age were positive for a deleterious mutation, while 4.0% of those diagnosed over age 50 were positive.

1,095 (89.9%) of the 1,218 women with cancer who did not have testing had a recorded reason for not testing (Table 2).

Results

Table 2. Top five reasons for not testing after receiving *BRCA* genetic counseling among women with cancer

Reason for Not Testing	Cancer Type N (%)		
	Breast N = 1,036	Ovarian N = 49	Both Breast & Ovarian N = 10
Inadequate Insurance Coverage	238 (23.0)	15 (30.6)	5 (50.0)
Not Clinically Indicated	248 (23.9)	4 (8.2)	0
Discuss Options with Relatives	74 (7.1)	8 (16.3)	0
Does not Meet Medicare Criteria	75 (7.2)	4 (8.2)	1 (10.0)
Not a Good Time	69 (6.7)	3 (6.1)	2 (20.0)

Among those with a recorded reason for not testing, 50.0% of women with both breast and ovarian cancer and 30.6% with ovarian cancer alone had to decline testing due to inadequate insurance coverage or a high co-pay. The most common reason for not testing for those with breast cancer was that testing was not clinically indicated (23.9%), followed by inadequate insurance coverage (23.0%, Table 2).

Conclusion

- *BRCA* mutation rates in those with ovarian cancer are high, especially for those with both breast and ovarian cancer
- Inadequate insurance coverage is a barrier to appropriate testing
- Genetics providers play an important role in determining the clinical appropriateness of testing

The observed mutation rate in women with a personal history of both breast and ovarian cancer underscores the importance of securing genetic counseling and testing services for all individuals with this type of history. Likewise, counseling is appropriate for all individuals with ovarian cancer. Referral to genetics providers also functions as a screen for determining the clinical necessity of costly genetic testing, even in the presence of a personal cancer history.

Efforts to improve insurance access and coverage (including out-of-pocket costs) for high-risk individuals are needed, particularly for the population referred for genetic counseling due to personal cancer history.

References & Acknowledgements

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