

# Breast cancer factors in general practice

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# Disclosures



THE UNIVERSITY OF  
MELBOURNE

**Developer of several breast cancer risk tools**

**Editor of Cancer section of RACGP Red Book**

**Medical Advisory Board of GTG Ltd**

# Overview



Current approaches

Family history

Multifactorial risk

Risk models and tools

Future approaches



# Guidelines for preventive activities in general practice


10th ed



**DRAFT**

# Red Book risk categories and recommendations

	Average/slightly higher	Moderate ( $<4\%$ population)	High ( $<1\%$ population)
Relative risk	Up to 1.5	1.5-3.0	$>3.0$
Lifetime risk to 75y	9-12%	12-25%	25-50%
	<ul style="list-style-type: none"> <li>1 FDR with BC <math>\geq 50y</math></li> <li>2 SDR with BC <math>\geq 50y</math></li> <li>2 FDR or 2 SDR with BC <math>\geq 50yr</math> on different sides of family</li> </ul>	<ul style="list-style-type: none"> <li>1 FDR with BC <math>&lt;50y</math></li> <li>2 FDR with BC on same side of family</li> <li>2 SDR with BC on same side of family and one diagnosed <math>&lt;50y</math></li> </ul>	<ul style="list-style-type: none"> <li>2 FDR or SDR on same side with BC or OC <u>plus</u>:</li> <li>FDR or SDR with BC or OC</li> <li>BC <math>&lt;40y</math></li> <li>Bilateral BC</li> <li>BC and OC in same woman</li> <li>Ashkenazi Jewish ancestry</li> <li>BC in male relative</li> <li>Family member with known BRCA1 or BRCA2 variant</li> </ul>
Recommendations	<ul style="list-style-type: none"> <li>Biennial mammography 50-74y</li> </ul>	<ul style="list-style-type: none"> <li>Mammography at least every 2 yrs from 40-74y</li> </ul>	<ul style="list-style-type: none"> <li>Referral to familial cancer clinic</li> </ul>



# Approaches to family history risk assessment in general practice

# GP medical records not well designed to capture family history

The screenshot shows a medical record interface for Jennifer S. Andrews. At the top, there is a toolbar with various icons and a 'Go MDReference' button. Below the toolbar, patient information is displayed: Name (Jennifer Andrews), DOB (20/04/1970), Age (43 yrs), Occupation (Airline Hostess), and a timer (2m 49s). Address and phone number are also shown. Allergies are listed as PENICILLINS. A 'Recalls' button is visible. Below this is a navigation bar with tabs for Pap Test, Obstetric, Acupuncture, Correspondence, and MDExchange. A secondary bar contains Summary, Current Rx, Progress, Past history, Results, Letters, Documents, Old scripts, and Imm. The main content area shows a consultation date of 11/07/2013 and a 'Previous visits' dropdown set to 'ALL'. A table lists previous visits with columns for Date, Recorded by, Reason for contact, Start, and Duration. The current visit details for Thursday July 11 2013 at 13:29:07 are shown, including a history of CVS (Ankle swelling), examination findings (General: Not peripherally cyanosed), and a reason for contact (Headache). A prescription for ASPIRIN DISPTABLET 300mg 1 is noted. At the bottom, there are buttons for History, Examination, Reason, Review, Management, Comment, Procedure, Medicare, Append, Diagrams, Search, Clear Search, Custom #1, and Custom #2. The HCN logo and a Help button are also present.

Jennifer S. Andrews

Jennifer Andrews | DOB: 20/04/1970 | 43 yrs | Occupation: Airline Hostess | 2m 49s

2 Kennedy Rd. Demo Town. Qld 4523 | Ph: (07) 1234 5678 (home) | Record No: 107 | IHI No: | Pension No: | ATSI: Neither Aboriginal nor Torres Strait Islander | Smoking Hx: Never smoked

Allergies: PENICILLINS

Warnings:

Recalls

Pap Test | Obstetric | Acupuncture | Correspondence | MDExchange

Summary | Current Rx | Progress | Past history | Results | Letters | Documents | Old scripts | Imm.

Consultation date: 11/07/2013 | Previous visits: ALL

**Thursday July 11 2013 13:29:07**  
Dr. A. Practitioner

**History:**  
CVS: Ankle swelling.

**Examination:**  
General: Not peripherally cyanosed.

**Respiratory:**

**Reason for contact:**  
Headache  
Headache

**Actions:**  
Prescription added: ASPIRIN DISPTABLET 300mg 1  
Prescriptions stored:

Date	Recorded by:	Reason for contact	Start	Duratic
08/12/1999	DR. A. PRACTITIONER	Antenatal visit	21:20:16	3m 6s
13/02/2000	DR. A. PRACTITIONER	Antenatal visit	11:40:07	29m 41s
23/02/2004	DR. A. PRACTITIONER		22:52:55	4m 17s
09/03/2004	Dr. A. Practitioner		13:27:59	1m 38s
11/07/2013	Dr. A. Practitioner	Headache	13:29:07	7m 47s

**Tuesday March 9 2004 13:27:59**  
Dr. A. Practitioner

**Medicare item:**  
23

History | Examination | Reason | Review | Management | Comment | Procedure | Medicare | Append | Diagrams | Search | Clear Search | Custom #1 | Custom #2

HCN | ? Help

# RACGP family history screening questionnaire

This risk assessment focuses on your close relatives including parents, children, brothers and sisters who are either living or dead.	Yes	No
Have any of your close female relatives had ovarian cancer?		
Have any of your close relatives had breast cancer before 50 years of age?		
Do you have more than one relative on the same side of your family who has had breast cancer at any age?  Please think about your parents, children, brothers, sisters, grandparents, aunts, uncles, nieces, nephews and grandchildren.*		

- 9 questions covering 7 conditions
- 95% sensitivity 54% specificity to identify familial risk



# Online family history risk assessment tools

## GRAIDS

General Practice and Primary Care Research Unit, University of Cambridge  
**The GRAIDS Research Programme**

Use this button to

Assess Risk

## CRISP

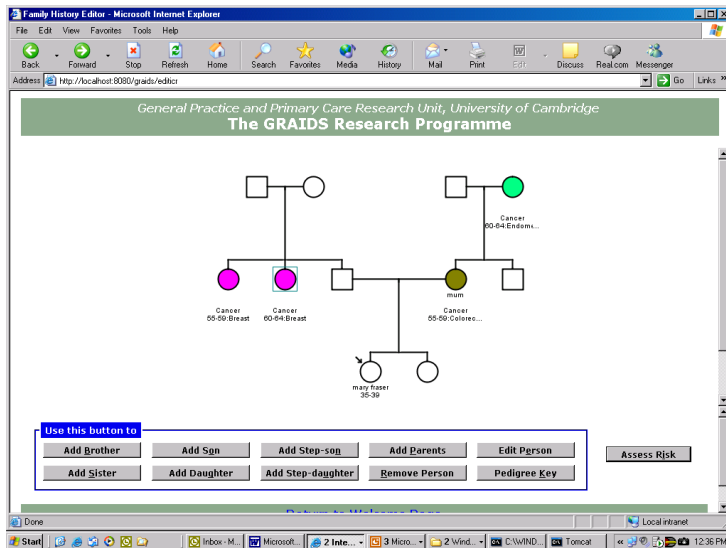
Home Demographics Diet Smoking Screening Medication Family Recommendation Risk Report

Save and resume

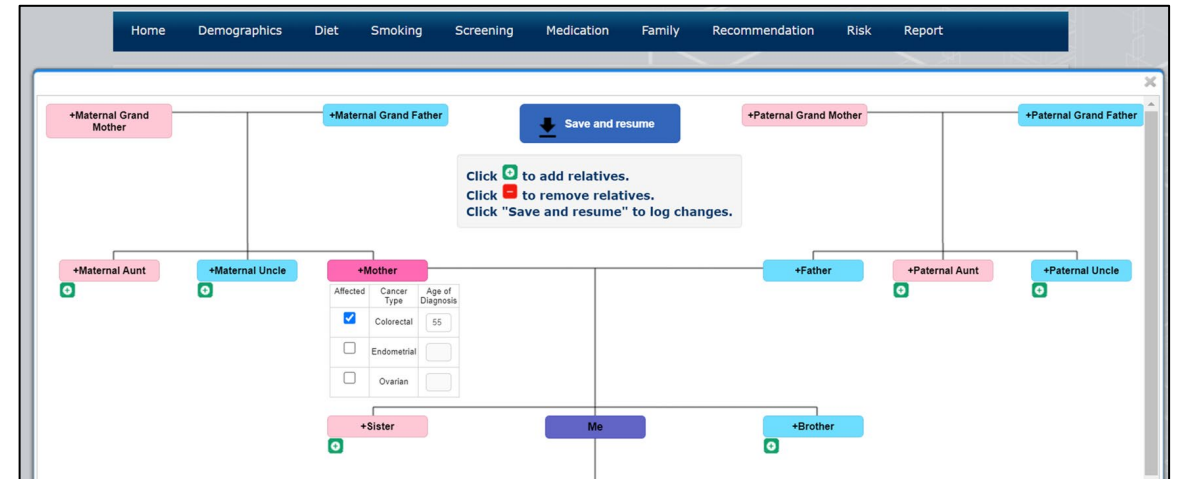
Click + to add relatives.  
Click - to remove relatives.  
Click "Save and resume" to log changes.

Affected	Cancer Type	Age of Diagnosis
<input checked="" type="checkbox"/>	Colorectal	55
<input type="checkbox"/>	Endometrial	
<input type="checkbox"/>	Ovarian	

# Online family history risk assessment tools



- 5.2 times more likely to refer patients meeting referral criteria to familial cancer clinic
- Doubled rate of referrals to familial cancer clinic



- 20% increase in risk-appropriate bowel cancer screening

# Multifactorial breast cancer risk

Most breast cancers occur in women without a family history of breast cancer

Family history and age are poor discriminators of breast cancer risk

# Multifactorial breast cancer risk prediction models



Age



Genetics



Family history



Breast density



Ethnicity



Weight



Physical activity



Alcohol intake



Hormonal medications

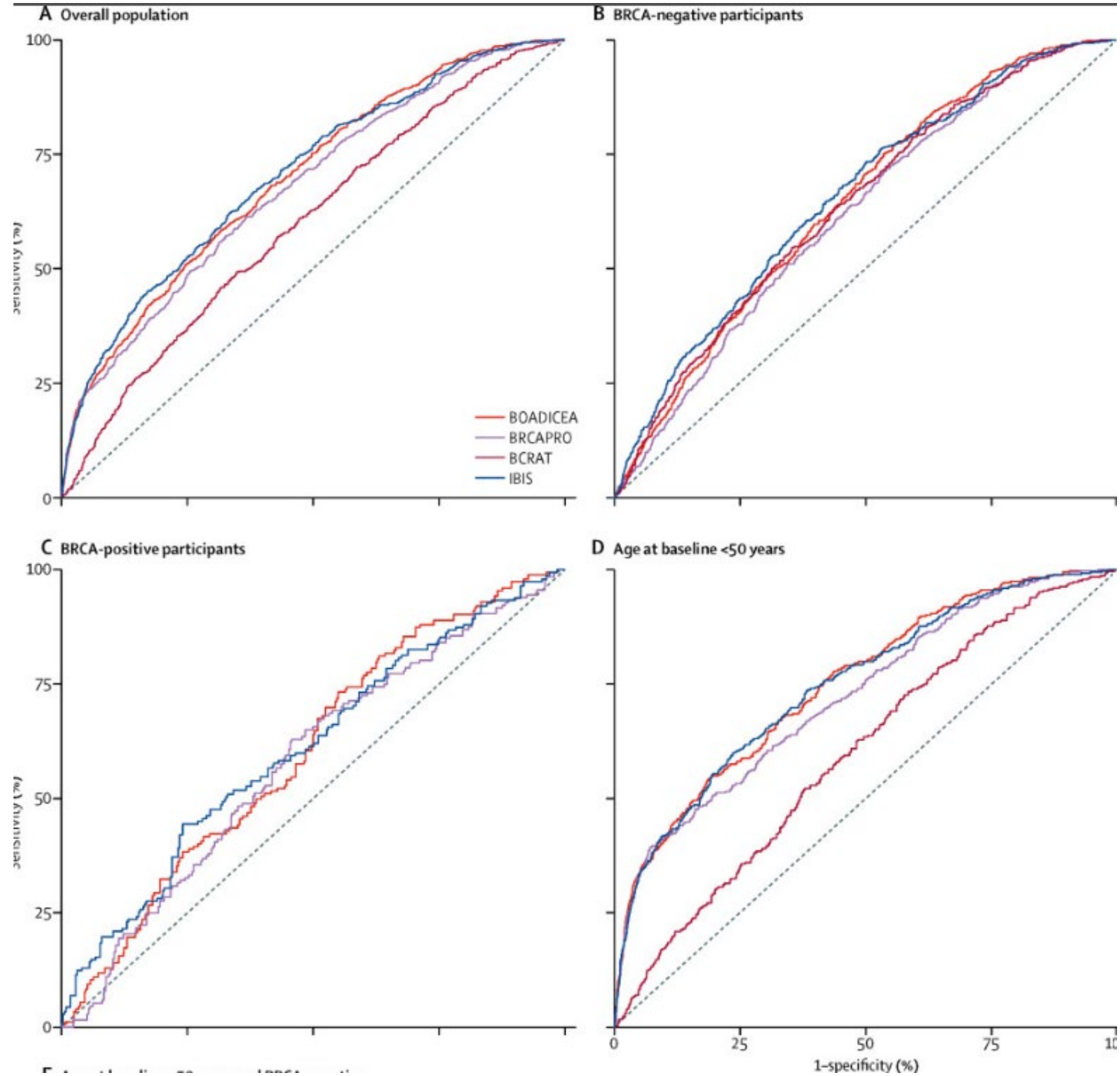


Smoking

Model	IBIS (Tyrrer/Cusick)	BCRAT (Gail)	iCARE	BRISK	QCancer10	BOADICEA	BRCAPRO
Age	✓	✓	✓	✓	✓	✓	✓
Family history	✓✓✓	✓	✓	✓✓	✓	✓✓✓	✓✓✓
Rare genetic variants	✓			✓		✓	
Polygenic risk score	✓		✓	✓		✓	
Ashkenazi Jewish/ancestry	✓		✓			✓	
BMI	✓		✓	✓		✓	
Alcohol use	✓		✓		✓	✓	
Age at menarche	✓	✓				✓	
Age at menopause	✓		✓	✓		✓	✓
HRT	✓		✓		✓	✓	
No. live births	✓		✓		✓	✓	
Age at 1 <sup>st</sup> birth	✓	✓	✓			✓	
Mammographic density	✓			✓		✓	
Breast biopsy	✓	✓					
Online tool	✓	✓			✓	✓	

# Comparative discrimination

IBIS and BOADICEA perform better  
No polygenic risk scores in this validation



# Tyrer-Cuzick Risk Assessment Calculator

The results will display your 10-year risk and your lifetime risk score. The purpose of this tool is simply to inform you. Please consult with your physician should you have any questions about your risk for breast cancer or for guidance on options for breast cancer screening or genetic counseling.

The Tyrer-Cuzick model is not intended to assess the risk of women who have already been diagnosed with breast cancer.

**Attention Clinical Users:** This free calculator is for **non-commercial, including non-clinical use. Such use would require a license.** Learn more about our [clinical risk assessment software](#).

## Assess Breast Cancer Risk

PERSONAL HISTORY

QUESTIONNAIRE

FAMILY HISTORY

YOUR RESULTS

FAQ

MOTHER

FATHER 

SISTERS 

DAUGHTERS 

BROTHER 

PATERNAL GRANDMOTHER 

PATERNAL AUNTS 



PATERNAL HALF SISTERS 



CANCER HISTORY

## Paternal Grandmother

Current age or age at death

  years old

Has your paternal grandmother had breast cancer?

Yes  No  I don't know

Has your paternal grandmother had ovarian cancer?

Yes  No  I don't know



# BOADICEA v6

**B**reast and **O**varian **A**nalysis of **D**isease Incidence and **C**arrier **E**stimation **A**lgorithm

Welcome

## CanRisk Tool

Load Save Reset Preferences

indicates completed stages

indicates mandatory field

indicates hover information

Input the information in any order by clicking on the blue bars. Please add as much information as possible. When a section is completed the bar will turn green. If some information is unknown, the bar will not turn green; this does not prevent risk calculation.

## Personal Details

Are you?

Female

In which country do you currently live?

UK

What is your date of birth?

Format dd/mm/yyyy

dd/mm/yyyy

Your age is: --

How tall are you?

e.g. 123.5cm

cm

Metric

What is your current weight?

e.g. 73.5kg

kg

Metric

Your BMI is --



# iPrevent

iPrevent™ is a breast cancer risk assessment and risk management decision support tool designed to facilitate prevention and screening discussions between women and their doctors

[Home](#) > [iPrevent](#)



## FAMILY HISTORY Your Grandmother (Mother's side)

Is your Maternal Grandmother alive?

No

How old was she when she died?

Leave blank if you don't know

In what year was she born?

Leave blank if you don't know

Did your Maternal Grandmother have any of these cancers?

Type	Affected	Diagnosis age
Breast cancer	Yes	62
Cancer in other breast	No	
Ovarian <a href="#">More information</a>	No	
Pancreatic	No	

Was she ever tested for an abnormality in a breast cancer gene, BRCA1 or BRCA2?

No

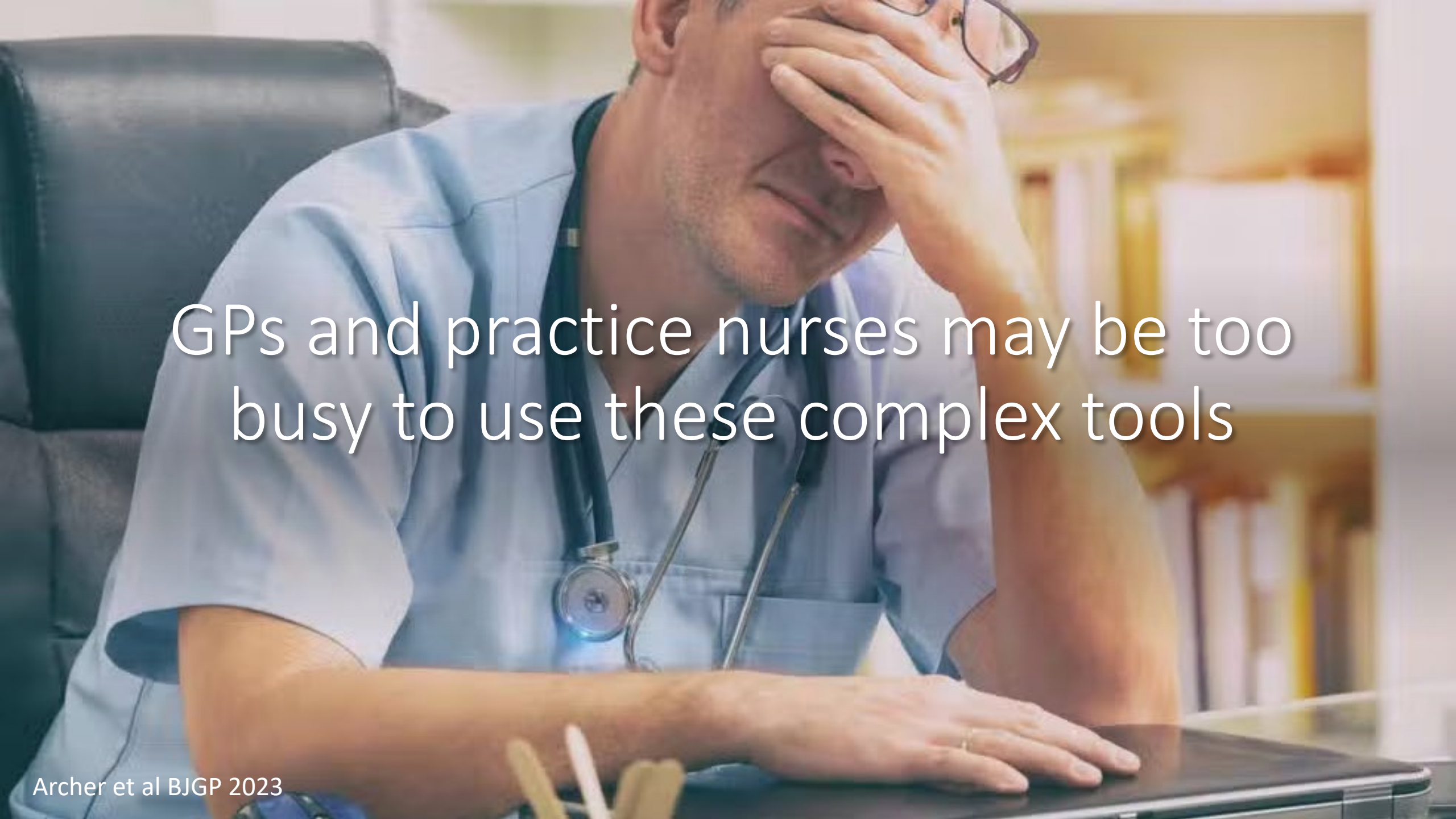
- ▶ Please estimate year of birth for this relative who had cancer.
- ▶ Please estimate age of death for this relative who had cancer.

< PREVIOUS

CANCEL

ESTIMATE RISKS

NEXT >

A male doctor in blue scrubs is sitting at a desk, looking stressed or overwhelmed. He has his right hand covering his face, and his left hand is resting on a laptop. A stethoscope is visible around his neck. The background is a blurred office setting.

GPs and practice nurses may be too busy to use these complex tools




<https://doi.org/10.1038/s41698-024-00553-6>

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# All models are wrong and yours are useless: making clinical prediction models impactful for patients

Florian Markowetz

 Check for updates

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‘If you want to have impact, your tool needs to be used outside Cambridge, Stanford or Zurich.’

A balance scale is shown against a clear blue sky. The scale is perfectly balanced. On the left pan, there are three smooth, light-colored stones stacked on top of each other. On the right pan, there are also three smooth, light-colored stones stacked on top of each other. The scale's beam is a single piece of wood, and it rests on a large, dark, textured stone base. The text "Breast cancer risk prediction models precision vs implementation" is overlaid in white, centered on the scale's beam.

Breast cancer risk prediction models  
precision vs implementation

# BRISK: a simpler alternative model?

# FDRs with breast cancer  
Age of youngest when diagnosed

# SDRs with breast cancer

BMI

Menopausal  
status

Breast density

Polygenic risk  
score

Nurses' Health Study validation: AUC for 5 yr risk: BRISK = 0.636 vs Gail = 0.511 ( $p < 0.0001$ )  
AUC for remaining lifetime risk: BRISK = 0.647 vs IBIS 0.571 ( $p < 0.0001$ )

UK Biobank validation: AUC for 5 yr risk: BRISK (313 SNP panel) 0.649 vs BRCAT = 0.567 ( $p < 0.001$ )

# Future models of implementation?

GP orders  
mammogram and  
PRS

MD  
PRS  
results

Online BRISK and  
screening  
recommendations  
in general practice

# Future models of implementation?

Breastscreen  
DNA collection

MD  
PRS  
results

Online BRISK and  
screening  
recommendations  
sent to patient  
and GP

# Future models of implementation

- Need for clinical studies of risk-based breast cancer screening
- Need for better coordination between range of disciplines and providers in breast cancer screening

## The ROSA Project – summary.

Summary of 'Roadmap for Optimising Screening in Australia – Breast', investigating risk-based breast cancer screening.

27 October 2023

**The Daffodil Centre**

A partnership between





# Acknowledgements

