Deleterious BRCA mutations confer increased cancer risks, including higher risks of new primary cancers, but surgical interventions can reduce these risks by at least 95%.1,2

Women with breast cancer who are found to be positive for BRCA mutations may opt for more extensive surgeries at the time of cancer treatment for the purpose of prophylaxis. Others may not have testing until well after their cancer diagnosis.

Our study explored which surgical interventions women with deleterious BRCA mutations choose, and whether there were differences in surgery choice depending on knowledge of BRCA results at the time of cancer treatment.

A phone survey including BRCA positive women was created by the Michigan Department of Community Health and conducted by eight Michigan centers with board-certified/eligible genetics providers who had provided genetic counseling to the respondents. Seven of the eight facilities attempted inclusion of all of patients meeting criteria, while one facility contacted a random subset of their eligible patients.

Women in this analysis met the following criteria:
• Counseled at one of eight facilities with genetics providers from Oct. 1, 2007 – Sept. 30, 2009
• Had BRCA testing, either before or after the counseling visit
• Were positive for a deleterious BRCA mutation

Out of 96 respondents who tested positive for a BRCA mutation, 48 (50.0%) had been diagnosed with breast cancer, and three of these individuals were diagnosed with breast cancer after having genetic counseling and testing (Table 1).

Table 1. Cancer History of BRCA positive respondents

<table>
<thead>
<tr>
<th>Cancer Event</th>
<th>BRCA Positive Patients</th>
<th>N = 96</th>
<th>% (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Cancer*</td>
<td>3 (3.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New breast cancer</td>
<td>4 (4.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No new cancer</td>
<td>89 (92.9)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Any cancer history*</td>
<td>44 (45.8)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovarian</td>
<td>10 (10.4)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Both breast and ovarian</td>
<td>4 (4.2)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>No cancer history</td>
<td>38 (39.6)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Forty-five BRCA positive respondents with a history of breast cancer reported the most extensive breast cancer treatment surgery undergone, including bilateral mastectomy (17, 37.8%), unilateral mastectomy (17, 37.8%) and lumpectomy (11, 24.4%).

There was a significant difference in the surgeries undergone by BRCA positive women who knew and who did not know their BRCA status at the time of surgery (Fisher’s exact test, p<0.01), shown in Figure 1.

Fifty percent of the women who knew their mutation status at the time of surgery opted for more extensive surgery, while 29% of women who did not know their mutation status at the time of surgery did the same. While this difference was significant (p<0.01), the majority (55%) of women who knew their mutation status opted for less extensive surgery.

Conclusion
• BRCA positive women who knew their mutation status at the time of surgery tended to choose more extensive breast cancer surgeries (majority bilateral mastectomy)
• Women with cancer who did not learn their BRCA positive status until after cancer treatment chose lumpectomies nearly as often as unilateral mastectomies; both were more common than bilateral mastectomies
• Prophylactic surgery uptake appears to be high among BRCA positive respondents
• Knowledge of BRCA positive status at the time of treatment may enable cancer patients to avoid additional prophylactic breast surgeries at a later time
• When genetic counseling and testing are indicated, efforts should be made to provide these services prior to surgical cancer treatment decision-making

Timing of BRCA Genetic Testing and Extent of Breast Cancer Surgery in Women with Deleterious Mutations
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Michigan Department of Community Health, Lifecourse Epidemiology and Genomics Division

Survey Surgery Q’s
Prophylactic Surgery
Prompt: A prophylactic measure is something done to prevent cancer before any symptoms occur. These surgeries may occur at the same time as cancer treatment. For example, the removal of an unaffected breast during surgery to remove cancer in the opposite breast is prophylactic.

1) Have you ever had a prophylactic mastectomy to prevent breast cancer?
   • Was this after you received your BRCA test results?
2) Are you considering a prophylactic surgery in the future?
   • What type of prophylactic surgery are you thinking of having?

Cancer Treatment Surgery
Prompt: This section is about cancer diagnoses and treatment.

1) If you have ever had surgery to treat breast cancer, what is the most extensive type of surgery you have had?
   • Did you receive your BRCA results before this cancer surgery?


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References & Acknowledgements