INTRODUCTION

Cancer is the second-leading cause of death in the United States (U.S.),1 and a reduction in mortality has been observed in populations with cancer screening programs.2,3 Recently, multi-cancer early detection (MCED) tests, which can simultaneously screen for multiple types of cancer, have been developed.4 When used alongside standard of care (SoC) screening, an economic analysis projects these tests may improve survival outcomes and lower treatment costs.7

The predicted benefits may depend on methods for projecting post-diagnosis survival. Mixture cure modeling (MCM) has been proposed for projecting survival impact with MCED testing because it includes a proportion of cured patients which is less sensitive to lead time bias.4

OBJECTIVE

This study explores the impact of using MCM as compared to a standard extrapolation of survival on the cost-effectiveness of MCED testing.

RESULTS

When adding MCED test to SoC with either method of survival projection, stage I/II cancer diagnoses increased by 23.2%, and stage III/IV cancer diagnoses were reduced by a relative difference of 39.3% when using MCED + SoC.

When adding MCED test to SoC alone in adults aged 50 to 79 years. Patient survival was estimated using the SEER database for three years, followed by a constant hazard.7

Diagnosis by Survival Projection

<table>
<thead>
<tr>
<th>Cancer Type</th>
<th>Simple</th>
<th>MCM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Breast (ER-positive)</td>
<td>14.28</td>
<td>15.69</td>
</tr>
<tr>
<td>Breast (ER-negative)</td>
<td>19.67</td>
<td>21.19</td>
</tr>
<tr>
<td>Prostate</td>
<td>12.65</td>
<td>14.51</td>
</tr>
<tr>
<td>Colon and Rectum</td>
<td>13.66</td>
<td>15.07</td>
</tr>
<tr>
<td>Leukemia</td>
<td>9.49</td>
<td>10.71</td>
</tr>
<tr>
<td>Non-Hodgkin Lymphoma</td>
<td>8.41</td>
<td>9.56</td>
</tr>
<tr>
<td>Lung and Bronchus</td>
<td>7.81</td>
<td>8.96</td>
</tr>
<tr>
<td>Skin (melanoma)</td>
<td>4.17</td>
<td>5.38</td>
</tr>
<tr>
<td>Skin (non-melanoma)</td>
<td>3.92</td>
<td>5.08</td>
</tr>
</tbody>
</table>

In scenario analysis, VBP was similarly sensitive to cancer dwell time assumptions with both survival methods (Figure 3).

METHODS

A Markov model was developed to compare annual MCED testing plus SoC screening vs. SoC alone in adults aged 50 to 79 years. Patient survival, cost, and quality of life measures were calculated pre- and post-survival over a lifetime time horizon. All costs and outcomes were discounted at 3% annually.7

Survival by cancer, stage, and age at detection was projected from the Surveillance, Epidemiology, and End Results (SEER) program.10

The model does not account for the additional post-diagnosis treatment costs associated with patients who have multiple types of cancers.

The model does not account for the additional post-diagnosis treatment costs associated with patients who have multiple types of cancers.

CONCLUSION

Different methods for projecting post-diagnosis survival may lead to variation in estimated cost-effectiveness of MCED testing, with the potential for cure supporting greater benefits.

Acknowledgments

The authors would like to acknowledge Edna Productions staff for figure generation and editorial services.

Disclosures

This study was funded by GRAIL, LLC, a subsidiary of Illumina, Inc.

AUTHORS

Kansal AR, Shaul A, Ye WP, Chavan A, Zou DR, Fendrick AM

1GRAIL, LLC, a subsidiary of Illumina, Inc, Menlo Park, CA, United States; 2Evidera, Bethesda, MD, United States; 3Departments of Internal Medicine, Center for Value-Based Insurance Design; University of Michigan, Ann Arbor, MI, United States

REFERENCES