

**Appendix Table 2. Qualitative Review of the Long-Term Effects of False-Positive Mammograms on Outcomes Other than Return for Screening\***

| Outcome  | Study, Year (Reference)                               | Timing of Assessment after Screening | Finding and Statistical Significance†          | Outcome Assessment   |
|--|---|--------------------------------------|--|--|
| <b>Frequency of BSE and attitudes toward BSE and mammography</b> |   |                                      |  |  |
| Frequency of BSE   | Aro et al., 2000 (34)                                 | 2 mo<br>12 mo                        | FP significantly more<br>FP significantly more | Ad hoc (1 item)  |
| Frequency of BSE   | Bull and Campbell, 1991 (39)                          | 6 wk                                 | FP significantly more                          | Ad hoc (1 item)  |
| Frequency of BSE   | Gram et al., 1990 (43)                                | 18 mo                                | No effect (direction of null effect NR)        | NR   |
| Frequency of BSE   | Lampic et al., 2001 (46);<br>Lampic et al., 2003 (47) | 12 mo                                | FP significantly more                          | Ad hoc (1 item)  |
| Frequency of BSE   | Lerman et al., 1991 (31);<br>Lerman et al., 1991 (48) | 3 mo                                 | No effect                                      | Ad hoc (1 item)  |
| Frequency of BSE   | Scaf-Klomp et al., 1997 (55)                          | 8–10 wk                              | FP more, not significant                       | Ad hoc (1 item)  |
| Confidence in BSE  | Aro et al., 2000 (34)                                 | 2 mo                                 | FP less, not significant                       | Ad hoc (1 item)  |
|  |   | 12 mo                                | FP significantly less                          |  |
| Perceived importance of BSE                                      | Aro et al., 2000 (34)                                 | 2 mo                                 | FP more, not significant                       | Ad hoc (1 item)  |
| Confidence in breast cancer prevention                           | Aro et al., 2000 (34)                                 | 2 mo                                 | FP less, not significant                       | Ad hoc (1 item)  |
|  |   | 12 mo                                | FP less, not significant                       |  |
| Perceived sensitivity of mammography                             | Bull and Campbell, 1991 (39)                          | 6 wk                                 | FP significantly more                          | Ad hoc (1 item)  |
| Perceived benefits of mammography                                | Gram et al., 1990 (43)                                | 18 mo                                | FP more, not significant                       | NR   |
| Perceived benefits of screening                                  | Lipkus et al., 2000 (49)                              | Varied                               | FP significantly more                          | Rakowski pros and cons scale (reference 57) (20 items)           |
| Ambivalence about future mammograms                              | Lipkus et al., 2000 (49)                              | Varied                               | FP significantly more                          | Ad hoc (1 item)  |
| Perceived benefits of mammography                                | Pisano et al., 1998 (15)                              | Varied                               | FP significantly more                          | NR   |
| Perceived barriers to mammography                                | Pisano et al., 1998 (15)                              | Varied                               | FP less, not significant                       | NR   |
| Perceived negative effect of mammography screening               | Pisano et al., 1998 (15)                              | Varied                               | FP less, not significant                       | NR   |
| Belief that annual mammography is necessary                      | Pisano et al., 1998 (15)                              | Varied                               | FP more, not significant                       | NR   |
| <b>Health care use and symptoms</b>                              |   |                                      |  |  |
| Frequency of outpatient care                                     | Gram et al., 1990 (43)                                | 18 mo                                | FP more, not significant                       | NR   |
| Frequency of physiotherapy                                       | Gram et al., 1990 (43)                                | 18 mo                                | FP less, not significant                       | NR   |
| Frequency of visits to general practitioner                      | Gram et al., 1990 (43)                                | 18 mo                                | FP no effect                                   | NR   |
| Mental health professional use                                   | Jatoi et al., 2006 (45)                               | Varied                               | FP significantly more                          | Ad hoc (1 item)  |
| Clinical breast examination in past 12 mo                        | Lipkus et al., 2000 (49)                              | Varied                               | FP no effect                                   | Ad hoc (1 item)  |
| Good health habits   | Aro et al., 2000 (34)                                 | 2 mo                                 | FP less, not significant                       | Illness attitude scale (reference 58), subscale (2 items)        |
|  |   | 12 mo                                | FP no effect                                   |  |
| Symptoms in breasts  | Aro et al., 2000 (34)                                 | 2 mo                                 | FP significantly more                          | Ad hoc (1 item)  |
| Symptom reports  | Ellman et al., 1989 (42)                              | 2 mo                                 | FP significantly more                          | General Health Questionnaire (reference 59) (28 items), subscale |
|  |   | 3 mo                                 | FP less, not significant                       |  |
| Symptom reports  | Sandin et al., 2002 (54)                              | 2 mo                                 | FP more, not significant                       | SCL-90-R (reference 60), subscale                                |
| Symptom reports  | Scaf-Klomp et al., 1997 (55)                          | 8–10 wk                              | FP more, not significant                       | SCL-90 (reference 61), somatization subscale                     |
|  |   | 8 mo                                 | FP significantly more                          |  |
| Effects of symptoms  | Aro et al., 2000 (34)                                 | 2 mo                                 | FP less, not significant                       | Illness attitude scale (reference 58), subscale (3 items)        |
|  |   | 12 mo                                | FP significantly less                          |  |
| Impairment in daily activities because of worrying               | Lerman et al., 1991 (31);<br>Lerman et al., 1991 (48) | 3 mo                                 | FP significantly more                          | Ad hoc (1 item)  |
| Believe breasts are healthy                                      | Aro et al., 2000 (34)                                 | 2 mo                                 | FP significantly less                          | Ad hoc (1 item)  |
|  |   | 12 mo                                | FP significantly less                          |  |
| Bodily preoccupation   | Aro et al., 2000 (34)                                 | 2 mo                                 | FP less, not significant                       | Illness attitude scale (reference 58), subscale (4 items)        |
|  |   | 12 mo                                | FP less, not significant                       |  |
| Well-being   | Gram et al., 1990 (43)                                | 18 mo                                | No effect (direction of null effect NR)        | Ad hoc   |

*Continued on following page*

**Appendix Table 2—Continued**

| <b>Outcome</b>   | <b>Study, Year (Reference)</b>  | <b>Timing of Assessment after Screening</b> | <b>Finding and Statistical Significance†</b>                            | <b>Outcome Assessment</b>  |
|--|---|---|---|--|
| <b>Psychological distress</b>                              |   |   |   |  |
| Generalized symptoms of distress related to past mammogram | Barton et al., 2004 (35)  | 3 mo  | FP significantly more   | Impact of Events Scale (reference 62)                                    |
| Distress about breast cancer                               | Cockburn et al., 1994 (41)  | 8 mo  | FP more on 3 subscales, not significant                                 | Psychological Consequences Questionnaire (reference 63)                  |
| Symptoms of distress, summary score                        | Ellman et al., 1989 (42)  | 3 mo  | FP less, not significant  | General Health Questionnaire (reference 59) (28 items)                   |
| Symptoms of social dysfunction                             | Ellman et al., 1989 (42)  | 3 mo  | FP less, not significant  | General Health Questionnaire (reference 59) (28 items), subscale         |
| Stress   | Gram et al., 1990 (43)  | 18 mo                                       | No effect (direction of null effect NR)                                 | NR   |
| Taking sleeping pills                                      | Gram et al., 1990 (43)  | 18 mo                                       | No effect (direction of null effect NR)                                 | NR   |
| Sleeplessness  | Gram et al., 1990 (43)  | 18 mo                                       | No effect (direction of null effect NR)                                 | NR   |
| Symptoms of distress about breast cancer                   | Olsson et al., 1999 (52)  | 6 mo  | FP significantly more   | Psychological Consequences Questionnaire (reference 64)                  |
| Generalized symptoms of distress                           | Ong et al., 1997 (38); Brett et al., 1998 (36); Brett and Austoker, 2001 (37) | 1 mo<br>5 mo<br>3 y                         | FP significantly more<br>FP significantly more<br>FP significantly more | Psychological Consequences Questionnaire (reference 65)                  |
| Symptoms of distress about breast cancer                   | Meystre-Agustoni et al., 2001 (51)  | 8 wk after screening or negative result     | FP significantly more   | Psychological Consequences Questionnaire (reference 66)                  |
| Symptoms of global distress                                | Sandin et al., 2002 (54)  | 2 mo  | FP less, not significant  | SCL-90-R (reference 60)  |
| Symptoms of obsessive-compulsion                           | Sandin et al., 2002 (54)  | 2 mo  | FP significantly less   | SCL-90-R (reference 60), subscale  |
| Symptoms of anger  | Sandin et al., 2002 (54)  | 2 mo  | FP significantly less   | SCL-90-R (reference 60), subscale  |
| Symptoms of psychoticism                                   | Sandin et al., 2002 (54)  | 2 mo  | FP significantly more   | SCL-90-R (reference 60), subscale  |
| Symptoms of paranoia                                       | Sandin et al., 2002 (54)  | 2 mo  | FP more, not significant  | SCL-90-R (reference 60), subscale  |
| Symptoms of interpersonal sensitivity                      | Sandin et al., 2002 (54)  | 2 mo  | FP less, not significant  | SCL-90-R (reference 60), subscale  |
| Symptoms of distress                                       | Scaf-Klomp et al., 1997 (55)  | 8–10 wk<br>8 mo                             | FP less, not significant<br>FP significantly less                       | General Health Questionnaire (reference 59)                              |
| Loss of appetite   | Scaf-Klomp et al., 1997 (55)  | 8–10 wk<br>8 mo                             | FP significantly more<br>FP more, not significant                       | Ad hoc (1 item)  |
| Sleep disturbances   | Scaf-Klomp et al., 1997 (55)  | 8–10 wk<br>8 mo                             | FP significantly more<br>FP more, not significant                       | Ad hoc (1 item)  |
| <b>Anxiety</b>   |   |   |   |  |
| Generalized symptoms of anxiety                            | Aro et al., 2000 (34)   | 2 mo<br>12 mo                               | FP more, not significant<br>FP significantly less                       | State Trait Anxiety Inventory (67) (20 items)                            |
| Generalized symptoms of anxiety                            | Barton et al., 2004 (35)  | 3 mo  | FP more, not significant  | HSCL (reference 68), subscale  |
| Generalized symptoms of anxiety                            | Bull and Campbell, 1991 (39)  | 6 wk  | FP less, not significant  | Hospital Anxiety and Depression Scale (reference 69), subscale (7 items) |
| Generalized symptoms of anxiety                            | Ellman et al., 1989 (42)  | 3 mo  | FP more, not significant  | General Health Questionnaire (reference 59) (28 items)                   |
| Anxiety about breast cancer                                | Gram et al., 1990 (43)  | 6 mo<br>18 mo                               | FP significantly more<br>FP significantly more                          | NR   |
| Generalized feelings of nervousness, restlessness          | Jatoi et al., 2006 (45)   | Varied                                      | FP significantly more   | K6 Questionnaire (reference 70) (2 of 6 items)                           |
| Generalized symptoms of anxiety                            | Lampic et al., 2001 (46); Lampic et al., 2003 (47)                            | 3 mo<br>12 mo                               | FP less, not significant<br>FP less, not significant                    | Hospital Anxiety and Depression Scale (reference 69), subscale           |
| Anxiety about future mammograms                            | Lampic et al., 2001 (46); Lampic et al., 2003 (47)                            | 24 mo                                       | FP significantly more   | Ad hoc (11 item)   |
| Anxiety about future mammograms                            | Lerman et al., 1991 (31); Lerman et al., 1991 (48)                            | 3 mo  | FP significantly more   | Ad hoc (1 item)  |
| Anxiety about breast cancer                                | Meystre-Augustoni et al., 2001 (51)   | 8 wk  | FP significantly more   | Ad hoc (1 item)  |
| Generalized symptoms of anxiety                            | Sandin et al., 2002 (54)  | 2 mo  | FP more, not significant  | SCL-90-R (reference 60), subscale  |
| Phobic anxiety   | Sandin et al., 2002 (54)  | 2 mo  | FP less, not significant  | SCL-90-R (reference 60), subscale  |
| Generalized symptoms of anxiety                            | Scaf-Klomp et al., 1997 (55)  | 8–10 wk<br>8 mo                             | FP significantly more<br>FP more, not significant                       | Hospital Anxiety and Depression Scale (reference 69), subscale           |

Appendix Table 2—Continued

| Outcome  | Study, Year (Reference)                               | Timing of Assessment after Screening | Finding and Statistical Significance†                | Outcome Assessment   |
|--|---|--------------------------------------|--|--|
| <b>Worry, intrusive thoughts, fear, and perceived risk</b>                 |   |                                      |  |  |
| Worry about illness  | Aro et al., 2000 (34)                                 | 2 mo<br>12 mo                        | FP more, not significant<br>FP more, not significant | Illness Attitudes Scale (reference 58), subscale (4 items)                   |
| Worry about breast cancer  | Aro et al., 2000 (34)                                 | 2 mo<br>12 mo                        | FP significantly more<br>FP significantly more       | Ad hoc (1 item)  |
| Worry  | Gram et al., 1990 (43)                                | 18 mo                                | No effect (direction of null effect NR)              | NR   |
| Worry about breast cancer  | Lerman et al., 1991 (31);<br>Lerman et al., 1991 (48) | 3 mo                                 | FP significantly more                                | Ad hoc (1 item)  |
| Worry about breast cancer  | Lipkus et al., 2000 (49)                              | Varied                               | FP significantly more                                | Ad hoc (2 items)   |
| Worry about breast cancer  | Sandin et al., 2002 (54)                              | 2 mo                                 | FP significantly more                                | Ad hoc (1 item)  |
| Worry about breast cancer  | Scaf-Klomp et al., 1997 (55)                          | 8–10 wk<br>8 mo                      | FP significantly more<br>FP significantly more       | Ad hoc (1 item)  |
| Intrusive thoughts   | Aro et al., 2000 (34)                                 | 2 mo<br>12 mo                        | FP significantly more<br>FP significantly more       | Ad hoc (1 item)  |
| Increased concerns about breast cancer                                     | Lerman et al., 1991 (31);<br>Lerman et al., 1991 (48) | 3 mo                                 | FP significantly more                                | Ad hoc (1 item)  |
| Fear of breast cancer  | Sandin et al., 2002 (54)                              | 2 mo                                 | FP significantly more                                | Ad hoc (1 item)  |
| Fear of cancer   | Scaf-Klomp et al., 1997 (55)                          | 8–10 wk<br>8 mo                      | FP significantly more<br>FP significantly more       | Ad hoc (8 item)  |
| Fear of death  | Aro et al., 2000 (34)                                 | 2 mo<br>12 mo                        | FP less, not significant<br>FP less, not significant | Illness attitude scale (reference 58), subscale (3 items)                    |
| Fear of illness  | Aro et al., 2000 (34)                                 | 2 mo<br>12 mo                        | FP more, not significant<br>FP more, not significant | Illness attitude scale (reference 58), subscale (6 items)                    |
| Perceived risk for breast cancer   | Aro et al., 2000 (34)                                 | 12 mo                                | FP significantly more                                | Ad hoc (1 item)  |
| Perceived likelihood of breast cancer                                      | Aro et al., 2000 (34)                                 | 12 mo                                | FP significantly more                                | Ad hoc (5 items)   |
| Perceived likelihood of breast cancer                                      | Lipkus et al., 2000 (49)                              | Varied                               | FP significantly more                                | Ad hoc (2 items)   |
| Perceived likelihood of breast cancer                                      | Pisano et al., 1998 (15)                              | Varied                               | FP significantly more                                | NR   |
| Perceived likelihood of breast cancer                                      | Sandin et al., 2002 (54)                              | 2 mo                                 | FP more, not significant                             | Ad hoc (1 item)  |
| Perceived severity of breast cancer  | Aro et al., 2000 (34)                                 | 12 mo                                | FP less, not significant                             | Ad hoc (6 items)   |
| Perceived severity of breast cancer  | Pisano et al., 1998 (15)                              | Varied                               | FP less, not significant                             | NR   |
| <b>Depression</b>  |   |                                      |  |  |
| Generalized symptoms of depression   | Aro et al., 2000 (34)                                 | 2 mo<br>12 mo                        | FP more, not significant<br>FP more, not significant | Beck Depression Inventory (reference 71) (21 items)                          |
| Generalized symptoms of depression   | Barton et al., 2004 (35)                              | 3 mo                                 | FP more, not significant                             | HSCL (reference 68), subscale  |
| Generalized symptoms of depression   | Bull and Campbell, 1991 (39)                          | 6 wk                                 | FP more, not significant                             | Hospital Anxiety and Depression Scale (reference 69), subscale (7 items)     |
| Generalized symptoms of depression   | Ellman et al., 1989 (42)                              | 3 mo                                 | No effect  | General Health Questionnaire (reference 59) (28 items), subscale             |
| Generalized feelings of sadness, worthlessness, everything being an effort | Jatoi et al., 2006 (45)                               | Varied                               | FP significantly more                                | K6 Questionnaire (reference 70) (3 of 6 items)                               |
| Generalized feelings of hopelessness                                       | Jatoi et al., 2006 (45)                               | Varied                               | FP more, not significant                             | K6 Questionnaire (reference 70) (1 of 6 items)                               |
| Generalized symptoms of depression   | Lampic et al., 2001 (46);<br>Lampic et al., 2003 (47) | 3 mo<br>12 mo                        | FP significantly less<br>FP significantly less       | Hospital Anxiety and Depression Scale (reference 69), subscale               |
| Generalized symptoms of depression   | Lipkus et al., 2000 (49)                              | Varied                               | No effect (direction of effect NR)                   | Center for Epidemiologic Studies Depression Scale, short form (reference 72) |
| Generalized symptoms of depression   | Sandin et al., 2002 (54)                              | 2 mo                                 | FP less, not significant                             | SCL-90-R (reference 60), subscale  |
| Generalized symptoms of depression   | Scaf-Klomp et al., 1997 (55)                          | 8–10 wk<br>8 mo                      | FP more, not significant<br>FP more, not significant | Hospital Anxiety and Depression Scale (reference 69), subscale               |

\* All variables assessed by self-report. BSE = breast self-examination; FP = false-positive mammogram; HSCL = Hopkins Symptoms Checklist; K6 = Kessler 6; SCL-90 = Symptoms Checklist-90; SCL-90-R = Symptoms Checklist-90-Revised.

† The term “significant” refers to statistical significance ( $P < 0.05$ , 2-tailed test) of the bivariate relationship of receiving a false-positive mammogram to the outcome. Although we report the direction of results that do not reach statistical significance to allow the possibility of detecting trends in the data, the text of the paper summarizes the studies as finding an increase or decrease only when the effects are statistically significant.