CLINICAL GUIDELINE:

STANDARDIZED BREAST CANCER SCREENING

Physician Clinical Integration Network, LLC

Scope

Breast cancer is the most common noncutaneous cancer and the second leading cause of death in U.S. women. [1,2] A 30% decrease in breast cancer mortality since 1990 is attributed to earlier detection through mammography. However, the use of screening tools to identify a woman's lifetime risk for breast cancer can assist practitioners in making critical decisions regarding further assessment and genetic counseling. [3]

Women should be counseled about the harms and benefits of mammography. Individualized decisions should include shared decision-making based on risks, benefits, patient values, and preferences. [6]

Although mammography remains the most cost-effective approach for breast cancer screening, it is far from a perfect screening test, with a sensitivity of 76.5% and a specificity of 87.1% for women younger than 40 years. [7] Sensitivity is higher in women over 50 than in younger women. It is also higher in women with fatty breasts than in women with dense breasts. [8]

This clinical guideline focuses on breast cancer screening and methods to identify those at risk.

Population Included

Females with average risk for breast cancer.

Exclusions

- Females ≤25 years of age
- Males

Guidance

- The PCIN Quality Committee and its designees reviewed the available information in the medical literature and societal guidelines on the screening and risk assessment for breast cancer in the primary care setting.
- Various government sponsored groups, medical societies and coalitions each have their own recommendation on age and frequency of screenings. See Table 1 below.

Table 1: Breast Cancer Screening Recommendations by Organization

Society and expert recommendations for routine mammographic screening in women at average risk

Group (date)	Frequency of screening (years)	Initiation of screening for women at average risk		
		40 to 49 years of age	50 to 69 years of age	≥70 years of age
Government-sponsored groups				
US Preventive Services Task Force (2016)[1]	2	Individualize*	Yes	Yes, to age 74
Canadian Task Force on Preventive Health Care (2018)[2]	2 to 3	Recommend against*	Yes	Yes, to age 74
National Health Service, United Kingdom (2018)[3]	3	Yes, start age 47	Yes	Yes, to age 73
Royal Australian College of General Practitioners (2018)[4]	2	No	Yes	Yes, to age 74
Medical societies				
American College of Obstetricians and Gynecologists (2017)[5]	1 to 2*	Individualize*	Yes	Yes, to at least age 75¶
American College of Physicians (2019)[6]	2	Individualize*	Yes	Yes, to age 74
American Academy of Family Physicians (2019)[7]	2	Individualize*	Yes	Yes, to age 74
American Cancer Society (2015)[8]	1 year age 45 to 54	Individualize* through age 44	Yes	Yes△
	1 to 2 years age ≥55	Yes, start age 45		
American College of Radiology (2017)[9]	1	Yes	Yes	Yes◇
Coalitions				
National Comprehensive Cancer Network (2018)[10]	1	Yes	Yes	Yes

References:

1. *US Preventive Services Task Force. Screening for Breast Cancer: US Preventive Services Task Force recommendation statement. Ann Intern Med 2016; 164:279.*
2. *Canadian Task Force on Preventive Health Care, Klarenbach S, Sims-Jones N, Lewin G, et al. Recommendations on screening for breast cancer in women aged 40-74 years who are not at increased risk for breast cancer. CMAJ 2018; 190:E1441.*
3. *National Health Service. When it's offered: Breast cancer screening. Available at: https://www.nhs.uk/conditions/breast-cancer-screening/when-its-offered/ (Accessed on June 18, 2019).*
4. *The Royal Australian College of General Practitioners. Guidelines for preventive activities in general practice, 9th ed, East Melbourne, RACGP 2018.*
5. *American College of Obstetricians-Gynecologists. Practice bulletin no. 179: Breast cancer risk assessment and screening in average-risk women. Obstet Gynecol 2017; 130:e1-16.*
6. *Qaseem A, Lin JS, Mustafa RA, et al. Screening for breast cancer in average-risk women: A guidance statement from the American College of Physicians. Ann Intern Med 2019; 170:547.*
7. *American Academy of Family Physicians. Clinical preventive service recommendation: Breast cancer. Available at: www.aafp.org/patient-care/clinical-recommendations/all/breast-cancer.html (Accessed on June 27, 2019).*
8. *Oeffinger KC, Fontham ETH, Etzioni R, et al. Breast cancer screening for women at average risk: 2015 guideline update from the American Cancer Society. JAMA 2015; 314:1599.*
9. *Mainiero MB, Lourenco A, Mahoney MC, et al. ACR Appropriateness Criteria Breast Cancer Screening. J Am Coll Radiol 2013; 10:11.*
10. *National Comprehensive Cancer Network. NCCN Clinical Practice Guidelines in oncology: Breast cancer version 2. 2018.*

Recommendations

✓ **When to start mammogram screenings:**

- Women at average risk for breast cancer:
  - Consideration of starting annual screening in the 40s based on individual preferences and past medical and family history. Refer to Table 1 with recommendations from various societies.
- Women with certain BRCA1 or BRCA2 mutations or who are untested but have first-degree relatives (mothers, sisters, or daughters) who are proven to have BRCA mutations
  - Annual screening by age 30 (but not before age 25)
- Women with >20% lifetime risk for breast cancer based on family history (both maternal and paternal)
  - Annual screening by age 30 (but not before age 25), or 10 years earlier than the age of diagnosis of the youngest affected relative, whichever is later
- Women with mothers or sisters with pre-menopausal breast cancer
  - Annual screening by age 30 (but not before age 25), or 10 years earlier than the age of diagnosis of the youngest affected relative, whichever is later
- Women with histories of mantle radiation (usually for Hodgkin's disease) received between the ages of 10 and 30
  - Annual screening beginning 8 years after the radiation therapy, but not before age 25

- Women with biopsy-proven lobular neoplasia (lobular carcinoma in situ and atypical lobular hyperplasia), atypical ductal hyperplasia (adh), ductal carcinoma in situ (dcis), invasive breast cancer or ovarian cancer
    - Annual screening from time of diagnosis, regardless of age

✓ **When to stop annual mammogram screenings:**

- When life expectancy is < 5 to 7 years based on age or comorbid conditions
- When abnormal results of screening would not be acted on because of age or comorbid conditions
- Patient preference

✓ **When to perform screen breast MRI**

- Proven carriers of a deleterious BRCA mutation
    - Annual screening by age 30
- Untested first-degree relatives of proven BRCA mutation carriers
    - Annual screening by age 30
- Women with 20% lifetime risk for breast cancer based on family history
    - Annual screening by age 30
- Women with histories of chest irradiation (usually as treatment for Hodgkin's disease)
    - Annual screening beginning 8 years after the radiation therapy
- Women with newly diagnosed breast cancer and normal contralateral breast by conventional imaging and physical examination
    - Single screening MRI of the contralateral breast at the time of diagnosis
- May be considered in women with 15% to 20% lifetime risk for breast cancer based on personal history of breast or ovarian cancer or biopsy proven lobular neoplasia or adh

✓ **The Tyrer-Cuzick model for calculating breast cancer risk can be downloaded and used on all female patients >25 years of age and periodically thereafter**

- Use version 8 - includes the use of breast density in the risk calculation
- http://www.ems-trials.org/riskevaluator/

✓ **Patients at high risk will be referred to a genetic counselor:**

- Patients with a lifetime-risk calculation of >20% based on the Tyrer-Cuzick assessment OR
- Personal history of:
    - Li-Fraumeni syndrome
    - Cowden syndrome
    - Peutz-Jeghers syndrome
    - Diffuse gastric cancer OR
- With a family history of 3 or more of the following:
    - Breast cancer, pancreatic cancer, prostate cancer, melanoma, sarcoma, adrenocortical carcinoma, brain tumors, leukemia, diffuse gastric cancer, colon cancer, endometrial cancer, thyroid cancer, kidney cancer, dermatologic manifestations and/or macrocephaly, hamartomatous polyps of the Gi [gastrointestinal] tract.

Rationale

Mammography is the most commonly used screening test for the detection of breast cancer. Studies prove that early detection, with the appropriate follow-up and screening can decrease mortality associated with breast cancer. Several software-based screening tools have been used to identify lifetime risk based on family history and other risk factors; however, only the Tyrer-Cuzick model combines personal and family history as well as genetic analysis (BRCA1 and BRCA2), to provide the best overall determinant of lifetime risk. [2,5] In a study combining classic risk factors and breast density, Brentnall, et al. found "the Tyrer-Cuzick model with mammographic density was well calibrated with no significant loss in calibration to 19 years after assessment." [4]

Using best practice recommendations from The Society of Breast Imaging and the Breast Imaging Commission of the ACR, as well as the Tyrer-Cuzick model will provide practitioners with the tools necessary to make critical decisions regarding breast cancer screening as well as appropriate referrals to genetic services for women with increased lifetime risk of developing breast cancer. [2]

- Refer to Table 1: Breast cancer screening recommendations by organization [9]
- Refer to Figure 1: Algorithm for assessing breast cancer risk: making decisions about referral to genetic services and ordering breast MRI screening for women [2]

Recommendations by the National Comprehensive Cancer Network (NCCN) suggests women with a lifetime-risk calculation >20% (determined by the Tyrer-Cuzick Risk model) should be referred to genetic counselors trained to evaluate genetic mutations, including the BRCA1, BRCA2 and many others. The Tyrer-Cuzick model only assesses genetic factors associated with hereditary breast and ovarian cancer; therefore, any patient with the following should also be referred to a genetic counselor:

- TP53 mutations Li-Fraumeni syndrome
- PTEN mutations in Cowden syndrome
- STK11 mutations in Peutz-Jeghers syndrome
- CDH1 in hereditary diffuse gastric cancer
  OR
- A family history of 3 or more of the following:
  - breast cancer
  - pancreatic cancer
  - prostate cancer
  - melanoma
  - sarcoma
  - adrenocortical carcinoma
  - brain tumors
  - leukemia
  - diffuse gastric cancer
  - colon cancer
  - endometrial cancer
  - thyroid cancer
  - kidney cancer
  - dermatologic manifestations and/or macrocephaly
  - hamartomatous polyps of the GI (gastrointestinal) tract [2]

References

1. National Cancer Institute. Breast Cancer Screening (PDQ)-Health Professional Version. 2016. From: https://www.cancer.gov/types/breast/hp/breast-screening-pdq

2. Himes, Deborah O. et al. Breast Cancer Risk Assessment: Calculating Lifetime Risk Using the Tyrer-Cuzick Model. *The Journal for Nurse Practitioners*, Volume 12, Issue 9, 581 – 592.

3. Lee CH, et al. Breast cancer screening with imaging: Recommendations from the Society of Breast Imaging and the ACR on the Use of Mammography, Breast MRI, Breast Ultrasound, and Other Technologies for the Detection of Clinically Occult Breast Cancer. Journal of the American College of Radiology. https://doi.org/10.1016/j.jacr.2009.09.022

4. Brentnall, A. R., Cuzick, J., Buist, D., & Bowles, E. (2018). Long-term Accuracy of Breast Cancer Risk Assessment Combining Classic Risk Factors and Breast Density. *JAMA oncology*, *4*(9), e180174. doi:10.1001/jamaoncol.2018.0174

5. Tyrer, J. , Duffy, S. W. and Cuzick, J. (2004), A breast cancer prediction model incorporating familial and personal risk factors. Statist. Med., 23: 1111-1130. doi:10.1002/sim.1668

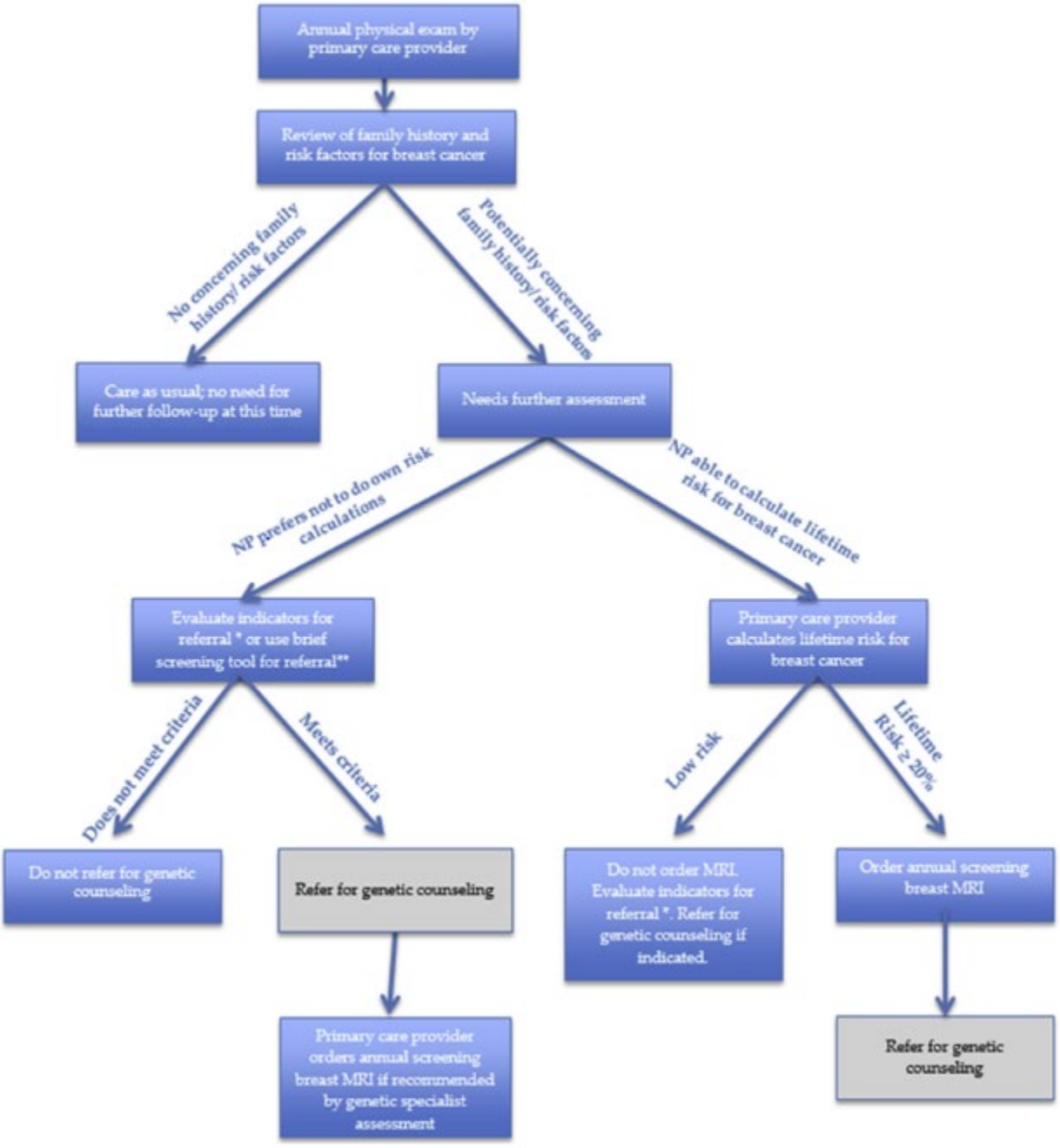
6. US Preventive Services Task Force. Screening for Breast Cancer: US Preventive Service Task Force recommendation statement, Annual Intern Med 2016;164:279.

7. Newton, Erin V & Lee, Marie C. (2019). Breast Cancer Screening. Emedicine .medscape.com. https://emedicine.medscape.com/article/1945498-overview#a3.

8. Komen, Susan E. (2020). Accuracy of Mammograms. https://ww5.komen.org/BreastCancer/AccuracyofMammograms.html.

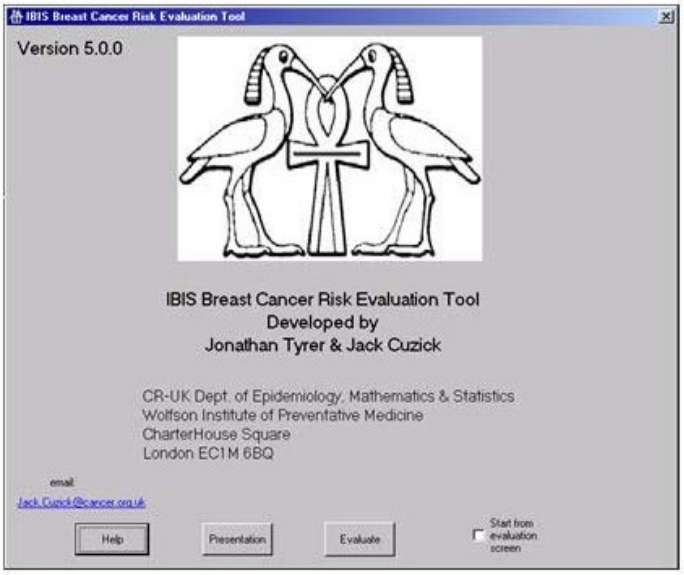
9. Elmore, Joann G, Aronson, Mark D & Kunins, Lisa. (2020). Screening for breast cancer: Strategies and recommendations. https://www.uptodate.com/contents/screening-for-breast-cancer-strategies-and-recommendations#H3331475080

Figure 1. Algorithm for assessing breast cancer risk: making decisions about referral to genetic services and ordering breast MRI screening for women.



Himes, Deborah O. et al. Breast Cancer Risk Assessment: Calculating Lifetime Risk Using the Tyrer-Cuzick Model. *The Journal for Nurse Practitioners*, Volume 12, Issue 9, 581 – 592.

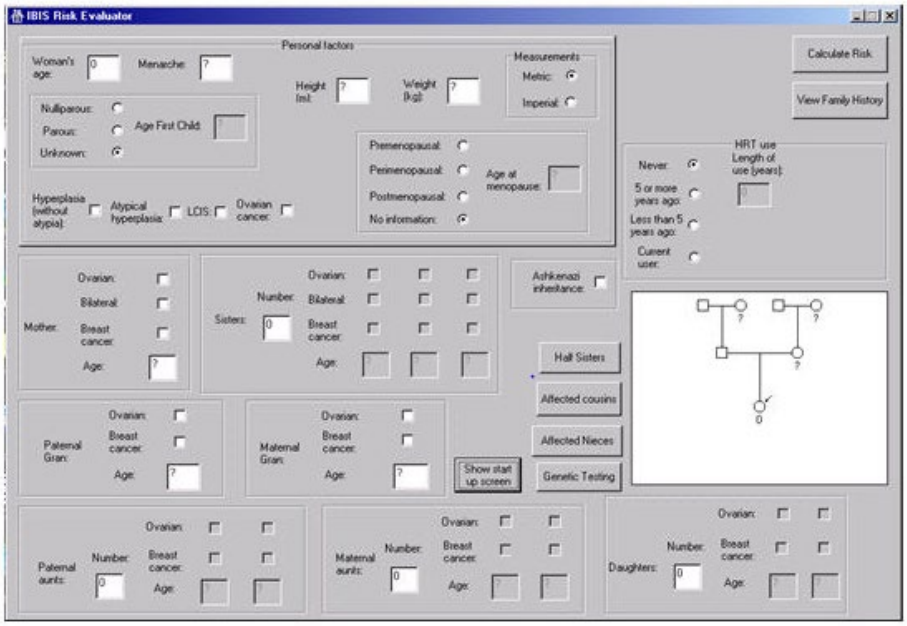
IBIS Breast Cancer Risk Evaluation Tool (Tyrer.Cuzick)
Instruction Guide



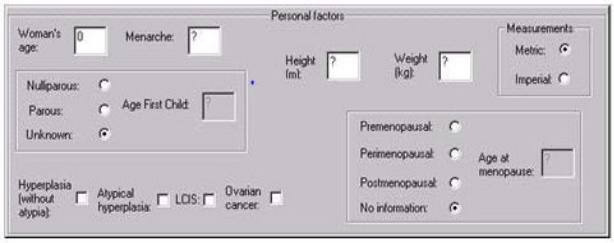
Description of Buttons

- "Help" activates a Word file giving details about the program
- "Presentation" activates this PowerPoint presentation
- "Evaluate" goes to the evaluation screen
- Checking the "start from evaluation screen" box determines whether the program will start from the evaluation screen the next time it is run (rather than the introductory screen)

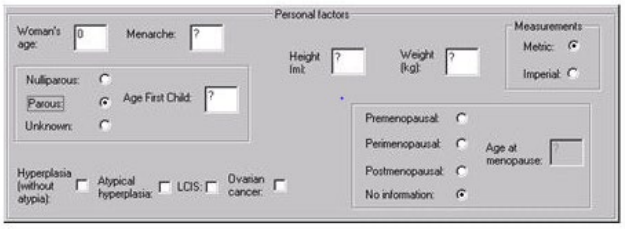
Evaluation Screen



Personal Details Section

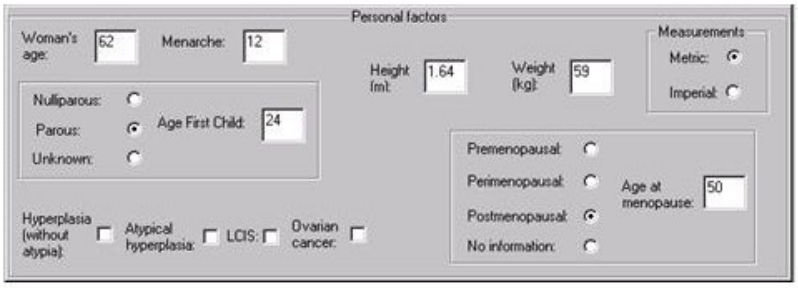


- Notice some boxes are greyed out
  - "Age First Child" box is greyed out because woman is not parous; therefore, has never had a child
  - "Age at Menopause" box is greyed out because woman is premenopausal

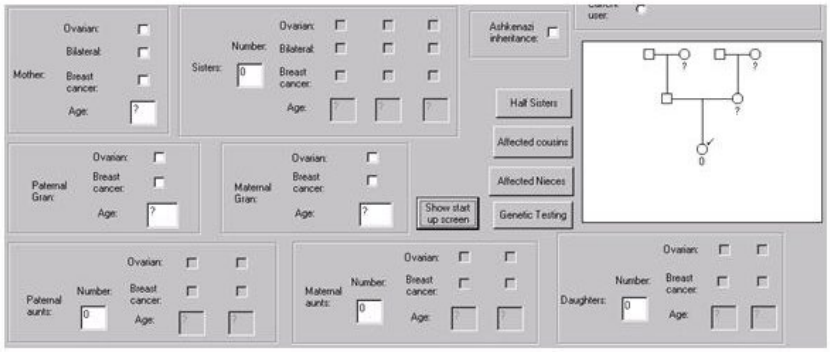


- After clicking "Parous" the "Age First Child" box is enabled, and you may now enter data in this field.

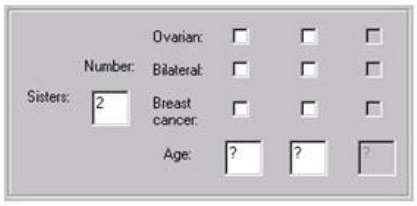
A Typical Personal Entry



Family History Section



- Five Box Types
  - 'Number' edit box
  - 'Age' edit box
  - 'Affected Status' check box
  - 'Ovarian Status' check box
  - 'Bilateral' check box



- Number boxes are used to enter the number of relatives
    - After increasing a number box's value, some other boxes will be activated as there are now more relatives for which data is needed
    - Conversely, after decreasing a number's value, other boxes will be deactivated.

Age Boxes

- Age boxes are used to enter relatives' ages.
- If age isn't known, then enter '?', and the age will be estimated based on the person's age and relationship to the relative.
- If there is no information about the relative, enter 'u' to represent missing data about the relative.

Check Boxes

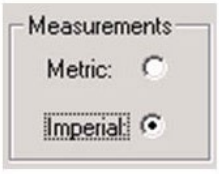
- The 'Affected Status' box determines whether a relative has had breast cancer
    - If it's unchecked, then the corresponding 'Bilateral' box is also unchecked.
- The 'Bilateral' box determines whether a relative has had bilateral breast cancer
    - If it's checked, then the corresponding 'Affected Status' box is also checked.
- The 'Ovarian' box determines whether a relative had ovarian cancer
    - If it's checked, then a dialog appears requesting the age at ovarian cancer.

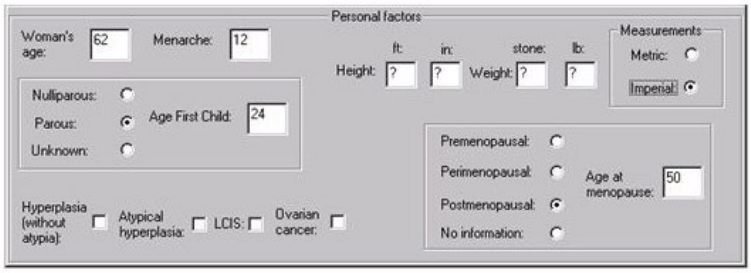
Buttons in the Family History Section

- 'Show start up screen' displays introduction screen
- 'Affected Nieces' allows the user to enter details regarding the woman's nieces
- 'Genetic Testing' allows results of genetics tests to be entered

Imperial Measurements

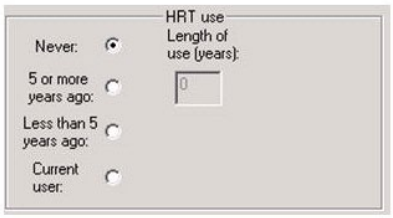
- To enter height and weight in imperial measurements rather than metric, click the imperial radio button.

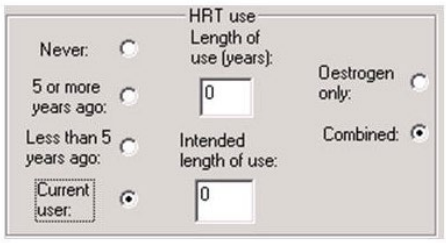




HRT Information

- HRT use also affects the risk of breast cancer
- The risk from HRT use is dependent on length of HRT use and how long ago it was used.
- Clicking certain radio buttons provides extra options.
- Example: clicking 'current user' provides new options based on time of use and type of HRT

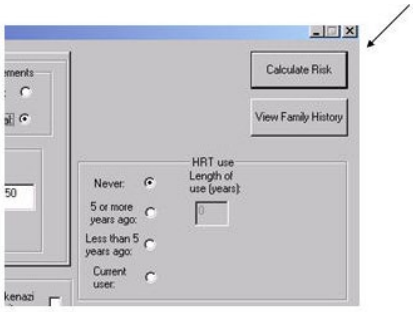




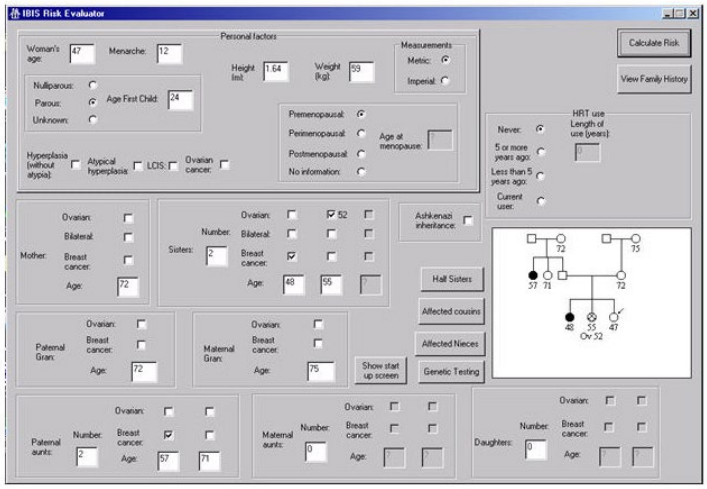
Checking Family History

- After typing in the family history data, you may need to check for accuracy.
- You can check the family history in the small pedigree drawing on the form.
- Alternatives, you can click 'View Family History' to get a larger drawing of the pedigree.

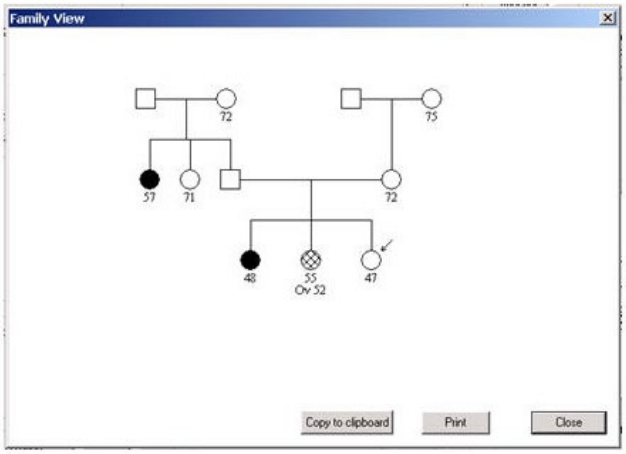
Use this button to calculate the risk in the future.



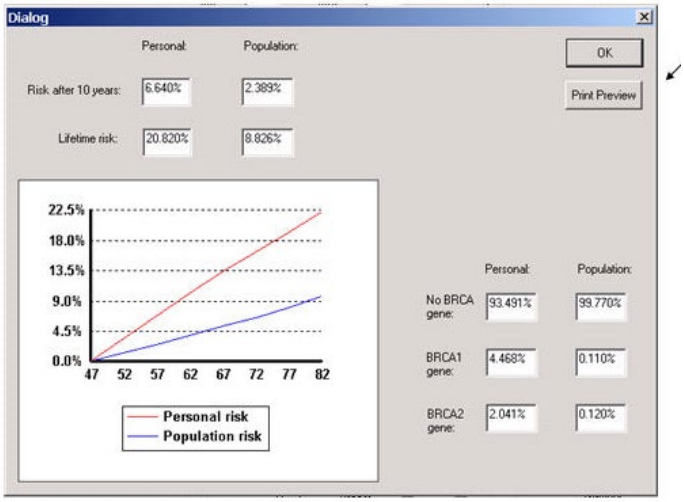
Example



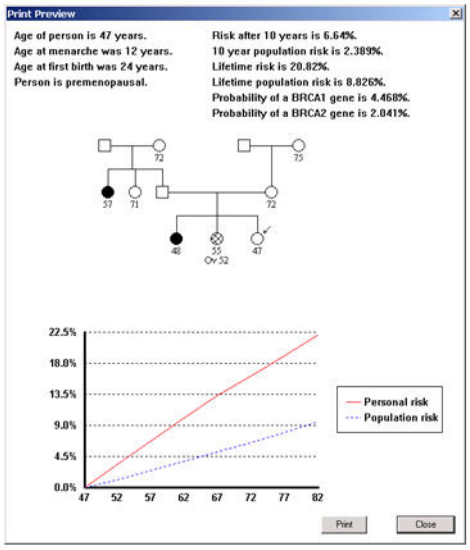
After pressing ‘View Family History’



After pressing ‘Calculate Risk’



After pressing ‘Print Preview’



Approved: 9/11/2020