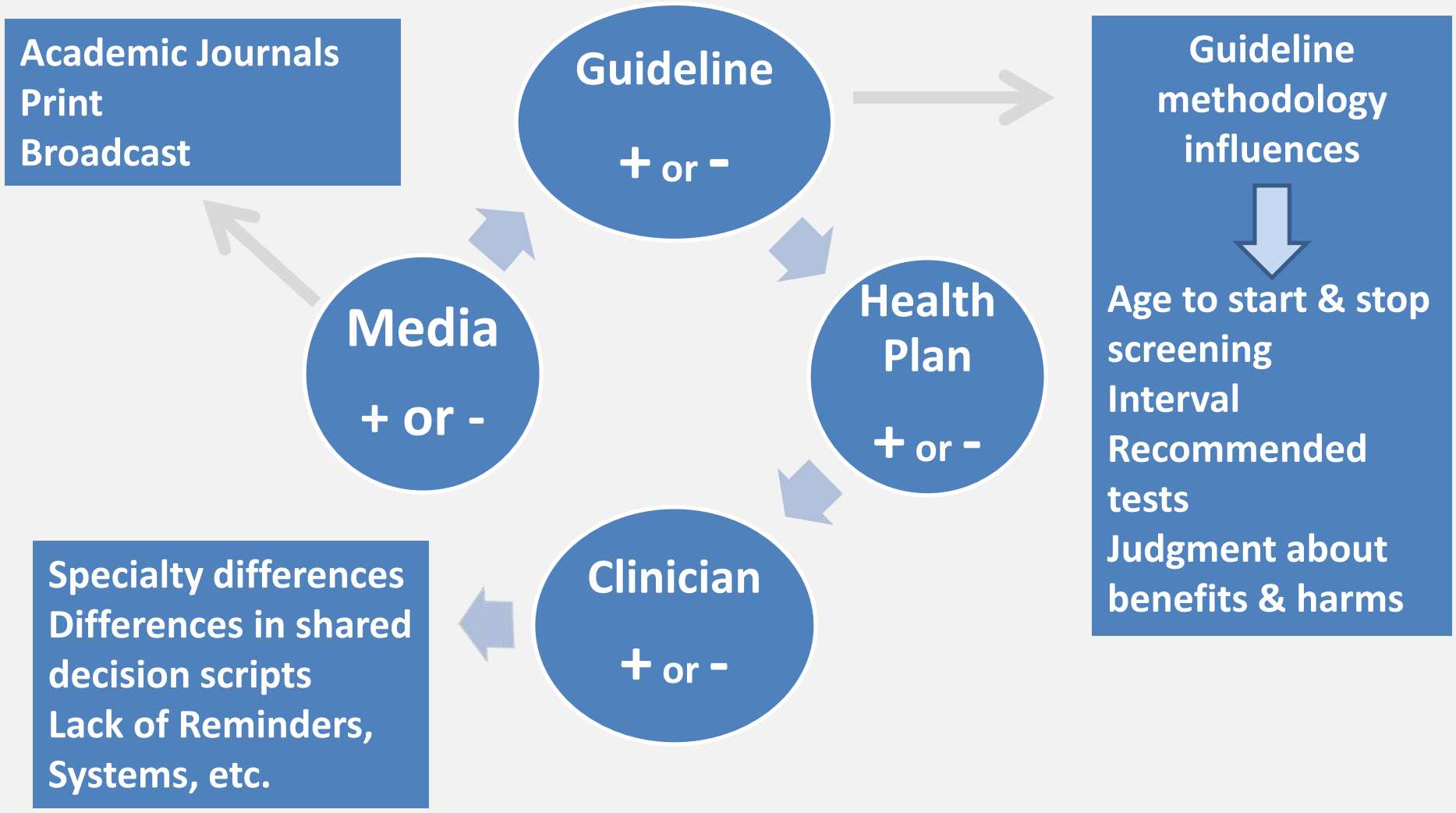
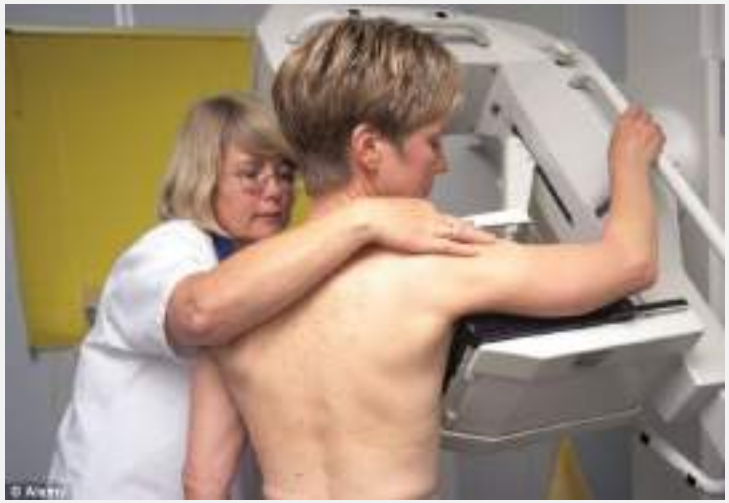
Politics and Policies of Screening

Robert A. Smith, PhD
American Cancer Society
Atlanta, GA

Politics and Policies Play Out Through Guidelines, Clinicians, Health Plans, and Media



Mammography Screening is Controversial: Should it be?



- **What fuels the debates?**
  - Overall and age-specific benefits and harms
  - RCT evidence vs. modern observational data
  - The existence and quantification of overdiagnosis
  - False positives
  - The relative contribution of early detection vs. therapy to deaths prevented
  - Costs to Society

Measuring Benefits

Selectively Choosing Your Numbers in the Orchard of Research

The Evolving Evidence for Mammography Screening—the Randomized Trials

Evaluation of Periodic Breast Cancer Screening With Mammography

Methodology and Early Observations

Sam Shapiro, Philip Strax, MD, and Louis Venet, MD

ening with mammography
eing evaluated to deter-
breast cancer mortality

Cancer detection programs have for years emphasized the importance of early diagnosis in breast cancer. Proponents of periodic physical

JAMA

Periodic Breast Cancer Screening in Reducing Mortality From Breast Cancer

ABSTRACT

L RESEARCH • NOUVEAUTÉS EN RECHERCHE

Canadian National Breast Screening Study: 1. Breast cancer detection and death rates among women aged 40 to 49 years

Anthony B. Miller, MB, FRCP; Cornelia J. Baines, MD, MSc; Teresa To, PhD; Claus Wall, MSc

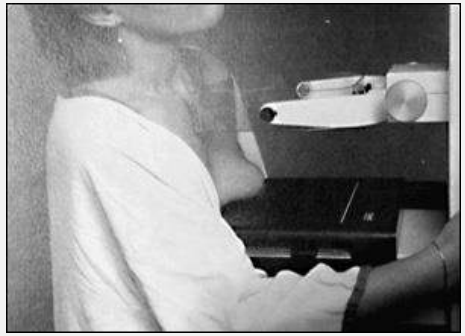
Objectives: To evaluate the efficacy of the combination of annual screening with mammography, physical examination of the breasts and the teaching of breast self-examination in reducing the rate of death from breast cancer among women aged 40 to 49 years on entry.

Design: Individually randomized controlled trial.

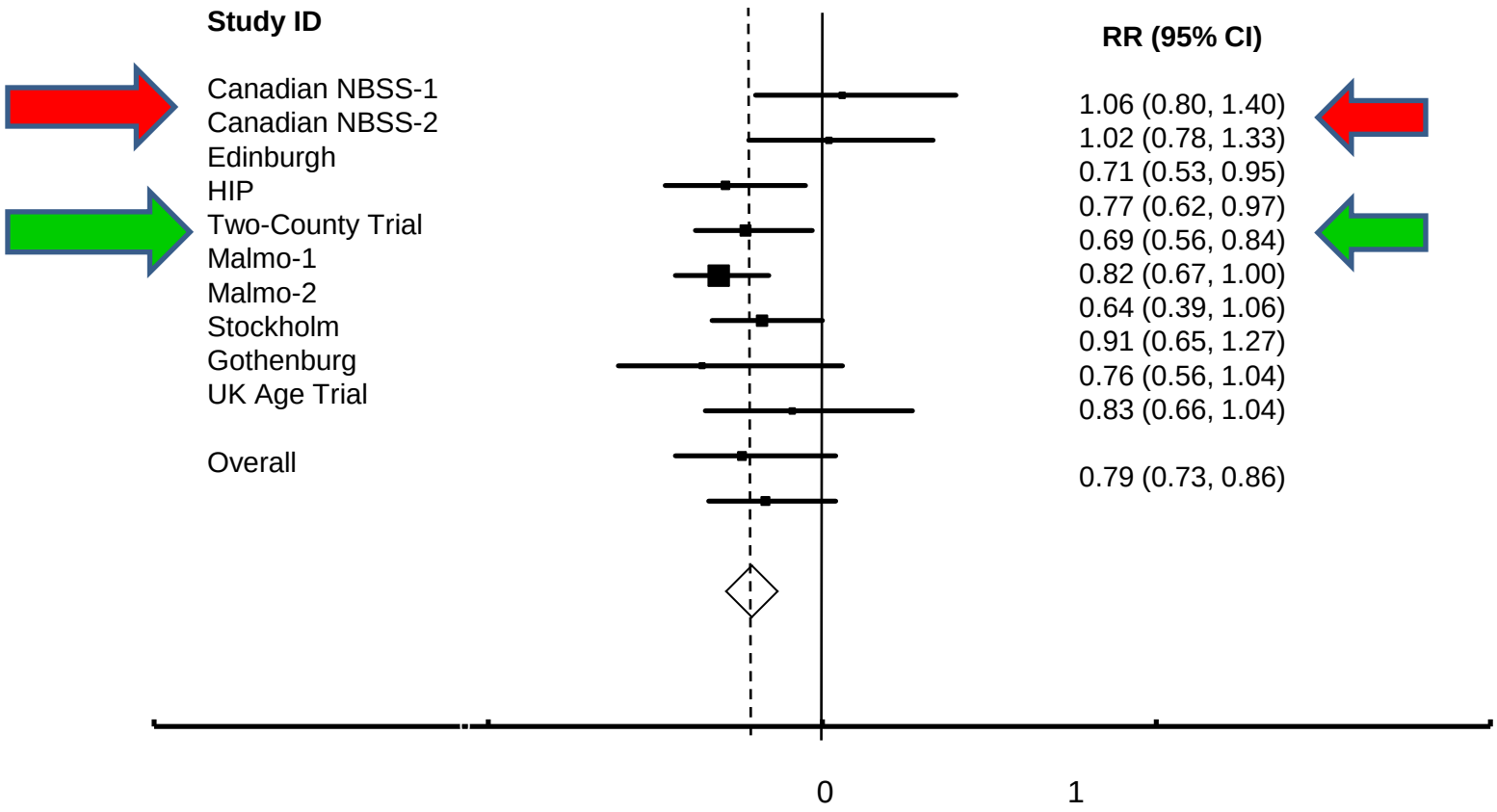
Randomised controlled trial of mammographic screening in women from age 40: results of screening in the first 10 years

S Moss*[1], I Thomas[1], A Evans[2], B Thomas[3] and L Johns[1] (writing committee) for the Trial Management Group[4]

[1]Cancer Screening Evaluation Unit, Institute of Cancer Research, Brookes Lawley Building, 15 Cotswold Road, Sutton, Surrey SM2 5NG, UK; [2]National Breast Screening Training Centre, City Hospital, Hucknall Road, Nottingham NG5 1PB, UK; [3]Jarvis Breast Screening, Diagnostic and National Training Centre, Stoughton Road, Guildford, Surrey GU1 1LJ, UK



RCTs of screening mammography: Overall results in terms of breast cancer mortality

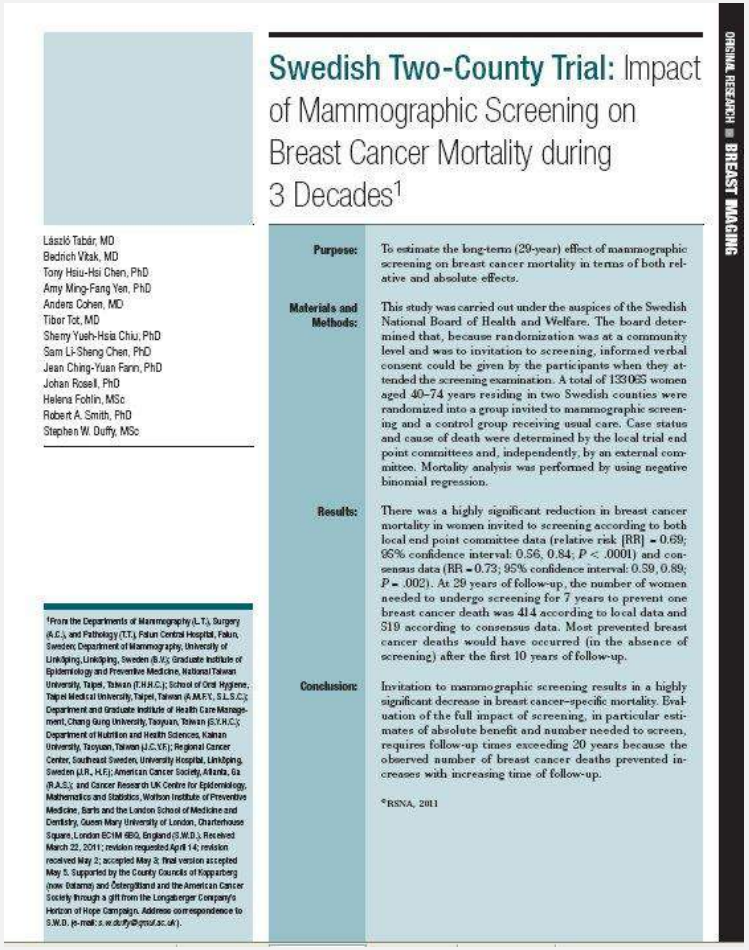


Overall RR = 0.79 (95% CI: 0.73, 0.86)

Tabar, et al. Breast J, 2014

Heterogeneity p = 0.3

The Swedish Two County Trial—the Importance of Long Term Follow-up (29 Years)



ORIGINAL RESEARCH ■ BREAST IMAGING

Swedish Two-County Trial: Impact of Mammographic Screening on Breast Cancer Mortality during 3 Decades[1]

László Tabár, MD
Bedrich Vitak, MD
Tony Hsiu-Hsi Chen, PhD
Amy Ming-Fang Yen, PhD
Anders Cohen, MD
Tibor Tot, MD
Sherry Yueh-Hsia Chiu, PhD
Sam Li-Sheng Chen, PhD
Jean Ching-Yuan Fann, PhD
Johan Rosell, PhD
Helena Fohlin, MSc
Robert A. Smith, PhD
Stephen W. Duffy, MSc

Purpose: To estimate the long-term (29-year) effect of mammographic screening on breast cancer mortality in terms of both relative and absolute effects.

Materials and Methods: This study was carried out under the auspices of the Swedish National Board of Health and Welfare. The board determined that, because randomization was at a community level and was to invitation to screening, informed verbal consent could be given by the participants when they attended the screening examination. A total of 133 065 women aged 40–74 years residing in two Swedish counties were randomized into a group invited to mammographic screening and a control group receiving usual care. Case status and cause of death were determined by the local trial end point committees and, independently, by an external committee. Mortality analysis was performed by using negative binomial regression.

Results: There was a highly significant reduction in breast cancer mortality in women invited to screening according to both local end point committee data (relative risk [RR] = 0.69; 95% confidence interval: 0.56, 0.84; $P < .0001$) and consensus data (RR = 0.73; 95% confidence interval: 0.59, 0.89; $P = .002$). At 29 years of follow-up, the number of women needed to undergo screening for 7 years to prevent one breast cancer death was 414 according to local data and 519 according to consensus data. Most prevented breast cancer deaths would have occurred (in the absence of screening) after the first 10 years of follow-up.

Conclusion: Invitation to mammographic screening results in a highly significant decrease in breast cancer–specific mortality. Evaluation of the full impact of screening, in particular estimates of absolute benefit and number needed to screen, requires follow-up times exceeding 20 years because the observed number of breast cancer deaths prevented increases with increasing time of follow-up.

[1]From the Departments of Mammography (L.T.), Surgery (A.C.), and Pathology (T.T.), Falun Central Hospital, Falun, Sweden; Department of Mammography, University of Linköping, Linköping, Sweden (B.V.); Graduate Institute of Epidemiology and Preventive Medicine, National Taiwan University, Taipei, Taiwan (T.H.H.C.); School of Oral Hygiene, Taipei Medical University, Taipei, Taiwan (A.M.F.Y., S.L.S.C.); Department and Graduate Institute of Health Care Management, Chang Gung University, Taoyuan, Taiwan (S.Y.H.C.); Department of Nutrition and Health Sciences, Kainan University, Taoyuan, Taiwan (J.C.Y.F.); Regional Cancer Center, Southeast Sweden, University Hospital, Linköping, Sweden (J.R., H.F.); American Cancer Society, Atlanta, Ga (R.A.S.); and Cancer Research UK Centre for Epidemiology, Mathematics and Statistics, Wolfson Institute of Preventive Medicine, Barts and the London School of Medicine and Dentistry, Queen Mary University of London, Charterhouse Square, London EC1M 6BQ, England (S.W.D.).

Received March 22, 2011; revision requested April 14; revision received May 2; accepted May 3; final version accepted May 5. Supported by the County Councils of Kopparberg (now Dalarna) and Östergötland and the American Cancer Society through a gift from the Longaberger Company's Horizon of Hope Campaign.

Address correspondence to S.W.D. (e-mail: s.w.duffy@qmul.ac.uk).

- 133,065 women ages 40-47 randomized to screening or usual care
- Screening phase = 7 years
- Screening interval
  - 40-49 = 24 months
  - 50-74 = 33 months
- Protocol
  - One view mammography
  - Single reader
  - No physical exam
- 1st mortality results published in 1985

Radiology June 28, 2011 110469

- **Two important points:**
  1. *Very* long term follow-up is necessary to measure the full benefit of breast cancer screening
  2. With long follow-up, the number-needed-to-screen to save one life steadily improves

Table 3

Local End Point Committee Data: Breast Cancer Deaths Avoided and Number of Women Needed to Screen for 7 Years to Prevent One Death according to Follow-up Time

Time between Randomization and Follow-up (y)	RR*	Deaths from Breast Cancer in ASP Group	Expected Deaths in ASP Group†	Deaths Prevented in ASP Group	No. of Women Needed to Screen*
10	0.74 (0.57, 0.98)	206	277	71	922 (515, 4410)
15	0.70 (0.56, 0.87)	284	408	124	526 (351, 1055)
20	0.70 (0.57, 0.85)	324	465	141	464 (316, 871)
25	0.70 (0.57, 0.85)	347	497	150	436 (297, 815)
29		351	509	158	414 (286, 748)

31% fewer deaths
After 29 years

* Numbers in parentheses

† Expected deaths if the ASP had the same mortality rate as the PSP, calculated by dividing the observed deaths by the RR (eg, at 10 years, 206/0.7435 = 277 expected deaths).

Radiology June 28, 2011 110469

The Evolving Evidence for Mammography Screening—Beyond the RCTs: Trend Studies, Incidence-Based Mortality Studies, Case Control Studies

Beyond Randomized Controlled Trials

Organized Mammographic Screening Substantially Reduces Breast Carcinoma Mortality

theguardian

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News › Society › Breast cancer

Breast cancer screening saves two lives for every one misdiagnosed - study

Latest research concludes benefits of mammograms far outweigh any potential drawbacks for women

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Society › Breast cancer

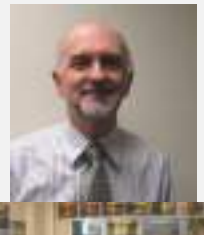
east cancer screening not shown to luce deaths, say researchers

st study of mortality figures in England over 39 years fails to v benefit of regular mammograms

ORIGINAL ARTICLE

The impact of mammographic screening on breast cance mortality in Europe: a review of observational studies

Mireille Broeders, Sue Moss, Lennarth Nyström, Sisse Njor, Håkan Jonsson, Ellen Paap, Nathalie Massat, Stephen Duffy, Elisebeth Lynge and Eugenio Paci, for the EUROSCREEN Working Group



Breast cancer mortality after screening mammography in British Columbia women

Andrew Coldman[1*], Norm Phillips[1], Linda Warren[2] and Lisa Kan[2]

[1]*Surveillance and Outcomes Unit, British Columbia Cancer Agency, Vancouver, BC, Canada*

[2]*Screening Mammography Program of BC, British Columbia Cancer Agency, Vancouver, BC, Canada*

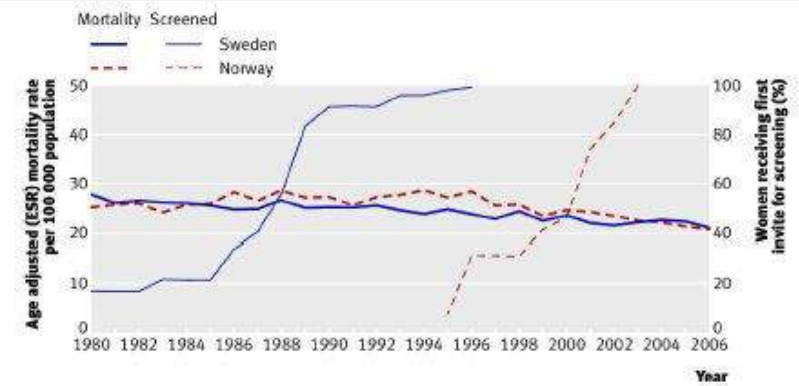
Quantification of the effect of mammographic screening on fatal breast cancers: The Florence Programme 1990–96

BMJ

BMJ 2011;343:d4411 doi: 10.1136/bmj.d4411

Trend Studies are Deceptively Intuitive

A



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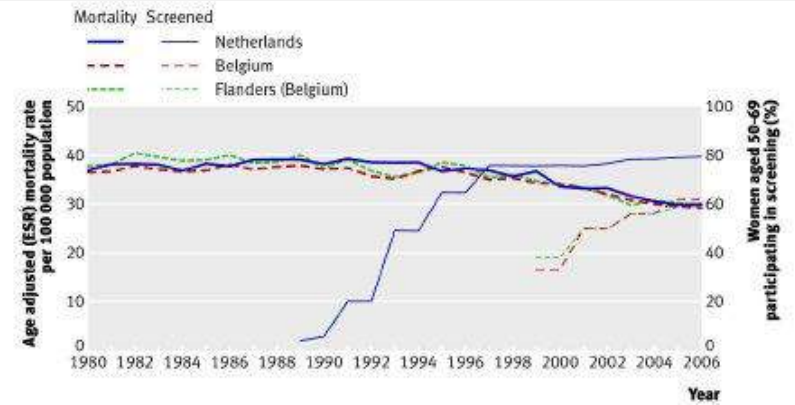

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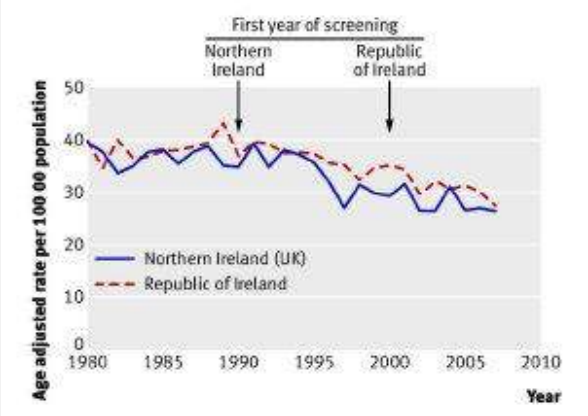


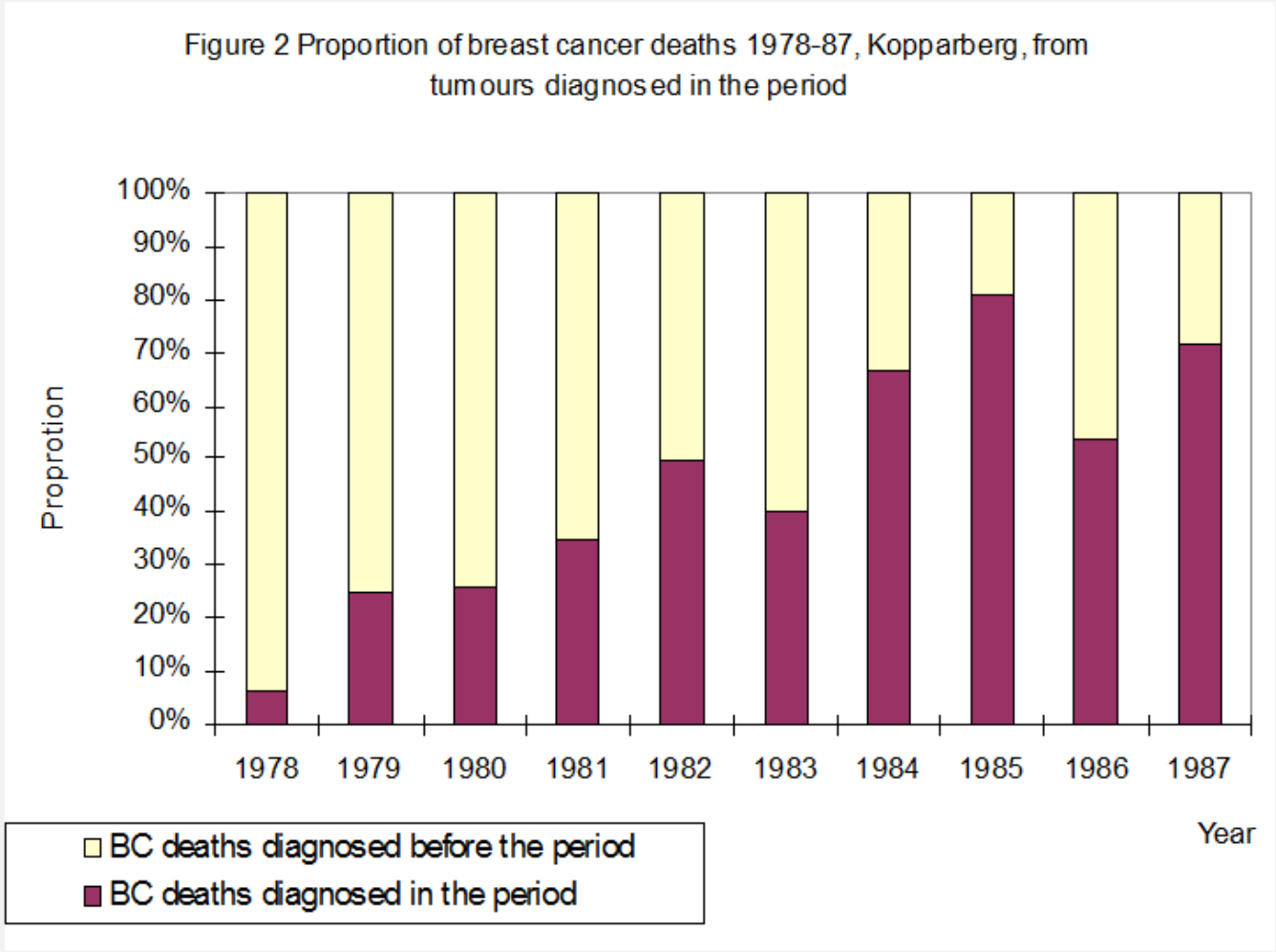
A. Sweden & Norway
B. Netherlands & Belgium
C. Northern Ireland & Republic of Ireland

BMJ 2011;343:d4411 doi: 10.1136/bmj.d4411

Methodological problems with the evaluation of the effectiveness of screening based on population trends

- No data on exposure to mammography
- Not all women who develop breast cancer are invited to screening or attend screening
- No adjustment for different baseline incidence rates
- No adjustment for incidence rates over time
- No adjustment for time to introduce screening
- No data on the quality of mammography
- Inadequate duration of follow-up (screening & follow-up period are too short)
- **Single biggest problem--Contamination of mortality trends with deaths due to incidence before screening was introduced**

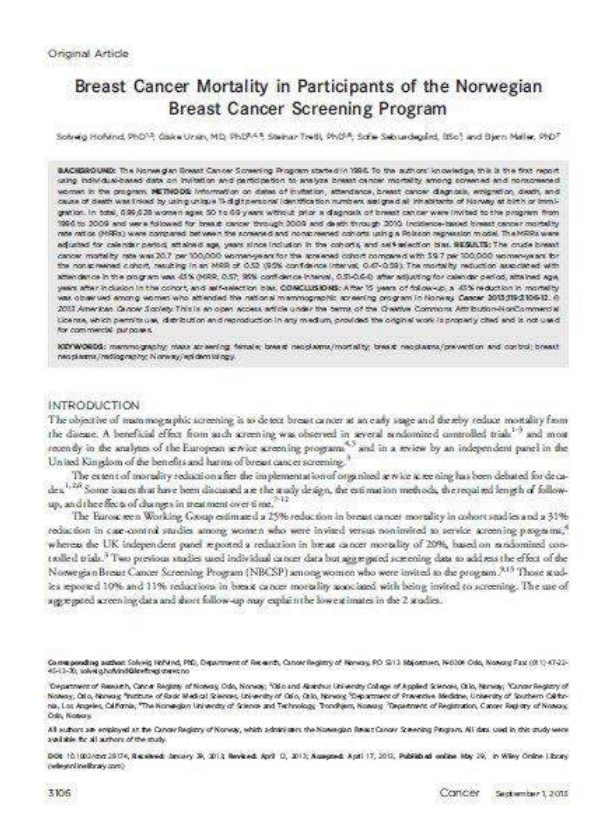
Contamination from breast cancer deaths in the post-screening period attributable to a diagnosis in the pre-screening period



In a 10 year period following the introduction of screening, more than 50% of the breast cancer deaths will be attributable to a diagnosis before the start of the period

These are deaths that could not have been influenced by screening.

Incidence Based Breast Cancer Mortality among Participants in the Norwegian Breast Cancer Screening Program, 1996-2010



Original Article

Breast Cancer Mortality in Participants of the Norwegian Breast Cancer Screening Program

Solveig Hofvind, PhD[1]; Giske Ursin, MD, PhD[2,3]; Steinar Tretli, PhD[4]; Sofie Sebuødegård, BSc[1] and Bjørn Møller, PhD[1]

BACKGROUND: The Norwegian Breast Cancer Screening Program started in 1996. To the authors' knowledge, this is the first report using individual-based data on invitation and participation to analyze breast cancer mortality among screened and nonscreened women in the program. **METHODS:** Information on dates of invitation, attendance, breast cancer diagnosis, emigration, death, and cause of death was linked by using unique 11-digit personal identification numbers assigned all inhabitants of Norway at birth or immigration. In total, 696,628 women ages 50 to 69 years without prior a diagnosis of breast cancer were invited to the program from 1996 to 2009 and were followed for breast cancer through 2009 and death through 2010. Incidence-based breast cancer mortality rate ratios (MRRs) were compared between the screened and nonscreened cohorts using a Poisson regression model. The MRRs were adjusted for calendar period, attained age, years since inclusion in the cohort, and self-selection bias. **RESULTS:** The crude breast cancer mortality rate was 20.7 per 100,000 women-years for the screened cohort compared with 29.7 per 100,000 women-years for the nonscreened cohort, resulting in an MRR of 0.52 (95% confidence interval, 0.47-0.59). The mortality reduction associated with attendance in the program was 45% (MRR, 0.57; 95% confidence interval, 0.51-0.64) after adjusting for calendar period, attained age, years after inclusion in the cohort, and self-selection bias. **CONCLUSIONS:** After 15 years of follow-up, a 43% reduction in mortality was observed among women who attended the national mammographic screening program in Norway. *Cancer* 2013;119:2106-12. © 2013 American Cancer Society. This is an open access article under the terms of the Creative Commons Attribution-NonCommercial License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited and is not used for commercial purposes.

KEYWORDS: mammography; mass screening; female; breast neoplasms/mortality; breast neoplasms/prevention and control; breast neoplasms/radiography; Norway/epidemiology.

INTRODUCTION

The objective of mammographic screening is to detect breast cancer at an early stage and thereby reduce mortality from the disease. A beneficial effect from such screening was observed in several randomized controlled trials[1-3] and most recently in the analyses of the European service screening programs[4,5] and in a review by an independent panel in the United Kingdom of the benefits and harms of breast cancer screening.[6]

The extent of mortality reduction after the implementation of organized service screening has been debated for decades.[1,2,6] Some issues that have been discussed are the study design, the estimation methods, the required length of follow-up, and the effects of changes in treatment over time.[7-12]

The Euroscreen Working Group estimated a 25% reduction in breast cancer mortality in cohort studies and a 31% reduction in case-control studies among women who were invited versus non-invited to service screening programs,[4] whereas the UK independent panel reported a reduction in breast cancer mortality of 20%, based on randomized controlled trials.[6] Two previous studies used individual cancer data but aggregated screening data to address the effect of the Norwegian Breast Cancer Screening Program (NBCSP) among women who were invited to the program.[9,13] Those studies reported 10% and 11% reductions in breast cancer mortality associated with being invited to screening. The use of aggregated screening data and short follow-up may explain the lowest estimates in the 2 studies.

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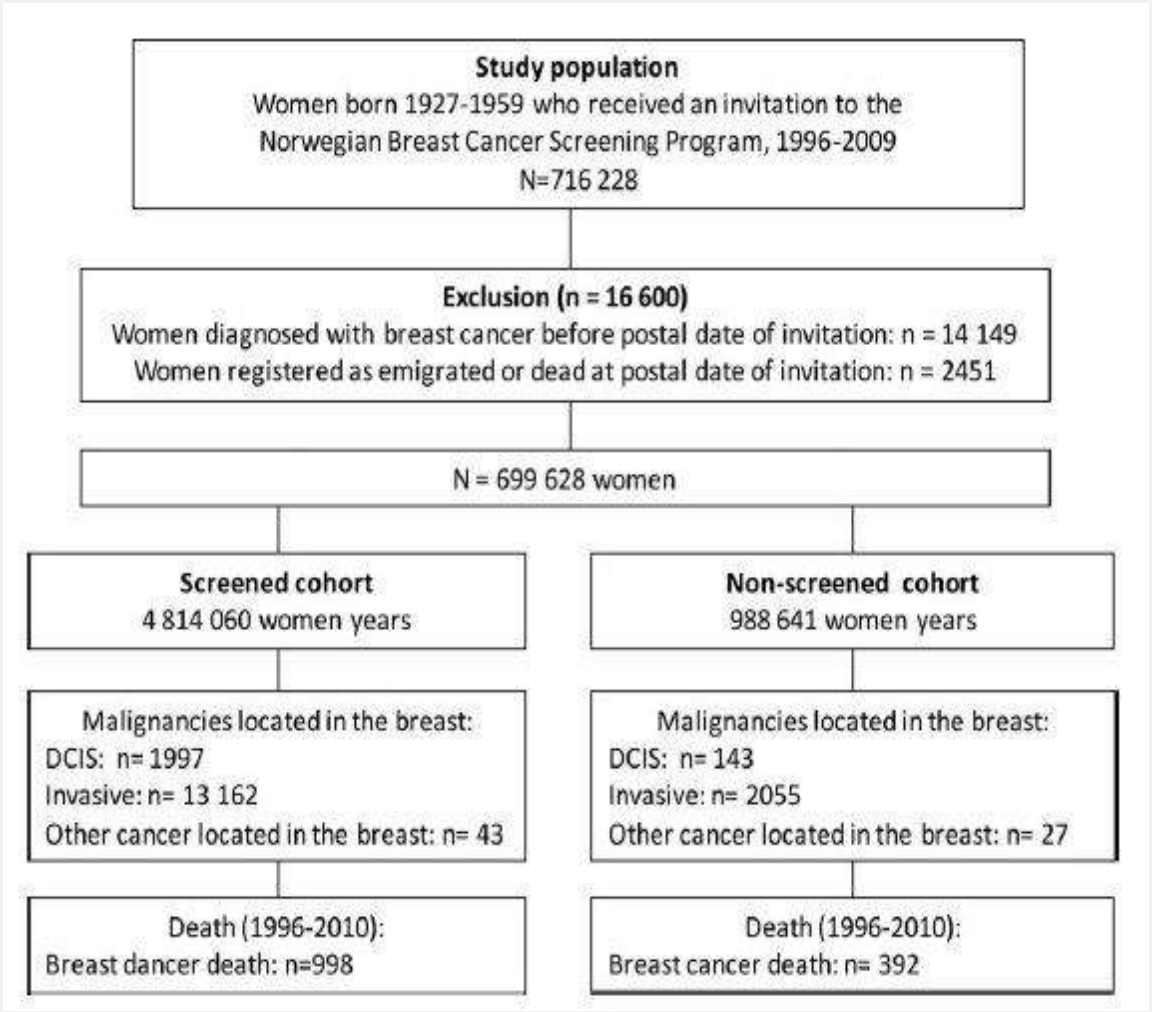
[1]Department of Research, Cancer Registry of Norway, Oslo, Norway; [2]Oslo and Akershus University College of Applied Sciences, Oslo, Norway; [3]Cancer Registry of Norway, Oslo, Norway; [4]Institute of Basic Medical Sciences, University of Oslo, Oslo, Norway; [5]Department of Preventive Medicine, University of Southern California, Los Angeles, California; [6]The Norwegian University of Science and Technology, Trondheim, Norway; [7]Department of Registration, Cancer Registry of Norway, Oslo, Norway

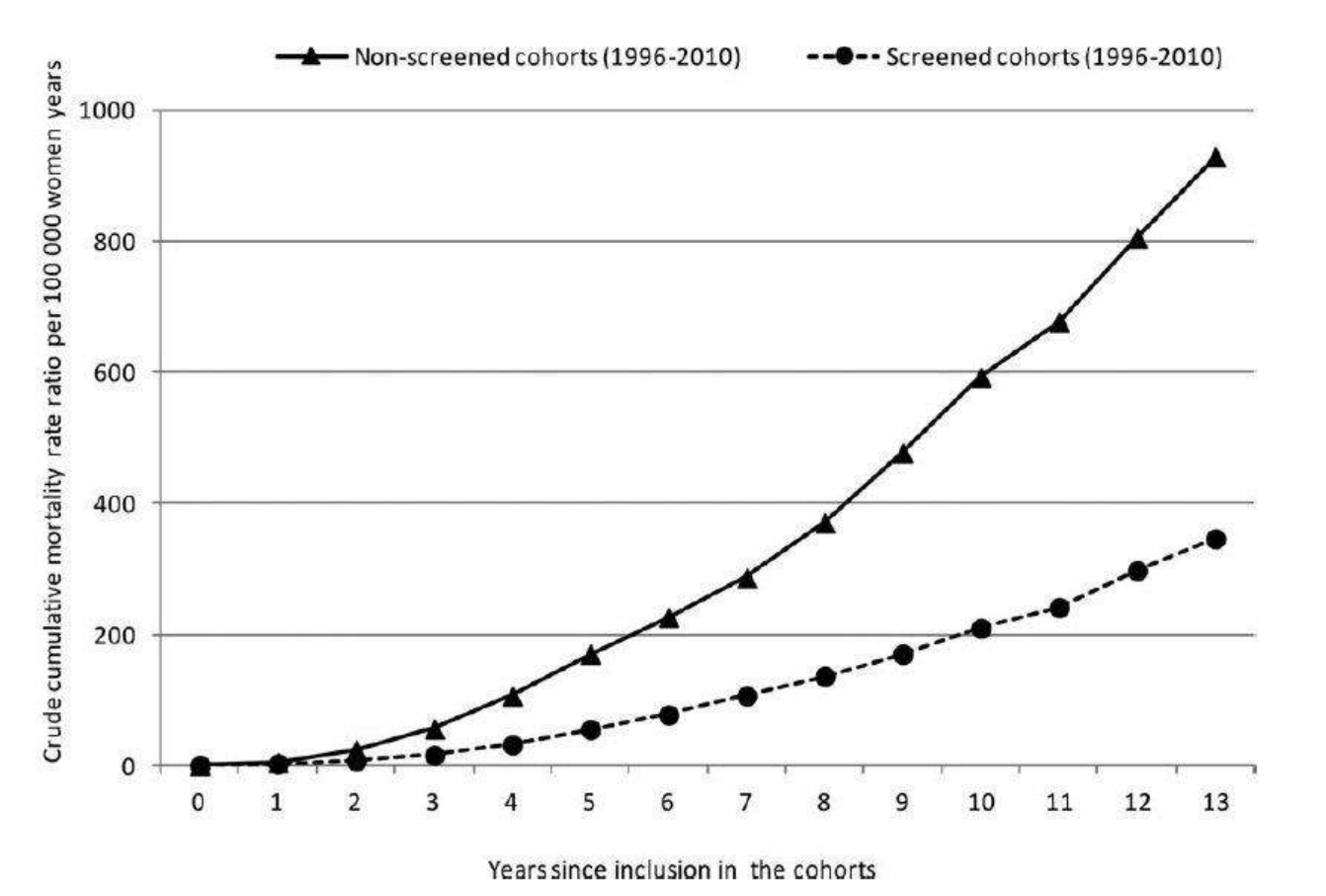
All authors are employed at the Cancer Registry of Norway, which administers the Norwegian Breast Cancer Screening Program. All data used in this study were available for all authors of the study.

DOI: 10.1002/cncr.28074, Received: January 30, 2013; Revised: April 12, 2013; Accepted: April 17, 2013; Published online May 29, in Wiley Online Library (wileyonlinelibrary.com)



Hofvind, et al. Cancer 2013;119:17

Crude cumulative breast cancer mortality rates for screened and unscreened cohorts among women invited to the Norwegian Breast Cancer Screening Program, 1996 to 2010.



Note—In this analysis there are no deaths from cases diagnosed before 1996

Fifteen years after the start of the program, the screened cohort had **43% lower breast cancer mortality rate** compared with the unscreened cohort.

Hofvind, et al. Cancer 2013;119:17

Disparities in the estimates of benefits and harms from mammography: Are the numbers really that different?

MANAGEMENT PERSPECTIVE

Real and artificial controversies in breast cancer screening

Stephen W Duffy*[1], Tony Hsiu-Hsi Chen[2], Robert A Smith[3], Amy Ming-Fang Yen[4] & Laszlo Tabar[5]

Practice Points

- Mammographic screening prevents deaths from breast cancer and can be recommended.
- When expressed in terms of breast cancer mortality in women of average UK risk, screened regularly from the age of 50–69 years, the major reviews indicate a reduction in breast cancer mortality in the range of one life saved per 64–257 women screened.
- Offering screening on the basis of age (starting at either 40 or 50 years) is an effective strategy.
- There is scope for varying the surveillance regimen (including the imaging technology) based on family history or breast density.

SUMMARY We review the apparent disparities between different reviews of the effects of mammographic screening on mortality from breast cancer and overdiagnosis. When results of each review are expressed with respect to a common population and a common baseline, all find a substantial mortality benefit and variation among estimates is minor. There are genuine disagreements about overdiagnosis, but methods that take account of lead time and underlying incidence trends yield estimates of overdiagnosis that are modest and are outweighed by the mortality benefit. There is potential for individualized screening regimens, particularly with respect to breast density.

In this paper, we give our perspective on recent debates about breast cancer screening, based on our own experience and knowledge of the research literature. It is generally accepted that screening with mammography prevents deaths from breast cancer, although debate continues about the absolute size of the mortality benefit conferred and the concomitant risks associated with screening [1–3]. Among these risks, the most highly publicized in recent years is overdiagnosis, defined as the diagnosis by screening of cancer that would not have been diagnosed in the patient's lifetime if screening had not taken place [4]. A number of recent observational studies have claimed to find low rates of benefit in terms of reducing mortality rates or late stage disease, and high rates of overdiagnosis [5,6]. These have achieved a high profile in the mass media and stimulated further debate [7,8]. Other areas of debate include ages at which to begin and end screening, the interaction of screening and contemporaneous changes to therapy, and

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[3]Cancer Control Science Department, American Cancer Society, Atlanta, GA, USA
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*Author for correspondence: Tel: +44 20 7882 3515; Fax: +44 20 7882 3899; s.w.duffy@qmul.ac.uk

Future Medicine fsg

10.2217/BMT.13.53 © Laszlo Tabar Breast Cancer Manage. (2013) 2(6), 519–528 ISSN 1758-1923

- Recent estimates of the absolute benefit of screening vary as much as 20 – fold
- If most estimates derive from the same studies, *why are the differences so great?*

Source: Duffy SW, Chen T HH, Smith RA, Yen A MF, Tabar L. Laszlo Tabar. ***Breast Cancer Manage.*** (2013) 2(6), 519–528

Quoted absolute benefits (NNS & NNI) to prevent 1 breast cancer death reveal a ~ 20-fold difference

Source	No. needed to screen	Follow-up period (years)
UK review (2012)	180*	25
USPSTF, depending on age (2009)	377-1904†	~ 15
Nordic Cochrane Review (2011)	2000†	10
EUROSCREEN (2012)	111*	30

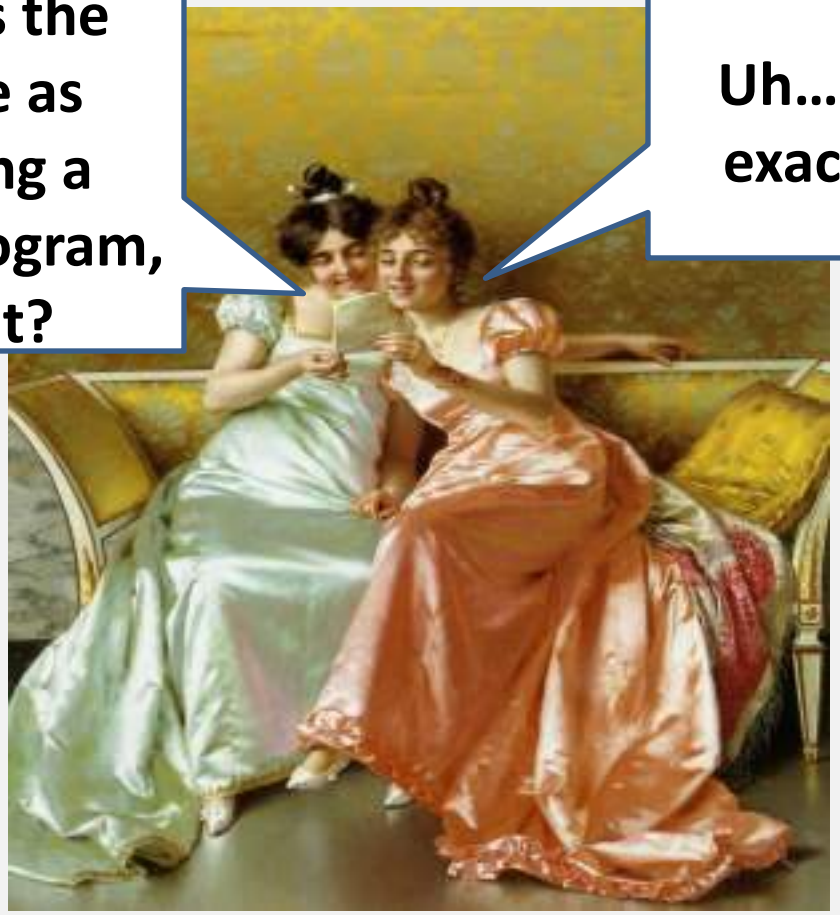
*Number of women needed to screen (NNS) for ten rounds to prevent one breast cancer death

†Number needed to invite (NNI) to screening

When measuring the ***effectiveness*** of screening, are we interested in measuring the benefit of an invitation to screening, ***or actually being screened?***

Invitation?

This is the same as getting a mammogram, right?



Uh….not exactly

Number Needed to Screen (NNS) vs. Number Needed to Invite (NNI) to Prevent 1 Breast Cancer Death

Age Group	Swedish data (NNS)[1]	USPSTF (NNI)[2]
Overall	**464**	**1224**
40-49	726	1,904
50-59	260	1,339
60-69	198	377

[1] **Number Needed to Screen (NNS) Every 2 Years (40-49—18 mos.) for a Period of 10 Years, with 20 Years of Follow-up, to Save One Life.** Source: Tabar, et al. Two County Trial, 2011

[2] **Number Needed to Invite (NNI), estimated from RCT data with variable screening intervals, variable screening rounds, different rates of adherence and non-compliance, and variable periods of follow-up (14 yrs.)** Source: USPSTF, 2009

Disparities in the estimates of benefits and harms from mammography

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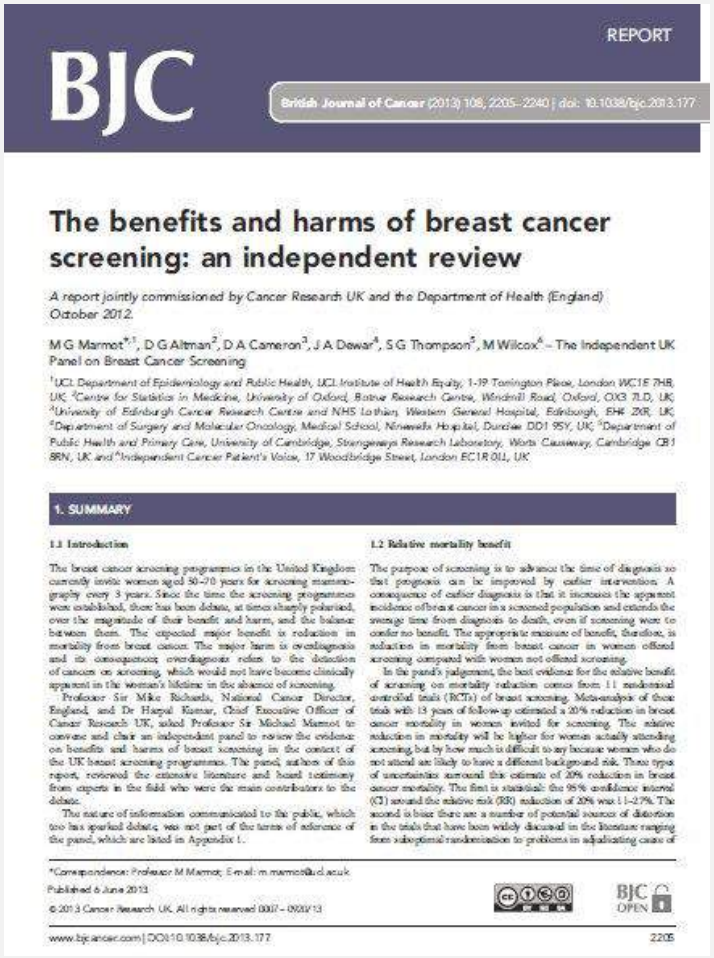
- We assessed whether estimates of absolute benefit represent….

  (1) genuine differences in the true estimate of benefit, OR

  (2) differences that mainly are due to such factors as relative risk, NNI vs. NNS, follow-up time, and target population

- We converted all four estimates to the same scenario as used in the UK Independent Review, i.e.,
  - the effect of screening for 20 years from the age of 50–69 on breast cancer mortality at age 55–79 years, in a UK population.

UK Independent Review of Breast Cancer Screening---Marmot Report



BJC

REPORT

British Journal of Cancer (2013) 108, 2205–2240 | doi: 10.1038/bjc.2013.177

The benefits and harms of breast cancer screening: an independent review

A report jointly commissioned by Cancer Research UK and the Department of Health (England) October 2012.

M G Marmot*[,1], D G Altman[2], D A Cameron[3], J A Dewar[4], S G Thompson[5], M Wilcox[6] – The Independent UK Panel on Breast Cancer Screening

[1]UCL Department of Epidemiology and Public Health, UCL Institute of Health Equity, 1-19 Torrington Place, London WC1E 7HB, UK; [2]Centre for Statistics in Medicine, University of Oxford, Botnar Research Centre, Windmill Road, Oxford, OX3 7LD, UK; [3]University of Edinburgh Cancer Research Centre and NHS Lothian, Western General Hospital, Edinburgh, EH4 2XR, UK; [4]Department of Surgery and Molecular Oncology, Medical School, Ninewells Hospital, Dundee DD1 9SY, UK; [5]Department of Public Health and Primary Care, University of Cambridge, Strangeways Research Laboratory, Worts Causeway, Cambridge CB1 8RN, UK and [6]Independent Cancer Patient's Voice, 17 Woodbridge Street, London EC1R 0LL, UK

1. SUMMARY

1.1 Introduction

The breast cancer screening programmes in the United Kingdom currently invite women aged 50–70 years for screening mammography every 3 years. Since the time the screening programmes were established, there has been debate, at times sharply polarised, over the magnitude of their benefit and harm, and the balance between them. The expected major benefit is reductions in mortality from breast cancer. The major harm is overdiagnosis and its consequences; overdiagnosis refers to the detection of cancers on screening, which would not have become clinically apparent in the woman's lifetime in the absence of screening.

Professor Sir Mike Richards, National Cancer Director, England, and Dr Harpal Kumar, Chief Executive Officer of Cancer Research UK, asked Professor Sir Michael Marmot to convene and chair an independent panel to review the evidence on benefits and harms of breast screening in the context of the UK breast screening programmes. The panel, authors of this report, reviewed the extensive literature and heard testimony from experts in the field who were the main contributors to the debate.

The nature of information communicated to the public, which too has sparked debate, was not part of the terms of reference of the panel, which are listed in Appendix 1.

1.2 Relative mortality benefit

The purpose of screening is to advance the time of diagnosis so that prognosis can be improved by earlier intervention. A consequence of earlier diagnosis is that it increases the apparent incidence of breast cancer in a screened population and extends the average time from diagnosis to death, even if screening were to confer no benefit. The appropriate measure of benefit, therefore, is reduction in mortality from breast cancer in women offered screening compared with women not offered screening.

In the panel's judgement, the best evidence for the relative benefit of screening on mortality reduction comes from 11 randomised controlled trials (RCTs) of breast screening. Meta-analysis of these trials with 13 years of follow-up estimated a 20% reduction in breast cancer mortality in women invited for screening. The relative reduction in mortality will be higher for women actually attending screening, but by how much is difficult to say because women who do not attend are likely to have a different background risk. There types of uncertainties surround this estimate of 20% reduction in breast cancer mortality. The first is statistical: the 95% confidence interval (CI) around the relative risk (RR) reduction of 20% was 11–27%. The second is bias: there are a number of potential sources of distortion in the trials that have been widely discussed in the literature ranging from suboptimal randomisation to problems in adjudicating cause of

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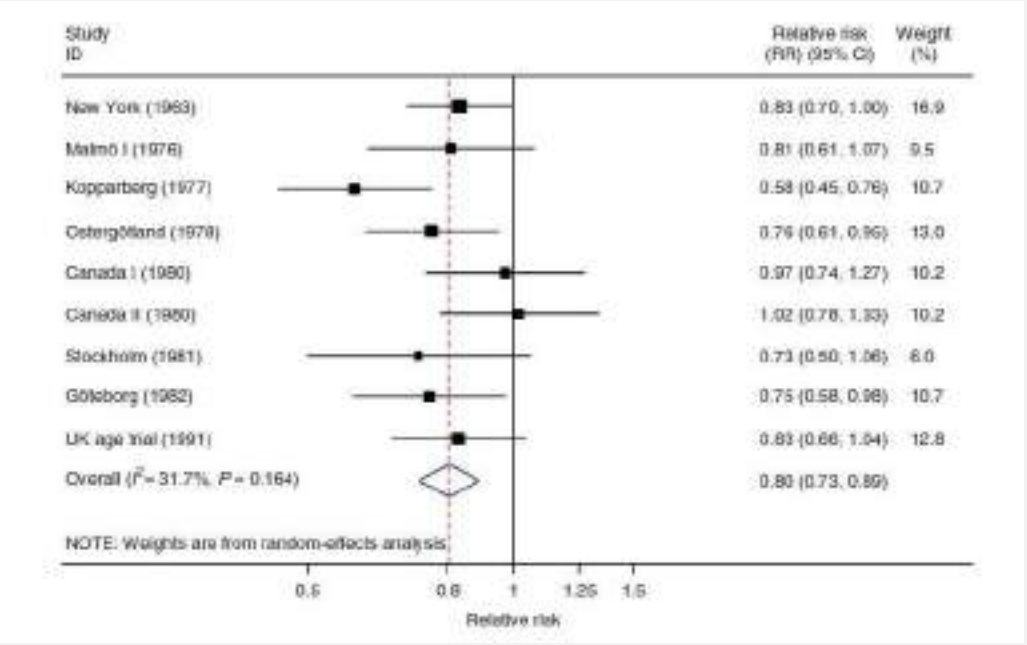
Published 6 June 2013

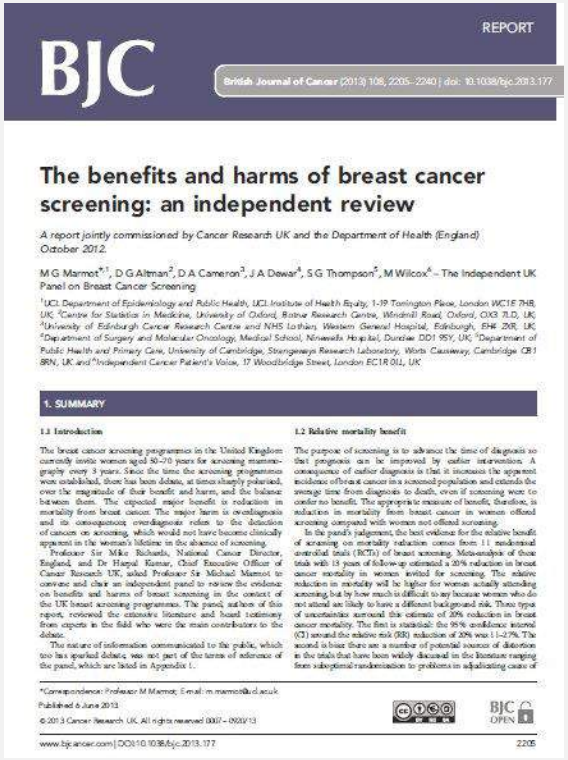


Meta-analysis of 11 RCTs with 13 years of follow-up.

Overall relative risk =0.80 (0.73, 0.89)

Source: Marmot, MG, et al. BJC, October 2012

UK Independent Review of Breast Cancer Screening—Estimate of Absolute Benefit



BJC

REPORT

British Journal of Cancer (2013) 108, 2205–2240 | doi: 10.1038/bjc.2013.177

The benefits and harms of breast cancer screening: an independent review

A report jointly commissioned by Cancer Research UK and the Department of Health (England) October 2012.

M G Marmot*[1], D G Altman[2], D A Cameron[3], J A Dewar[4], S G Thompson[5], M Wilcox[6] – The Independent UK Panel on Breast Cancer Screening

[1]UCL Department of Epidemiology and Public Health, UCL Institute of Health Equity, 1-19 Torrington Place, London WC1E 7HB, UK; [2]Centre for Statistics in Medicine, University of Oxford, Botnar Research Centre, Windmill Road, Oxford, OX3 7LD, UK; [3]University of Edinburgh Cancer Research Centre and NHS Lothian, Western General Hospital, Edinburgh, EH4 2XR, UK; [4]Department of Surgery and Molecular Oncology, Medical School, Ninewells Hospital, Dundee DD1 9SY, UK; [5]Department of Public Health and Primary Care, University of Cambridge, Strangeways Research Laboratory, Worts Causeway, Cambridge CB1 8RN, UK and [6]Independent Cancer Patient's Voice, 17 Woodbridge Street, London EC1R 0LL, UK

1. SUMMARY

1.1 Introduction

The breast cancer screening programmes in the United Kingdom currently invite women aged 50–70 years for screening mammography every 3 years. Since the time the screening programmes were established, there has been debate, at times sharply polarised, over the magnitude of their benefit and harm, and the balance between them. The expected major benefit is reduction in mortality from breast cancer. The major harm is overdiagnosis and its consequences: overdiagnosis refers to the detection of cancers on screening, which would not have become clinically apparent in the woman's lifetime in the absence of screening.

Professor Sir Mike Richards, National Cancer Director, England, and Dr Harpal Kumar, Chief Executive Officer of Cancer Research UK, asked Professor Sir Michael Marmot to convene and chair an independent panel to review the evidence on benefits and harms of breast screening in the context of the UK breast screening programmes. The panel, authors of this report, reviewed the extensive literature and heard testimony from experts in the field who were the main contributors to the debate.

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Published 6 June 2013

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www.bjcancer.com | DOI:10.1038/bjc.2013.177 2205

- In the UK, women ages 50-70 are invited to screening every 3 years
- Apply the relative mortality of 20% to the observed cumulative absolute risk of breast cancer mortality over the ages 55–79 years
- Results:
  - **For every 235 women *invited* to screening, 1 breast cancer death would be prevented**
  - **For every 180 women *screened*, 1 breast cancer death would be prevented**

Source: Marmot, MG, et al. BJC, October 2012

The Cochrane authors downgrade the RR based on judgments about the quality of the randomization


Screening for breast cancer with mammography (Review)

Gøtzsche PC, Jørgensen KJ

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This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2013, Issue 6

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WILEY

Screening for breast cancer with mammography (Review)
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- "The RR for all seven trials combined was 0.81 (95% CI 0.74 to 0.87)."

- "But if we assume the effect is 15%, it means that for every 2000 women invited for screening throughout 10 years, one will avoid dying of breast cancer."

The Nordic Cochrane Review

- **Estimate of absolute benefit is based on:**
  - 20% reduction in breast cancer mortality, (downgraded to 15%), based on invitation to screening among women ages 40-74
  - **The screening period and follow-up period are contemporaneous, i.e., a single 10 year period**
- Thus, 1 breast cancer death prevented per 2000 women ages 40-74 years invited to screening (based on variable attendance from the RCTs)

Source: Cochrane Database Syst Rev. 2013;6:CD001877

Extrapolation of the Cochrane estimate

- **Apply —**
  - the observed 20% mortality reduction vs. conjectured 15%, and estimate NNS vs. NNI
  - Now, the NNS to prevent 1 breast cancer death = 1,000
- **Next —**
  - follow 20 years instead of 10 years
  - Now, the NNS to prevent 1 breast cancer death = 600
- **Finally –**
  - the Cochrane estimate was derived from trials dominated by ages 40-49 (Malmo and NBSS). Using the UK age distribution for women ages 50-69
  - Now, the NNS to prevent 1 breast cancer death = 257

Adjusted absolute risk estimates of the number needed to screen to save one life based on UK Review Standard*

Source	No. needed to screen*/invite† (original)	No. needed to screen (adjusted)
UK review (2012)	180*	**180**
USPSTF, depending on age (2009)	377-1904†	**193**
Nordic Cochrane Review (2011)	2000†	**257**
EUROSCREEN (2012)	111*	**96**

* Original estimates are adjusted to the same scenario used in the UK Independent Review, i.e., the impact of screening UK women ages 50-51 every 3 years for 20 years on mortality in women ages 55-79.

Overdiagnosis and False Positives

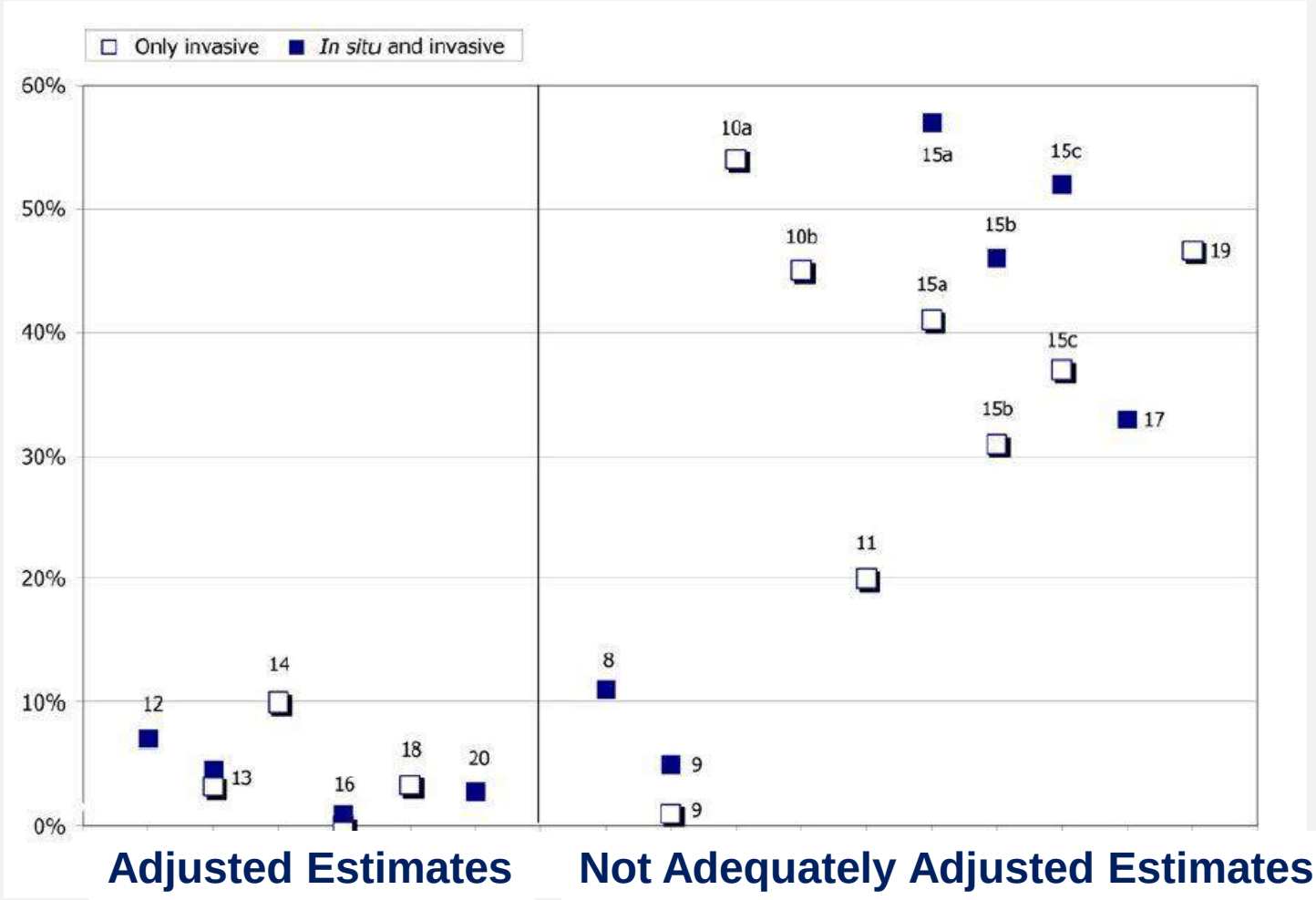
Overdiagnosis

- **Overdiagnosis**- is diagnosis by screening of cancer that never would have arisen symptomatically in the person's lifetime, and never would have been detected if screening had not taken place

- **Estimates of overdiagnosis associated with breast cancer screening range from 0 to > 50%**

- To estimate overdiagnosis, we must examine incidence rates over time, **and adjust for:**
  - Pre-existing trend of increasing incidence
  - Lead time
  - Estimates of the relative contribution of DCIS vs. invasive disease

Overdiagnosis Estimates Based on Adjustment for Incidence Trends and Lead-time



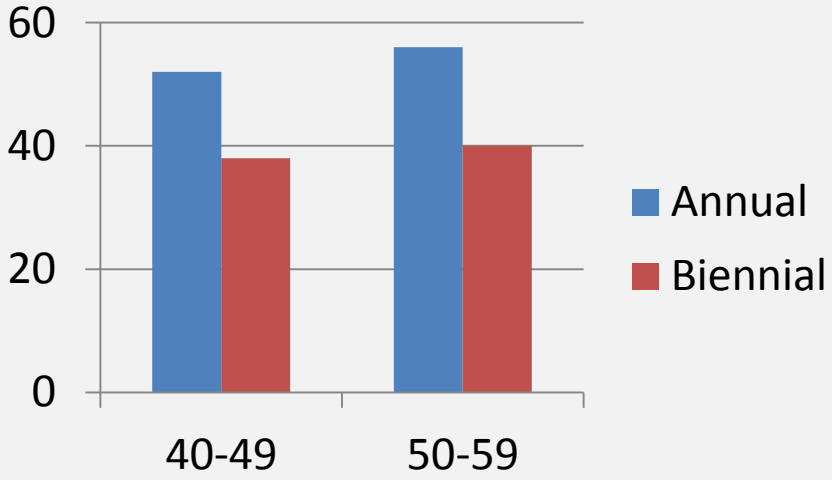
Puliti, et al. JMS 2012;19(1)

10 Year Probability of a False Positive Exam Based on Age at First Mammogram

Annals of Internal Medicine | ORIGINAL RESEARCH

Cumulative Probability of False-Positive Recall or Biopsy Recommendation After 10 Years of Screening Mammography

A Cohort Study



Overall

- False-positive recall probability:
  - 16.3% at first mammogram
  - 9.6% at subsequent exams
- Probability of false-positive biopsy recommendation:
  - 2.5% at first mammogram
  - 1.0% at subsequent exams

Consequences of False Positive Mammograms

Research

Original Investigation

Consequences of False-Positive Screening Mammograms

Anna N. A. Tosteson, ScD; Dennis G. Fryback, PhD; Cristina S. Hammond, MPH; Lucy G. Hanna, MS; Margaret R. Grove, MS; Mary Brown, MPH; Qianhe Wang, MS; Karen Lindfors, MD, MPH; Etta D. Pisano, MD

Invited Commentary

Supplemental content at jamainternalmedicine.com

IMPORTANCE False-positive mammograms, a common occurrence in breast cancer screening programs, represent a potential screening harm that is currently being evaluated by the US Preventive Services Task Force.

OBJECTIVE To measure the effect of false-positive mammograms on quality of life by measuring personal anxiety, health utility, and attitudes toward future screening.

DESIGN, SETTING, AND PARTICIPANTS The Digital Mammographic Imaging Screening Trial (DMIST) quality-of-life substudy telephone survey was performed shortly after screening and 1 year later at 22 DMIST sites and included randomly selected DMIST participants with positive and negative mammograms.

EXPOSURE Mammogram requiring follow-up testing or referral without a cancer diagnosis.

MAIN OUTCOMES AND MEASURES The 6-question short form of the Spielberger State-Trait Anxiety Inventory state scale (STAI-6) and the EuroQol EQ-5D instrument with US scoring. Attitudes toward future screening as measured by women's self-report of future intention to undergo mammographic screening and willingness to travel and stay overnight to undergo a hypothetical new type of mammography that would identify as many cancers with half the false-positive results.

RESULTS Among 1450 eligible women invited to participate, 1226 (84.6%) were enrolled, with follow-up interviews obtained in 1028 (83.8%). Anxiety was significantly higher for women with false-positive mammograms (STAI-6, 35.2 vs 32.7), but health utility scores did not differ and there were no significant differences between groups at 1 year. Future screening intentions differed by group (25.7% vs 14.2% more likely in false-positive vs negative groups); willingness to travel and stay overnight did not (0.9% vs 10.5% in false-positive vs negative groups). Future screening intention was significantly increased among women with false-positive mammograms (odds ratio, 2.12; 95% CI, 1.54-2.93), younger age (2.78; 1.5-5.0), and poorer health (1.63; 1.09-2.43). Women's anticipated high-level anxiety regarding future false-positive mammograms was associated with willingness to travel overnight (odds ratio, 1.94; 95% CI, 1.28-2.95).

CONCLUSIONS AND RELEVANCE False-positive mammograms were associated with increased short-term anxiety but not long-term anxiety, and there was no measurable health utility decrement. False-positive mammograms increased women's intention to undergo future breast cancer screening and did not increase their stated willingness to travel to avoid a false-positive result. Our finding of time-limited harm after false-positive screening mammograms is relevant for clinicians who counsel women on mammographic screening and for screening guideline development groups.

Author Affiliations: Dartmouth Institute for Health Policy and Clinical Practice and Norris Cotton Cancer Center, Geisel School of Medicine at Dartmouth, Lebanon, New Hampshire (Tosteson, Hammond, Grove, Wang); Departments of Population Sciences and Industrial and Systems Engineering, University of Wisconsin at Madison (Fryback); Center for Statistical Science, Brown University School of Medicine, Providence, Rhode Island (Hanna); Department of Radiology, University of North Carolina at Chapel Hill (Brown); Department of Radiology, University of California at Davis (Lindfors); Department of Radiology, Medical University of South Carolina, Charleston (Pisano).

Corresponding Author: Anna N. A. Tosteson, ScD, Dartmouth Institute for Health Policy and Clinical Practice, Geisel School of Medicine at Dartmouth, 1 Medical Center Dr, 6-6875 (55), Lebanon, NH 03756 (anna.n.a.tosteson@dartmouth.edu).

JAMA Intern Med. doi:10.1001/jamainternmed.2014.981
Published online April 21, 2014.

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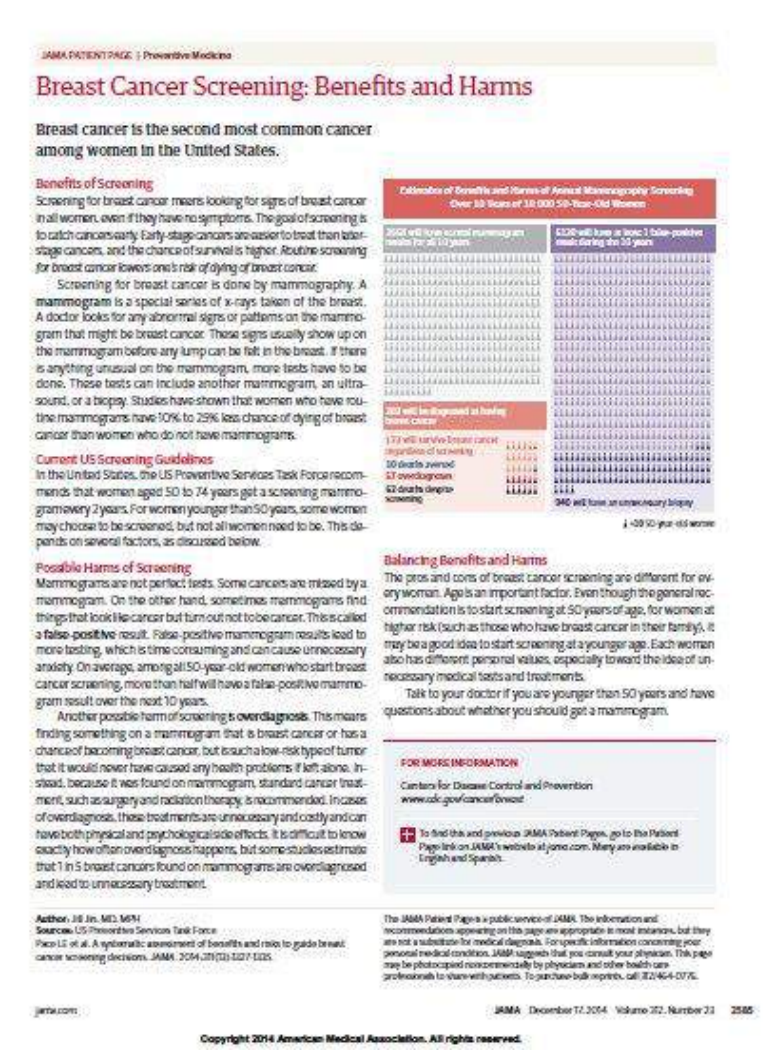
Decision Aids for Shared and Informed Decisions

The Devil is in the Details

Estimates of absolute benefits & harms of mammography often are miscalculated



JAMA PATIENT PAGE | Preventive Medicine

Breast Cancer Screening: Benefits and Harms

Breast cancer is the second most common cancer among women in the United States.

Benefits of Screening

Screening for breast cancer means looking for signs of breast cancer in all women, even if they have no symptoms. The goal of screening is to catch cancers early. Early-stage cancers are easier to treat than later-stage cancers, and the chance of survival is higher. Routine screening for breast cancer lowers one's risk of dying of breast cancer.

Screening for breast cancer is done by mammography. A **mammogram** is a special series of x-rays taken of the breast. A doctor looks for any abnormal signs or patterns on the mammogram that might be breast cancer. These signs usually show up on the mammogram before any lump can be felt in the breast. If there is anything unusual on the mammogram, more tests have to be done. These tests can include another mammogram, an ultrasound, or a biopsy. Studies have shown that women who have routine mammograms have 10% to 29% less chance of dying of breast cancer than women who do not have mammograms.

Current US Screening Guidelines

In the United States, the US Preventive Services Task Force recommends that women aged 50 to 74 years get a screening mammogram every 2 years. For women younger than 50 years, some women may choose to be screened, but not all women need to be. This depends on several factors, as discussed below.

Possible Harms of Screening

Mammograms are not perfect tests. Some cancers are missed by a mammogram. On the other hand, sometimes mammograms find things that look like cancer but turn out not to be cancer. This is called a **false-positive** result. False-positive mammogram results lead to more testing, which is time consuming and can cause unnecessary anxiety. On average, among all 50-year-old women who start breast cancer screening, more than half will have a false-positive mammogram result over the next 10 years.

Another possible harm of screening is **overdiagnosis**. This means finding something on a mammogram that is breast cancer or has a chance of becoming breast cancer, but is such a low-risk type of tumor that it would never have caused any health problems if left alone. Instead, because it was found on mammogram, standard cancer treatment, such as surgery and radiation therapy, is recommended. In cases of overdiagnosis, these treatments are unnecessary and costly and can have both physical and psychological side effects. It is difficult to know exactly how often overdiagnosis happens, but some studies estimate that 1 in 5 breast cancers found on mammograms are overdiagnosed and lead to unnecessary treatment.

Balancing Benefits and Harms

The pros and cons of breast cancer screening are different for every woman. Age is an important factor. Even though the general recommendation is to start screening at 50 years of age, for women at higher risk (such as those who have breast cancer in their family), it may be a good idea to start screening at a younger age. Each woman also has different personal values, especially toward the idea of unnecessary medical tests and treatments.

Talk to your doctor if you are younger than 50 years and have questions about whether you should get a mammogram.

FOR MORE INFORMATION

Centers for Disease Control and Prevention
www.cdc.gov/cancer/breast

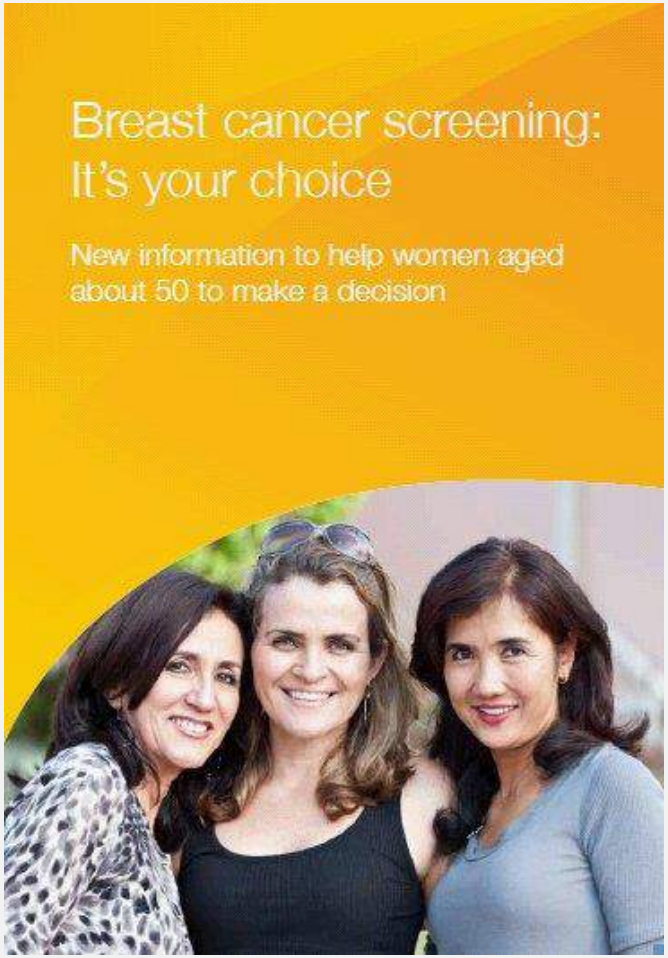
To find this and previous JAMA Patient Pages, go to the Patient Page link on JAMA's website at jama.com. Many are available in English and Spanish.

Author. Jill Jin, MD, MPH
Sources. US Preventive Services Task Force
Pace LE, et al. A systematic assessment of benefits and risks to guide breast cancer screening decisions. JAMA. 2014;311(13):1327-1335.

- Source:
  - Welch HG, Passow HJ. Quantifying the benefits and harms of screening mammography. JAMA Internal Medicine 2014;174:448-54.
  - Pace LE, He Y, Keating NL. A Systematic Assessment of Benefits and Risks to Guide Breast Cancer Screening Decisions. JAMA 2014;311(13): 1327-1335.

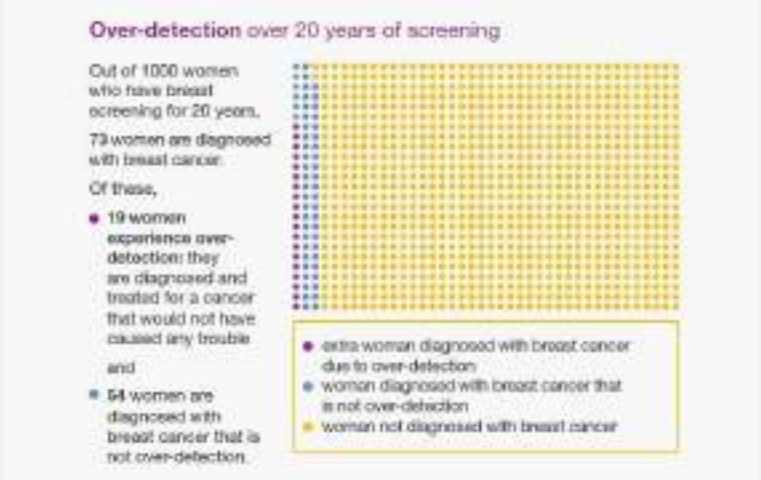
Use of a decision aid including information on overdetection to support informed choice about breast cancer screening: a randomised controlled trial

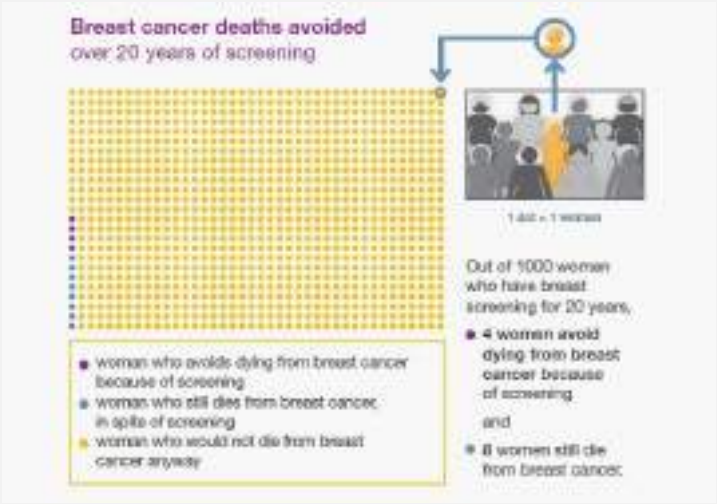
Jolyn Hersch, Alexandra Barratt, Jesse Jansen, Les Irwig, Kevin McGeechan, Gemma Jacklyn, Hazel Thornton, Haryana Dhillon, Nehmat Houssami, Kirsten McCaffery

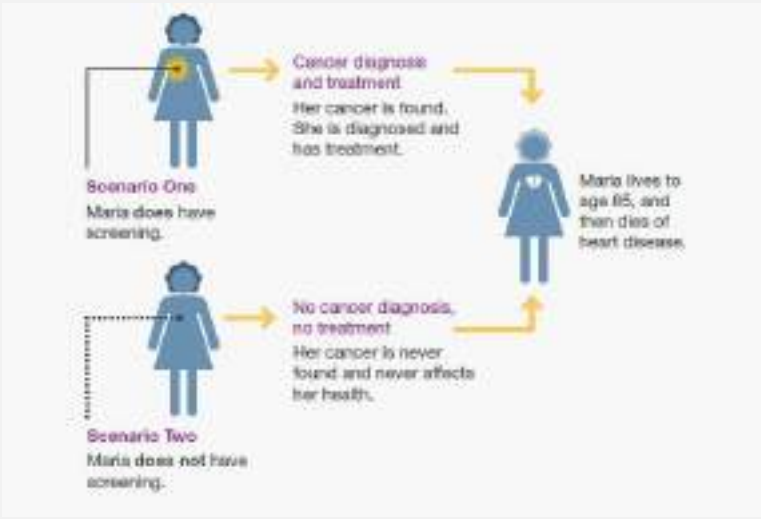


- New South Wales, Australia
- Women ages 48-50
- Women were randomized to receive the standard decision aid, or a revised decision aid that included overdiagnosis

Here, false positives & overdiagnosis are overestimated, and lives saved are cancer risk are underestimated







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Intentions about having breast screening	Intervention	Control
Intending to be screened (definitely or likely)	308 (74%)	363 (87%)
Definitely will	197 (47%)	268 (64%)
Likely to	111 (26%)	95 (23%)
Unsure	69 (16%)	30 (7%)
Not likely to, or definitely will not	42 (10%)	26 (6%)

In the baseline questionnaire, both the intervention group and control group were equally likely to attend screening.
After the intervention, 26% vs. 13% were unsure, not likely, or definitely would not attend screening

Use of a decision aid including information on overdetection to support informed choice about breast cancer screening: a randomised controlled trial

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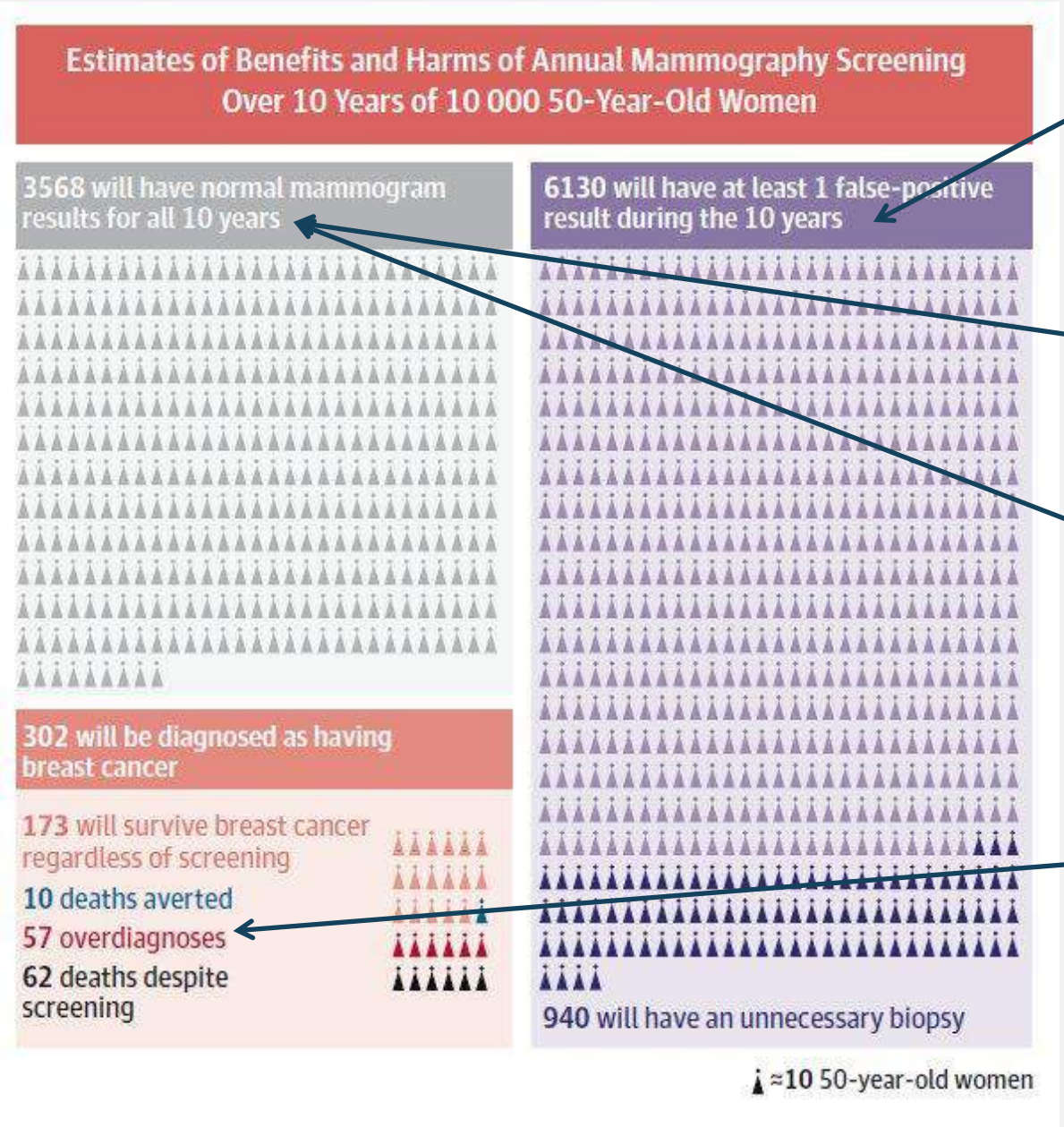
Balance of decision aid		
Clearly slanted towards screening	39 (9%)	71 (17%)
A little slanted towards screening	47 (11%)	58 (14%)
Completely balanced	177 (43%)	217 (52%)
A little slanted away from screening	125 (30%)	58 (14%)
Clearly slanted away from screening	25 (6%)	12 (3%)
Decision aid was clear and easy to understand		
Strongly agree	147 (35%)	217 (52%)
Agree	212 (51%)	177 (42%)
Neither agree nor disagree	18 (4%)	6 (1%)
Disagree or strongly disagree	42 (10%)	18 (4%)
Found decision aid helpful in making decision		
Strongly agree	105 (25%)	157 (38%)
Agree	198 (47%)	185 (44%)
Neither agree nor disagree	59 (14%)	35 (8%)
Disagree or strongly disagree	55 (13%)	41 (10%)



Problems with this chart

- **The 10 year estimate of at least 1 recall is the *upper* estimate of the recall and biopsy rate**
- **The 10 year estimate of avoiding 1 death is the *lower* estimate of benefit**
- **The screening period and follow-up period are too short—little opportunity to measure benefit in most women**
- **The overdiagnosis estimate is overestimated (19%)**

ORIGINAL ARTICLE

Summary of the evidence of breast cancer service screening outcomes in Europe and first estimate of the benefit and harm balance sheet

EUROSCREEN Working Group

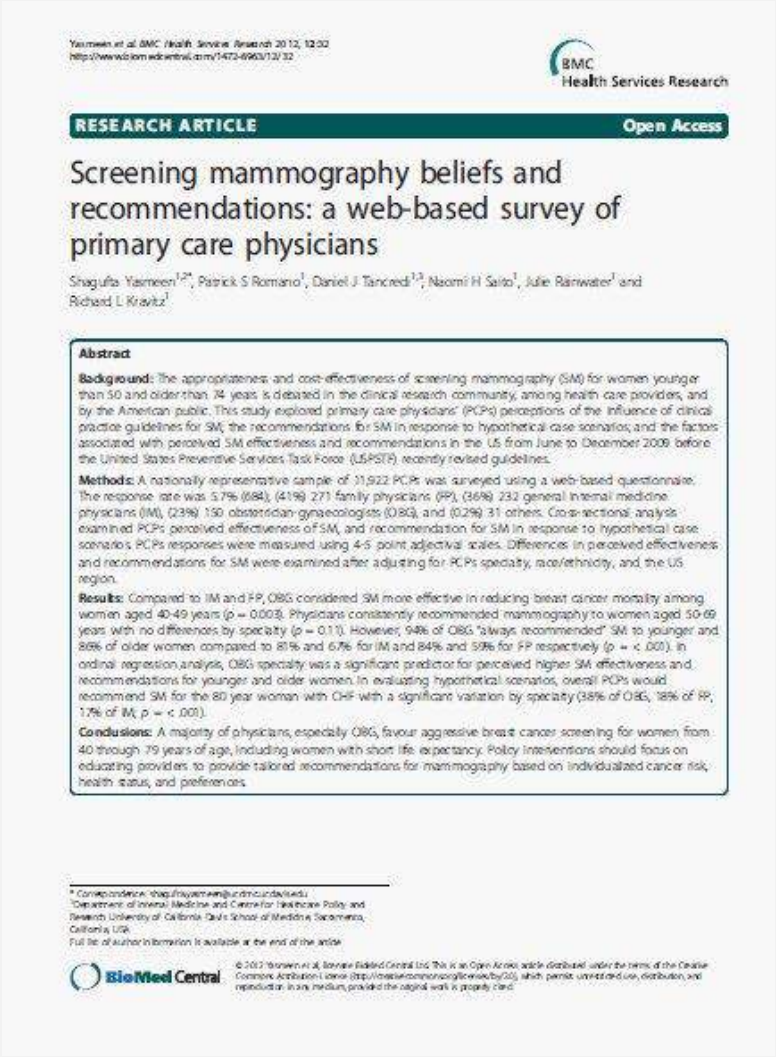
Note—the risk of overdiagnosis is 0.4%

Table 4 Balance sheet for 1000 women aged 50–51 years, screened biennially until 69 years (according to the EU policy on cancer screening[3]) and followed until 79 years

Outcome	For every 1000 women screened for 20 years:	The number of women that need to be screened:
Number of breast cancer cases diagnosed	71	14 women: to diagnose 1 case
BC mortality reduction	7–9 women's lives are saved (out of 30 BC deaths expected)*	111–143 women: to save 1 life
Over-diagnosis	4 cases are over-diagnosed (in addition to 67 BC expected)	250 women: to over-diagnose 1 case
False-positive test results among women without breast cancer	200 women recalled for further assessment procedures: 170 women with non-invasive assessment only 30 women with invasive assessment	6 women: to have 1 with at least one who has non-invasive assessment only 33 women: to have 1 with at least one invasive assessment

BC, breast cancer; EU, European Union
*19 out of the 30 expected BC death were diagnosed in ages 50–69

Primary Care Physicians Beliefs and Recommendations about Mammography



Yasmeen et al. BMC Health Services Research 2012, 12:50
http://www.biomedcentral.com/1472-6963/12/50

BMC Health Services Research

RESEARCH ARTICLE Open Access

Screening mammography beliefs and recommendations: a web-based survey of primary care physicians

Shagufta Yasmeen[1,2*], Patrick S Romano[1], Daniel J Tancredi[1,3], Naomi H Saito[1], Julie Rainwater[1] and Richard L Kravitz[1]

Abstract

Background: The appropriateness and cost-effectiveness of screening mammography (SM) for women younger than 50 and older than 74 years is debated in the clinical research community, among health care providers, and by the American public. This study explored primary care physicians' (PCPs) perceptions of the influence of clinical practice guidelines for SM, the recommendations for SM in response to hypothetical case scenarios, and the factors associated with perceived SM effectiveness and recommendations in the US from June to December 2009 before the United States Preventive Services Task Force (USPSTF) recently revised guidelines.

Methods: A nationally representative sample of 11,922 PCPs was surveyed using a web-based questionnaire. The response rate was 5.7% (684), (41%) 271 family physicians (FP), (36%) 232 general internal medicine physicians (IM), (23%) 150 obstetrician-gynaecologists (OBG), and (0.2%) 31 others. Cross-sectional analysis examined PCPs perceived effectiveness of SM, and recommendation for SM in response to hypothetical case scenarios. PCPs responses were measured using 4-6 point adjectival scales. Differences in perceived effectiveness and recommendations for SM were examined after adjusting for PCPs specialty, race/ethnicity, and the US region.

Results: Compared to IM and FP, OBG considered SM more effective in reducing breast cancer mortality among women aged 40-49 years ($p = 0.003$). Physicians consistently recommended mammography to women aged 50-69 years with no differences by specialty ($p = 0.11$). However, 94% of OBG "always recommended" SM to younger and 86% of older women compared to 81% and 67% for IM and 84% and 59% for FP respectively ($p = < .001$). In ordinal regression analysis, OBG specialty was a significant predictor for perceived higher SM effectiveness and recommendations for younger and older women. In evaluating hypothetical scenarios, overall PCPs would recommend SM for the 80 year woman with CHF with a significant variation by specialty (38% of OBG, 18% of FP, 17% of IM; $p = < .001$).

Conclusions: A majority of physicians, especially OBG, favour aggressive breast cancer screening for women from 40 through 79 years of age, including women with short life expectancy. Policy interventions should focus on educating providers to provide tailored recommendations for mammography based on individualized cancer risk, health status, and preferences.

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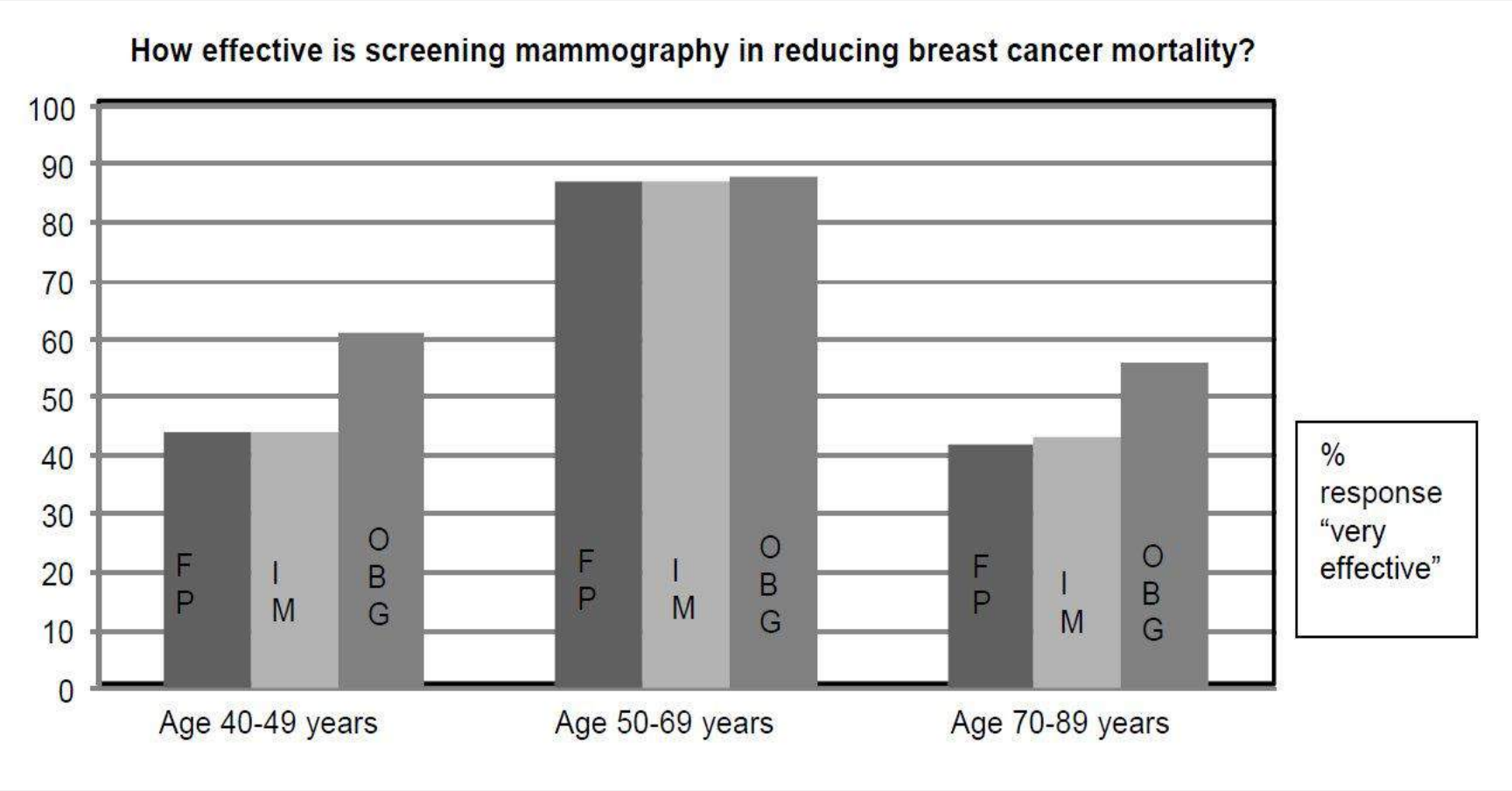
- A nationally representative sample of **11,922 PCPs** was surveyed using a web-based questionnaire.
- **The response rate was 5.7% (684);** (41%) 271 family physicians (FP), (36%) 232 general internal medicine physicians (IM), (23%) 150 obstetrician-gynecologists (OBG), and (0.2%) 31 others.

Primary care physicians' perceived effectiveness of screening mammography for average-risk women by age categories. How effective is screening mammography in reducing breast cancer mortality?



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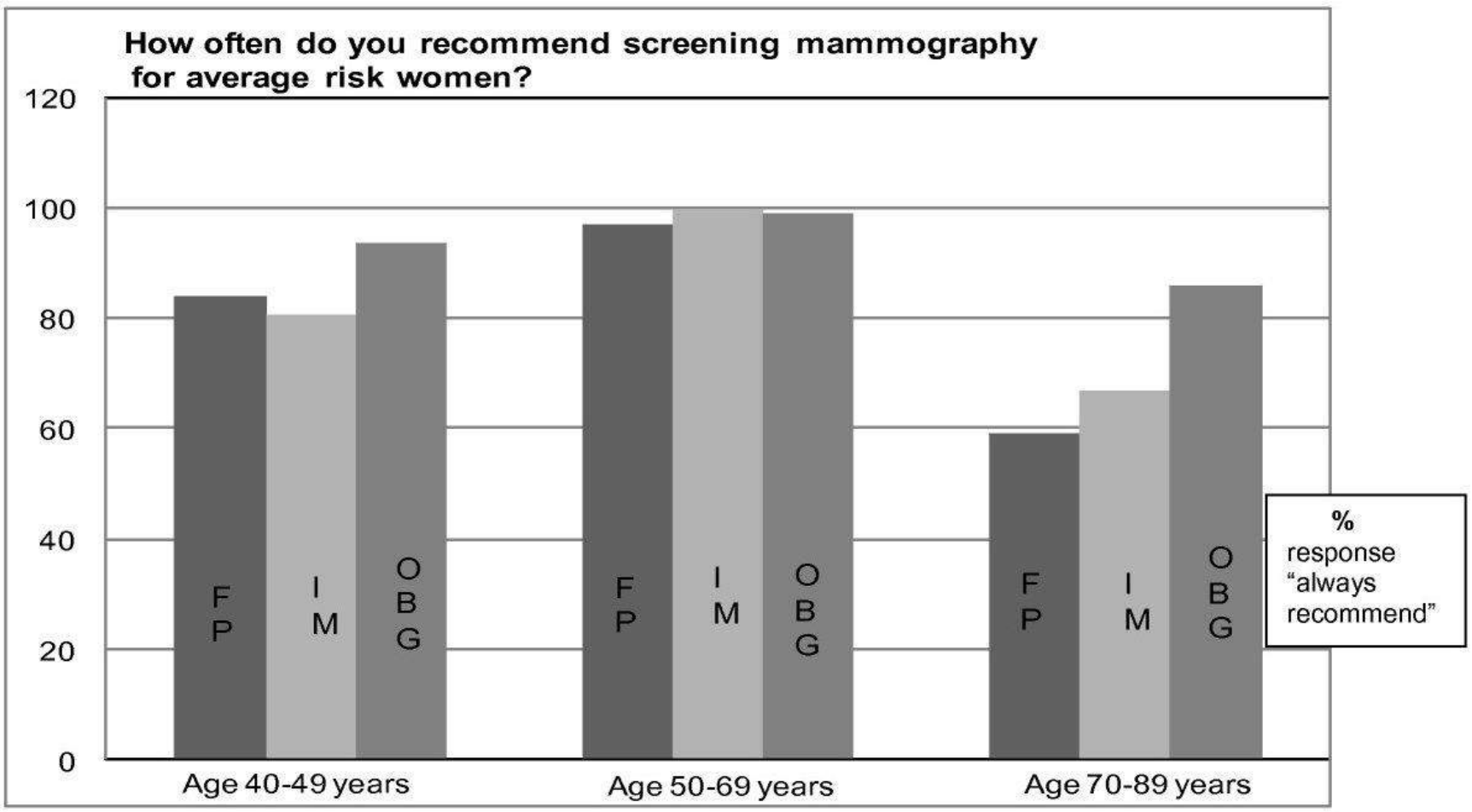
Primary care physicians' recommendations for screening mammography. How often do you recommend screening mammography for average-risk women?



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Does Modern Therapy Overcome the Need for Modern Mammography?

Of course not!

Do improvements in treatment make screening less important?

Screening Mammography — A Long Run for a Short Slide?

H. Gilbert Welch, M.D., M.P.H.

Thus, the increased awareness about the importance of promptly seeking care for overt breast abnormalities (there is no debate about diagnostic mammography) and the widespread use of adjuvant therapy have probably combined to make screening now less important.[4,5]

Absolute risk reductions among ER+ patients during the 1st 10 years by tamoxifen duration and nodal status

Absolute Mortality Reductions

Node + **10.9%**

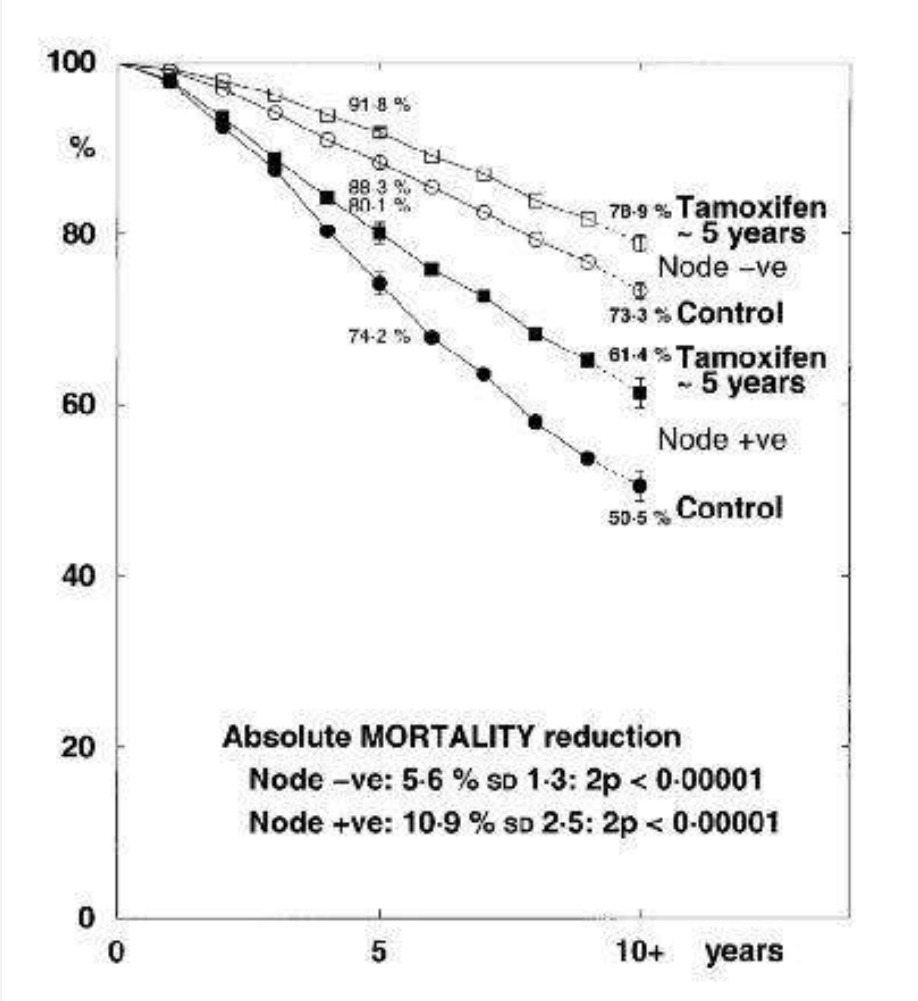
Node - **5.6%**

Conclusion?

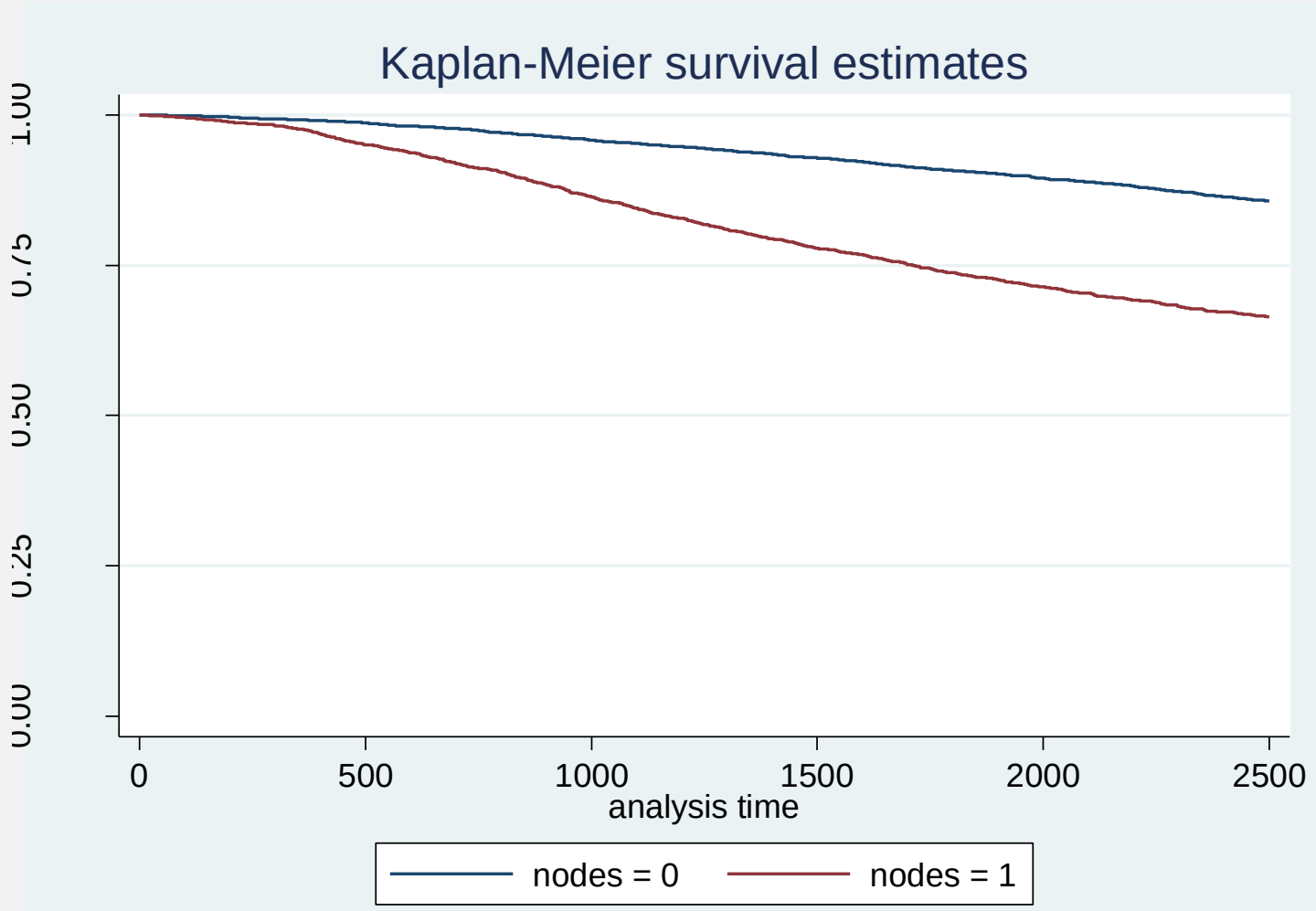
Tamoxifen reduces the risk of dying from breast cancer

Node negative breast cancers have better survival regardless of tamoxifen use

Source: Lancet 351:1451-67, 1998

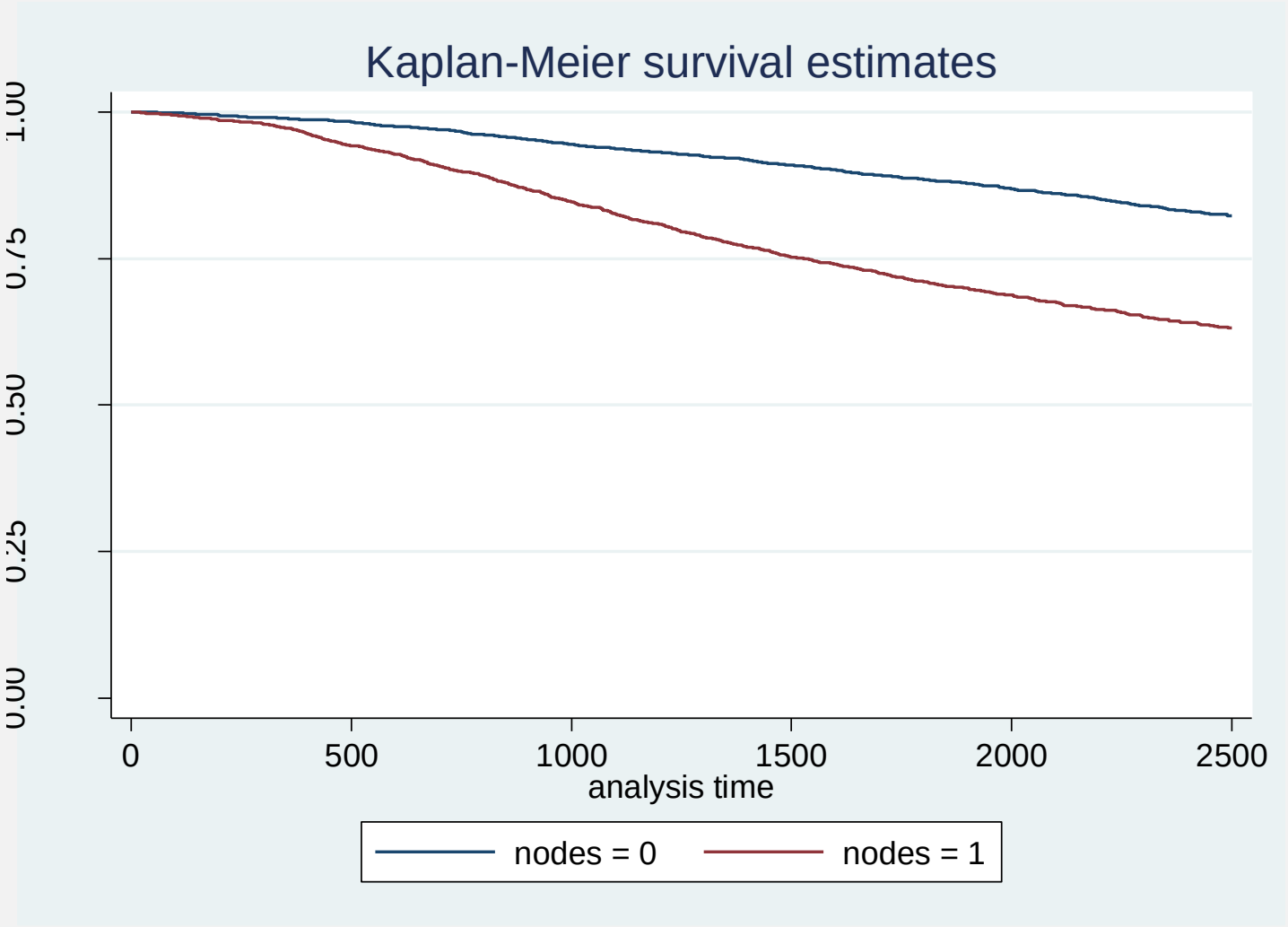


Survival by node status, 7209 breast cancer diagnosed since 1999 in East England

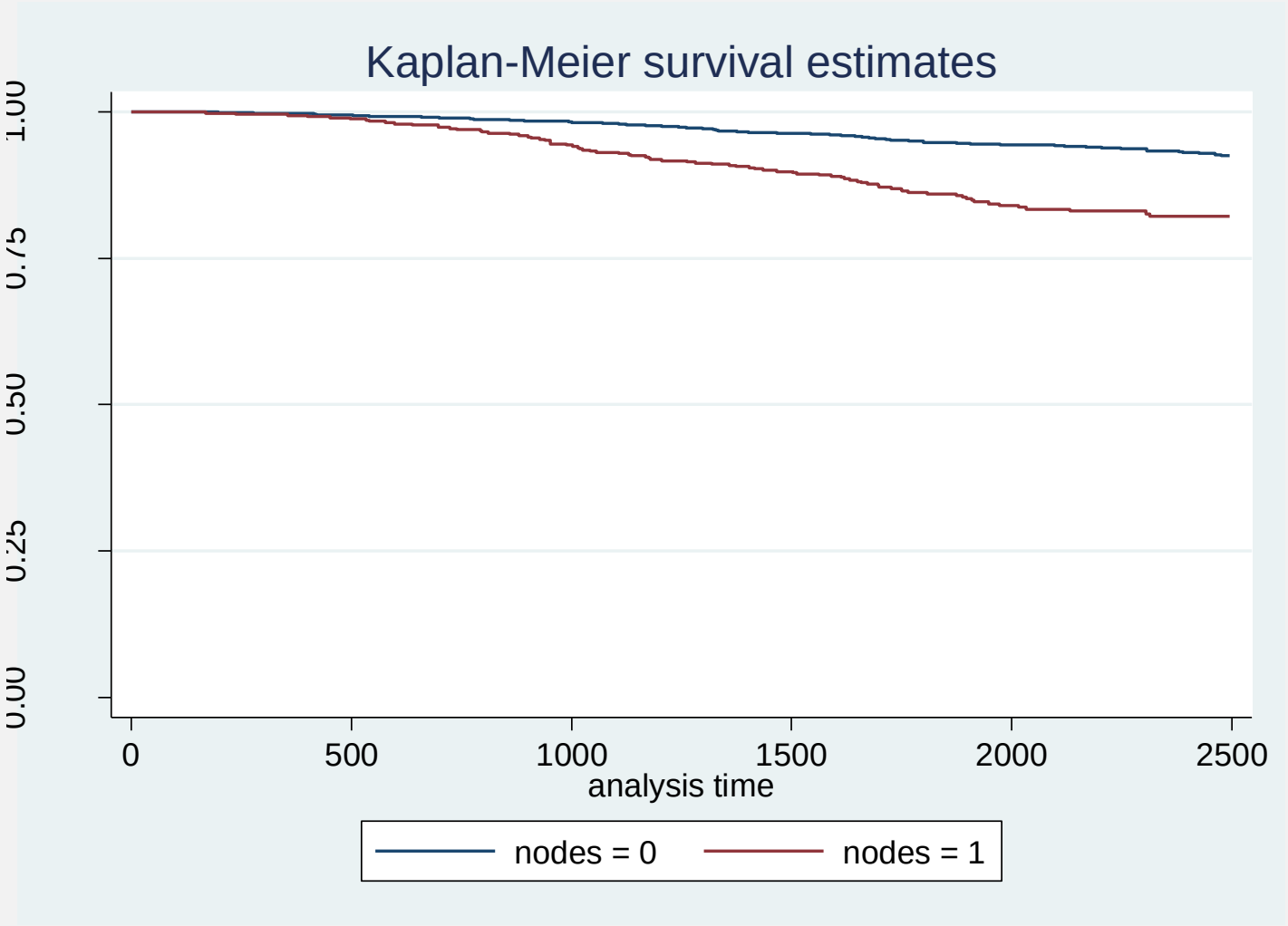


Source for this series, Stephen Duffy, MSc

Symptomatic Cancers Only



Screen-detected cancers only



Implications

- Despite treatment innovations, node positive disease still has poorer survival than node negative
- Screening reduces risk of node positive disease (24% vs 44% in this series)
- We should recapture our common sense and accept that both screening and therapy contribute to mortality reduction
- ***While screening does prevent deaths from breast cancer, you have to wait for years to observe the full benefit***

Costs to Society—Very Difficult to Estimate

But, Hey, Who Cares?

Health Affairs

National Expenditure For False-Positive Mammograms And Breast Cancer Overdiagnoses Estimated At $4 Billion A Year

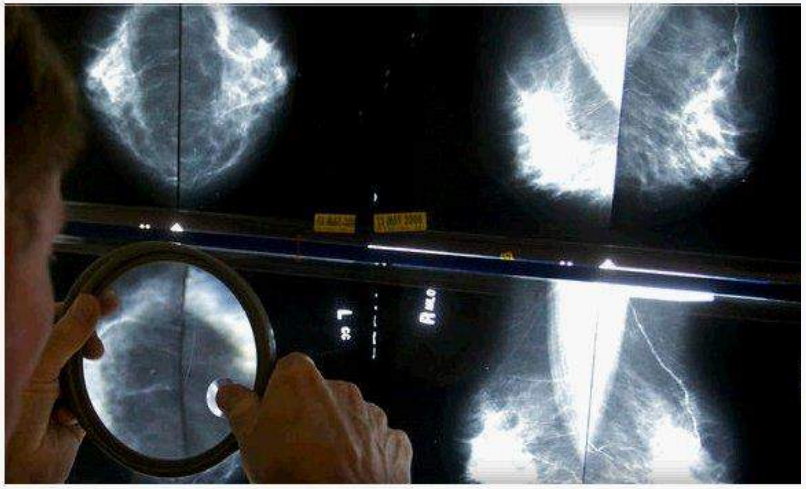
Expand

Mei-Sing Ong[1] and Kenneth D. Mandl[2,*]

CBSNEWS

AP / *April 7, 2015, 12:09 PM*

The high cost of breast cancer "false positives"



In this May 6, 2010 file photo, a radiologist uses a magnifying glass to check mammograms for breast can
Los Angeles. / **AP PHOTO/DAMIAN DOVARGANES**

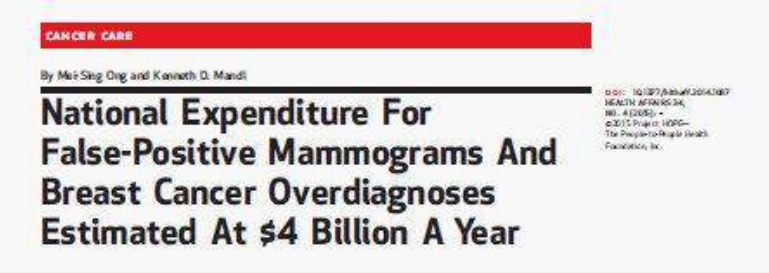
1 Comment / *23* Shares / *40* Tweets / Stumble / Email

MEDPAGE TODAY

Mammography's $4-Billion Problem

— Millions of women receive false-positive results annually, and 20,000 are overtreated.

What's wrong with this picture? ***Plenty!***



CANCER CARE

By Mei-Sing Ong and Kenneth D. Mandl

National Expenditure For False-Positive Mammograms And Breast Cancer Overdiagnoses Estimated At $4 Billion A Year

EXHIBIT 4

Estimated Annual National Costs Of False-Positive Mammograms In The United States, With Varying False-Positive Rates, 2012–13

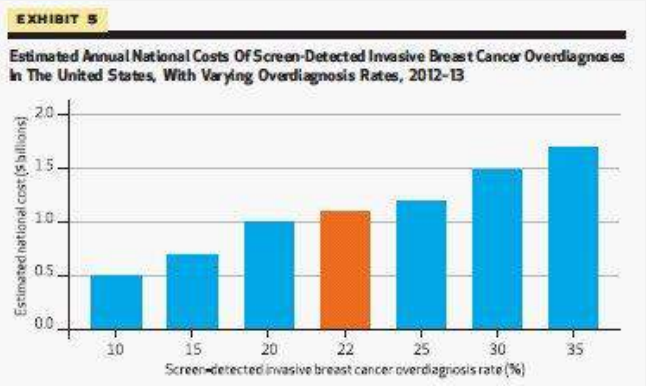


EXHIBIT 5

Estimated Annual National Costs Of Screen-Detected Invasive Breast Cancer Overdiagnoses In The United States, With Varying Overdiagnosis Rates, 2012–13

1) The annual false positive rate for women ages 40-59 was estimated with the NHIS 2 year screening rate for women 40-64 **(overestimate = $1.22 billion)**
2) They estimate more "screen detected" cancers than ACS and NCI estimate for "total cancers" diagnosed, inflating numbers of overdiagnosed cancers (overestimate = $852 million)
3) Overestimation of non-progressive DCIS **(overestimate = $117 million)**

Draft Recommendation Summary From USPSTF

Population	Recommendation	Grade (What's This?)
Women ages 50 to 74 years	The USPSTF recommends biennial screening mammography for women ages 50 to 74 years.	B
Women ages 40 to 49 years	The decision to start screening mammography in women prior to age 50 years should be an individual one. Women who place a higher value on the potential benefit than the potential harms may choose to begin biennial screening between the ages of 40 and 49 years. • For women at average risk for breast cancer, most of the benefit of mammography will result from biennial screening during ages 50 to 74 years. Of all age groups, women ages 60 to 69 years are most likely to avoid a breast cancer death through mammography screening. Screening mammography in women ages 40 to 49 years may reduce the risk of dying of breast cancer, but the number of deaths averted is much smaller than in older women and the number of false-positive tests and unnecessary biopsies are larger. • All women undergoing regular screening mammography are at risk for the diagnosis and treatment of noninvasive and invasive breast cancer that would otherwise not have become a threat to her health, or even apparent, during her lifetime (known as "overdiagnosis"). This risk is predicted to be increased when beginning regular mammography before age 50 years. • Women with a parent, sibling, or child with breast cancer may benefit more than average-risk women from beginning screening between the ages of 40 and 49 years. Go to the Clinical Considerations section for information on implementation of the C recommendation.	C
Women age 75 years and older	The USPSTF concludes that the current evidence is insufficient to assess the balance of benefits and harms of screening mammography in women age 75 years and older.	I

The meaning of the USPSTF "C" Recommendation has changed from 1998-2012

- The essence of the C recommendation has remained consistent: ***at the population level, the balance of benefits and harms is very close, and the magnitude of net benefit is small.***
  - **1998**: the USPSTF does not make a recommendation "for or against routinely" providing the service;
  - **2007**: the USPSTF recommends "against routinely" providing the service
  - **2012**: the USPSTF recommends "selectively" providing the service (2012).
- "Grade C recommendations are particularly sensitive to patient values and circumstances, and typically will require an informed conversation between the clinician and patient."

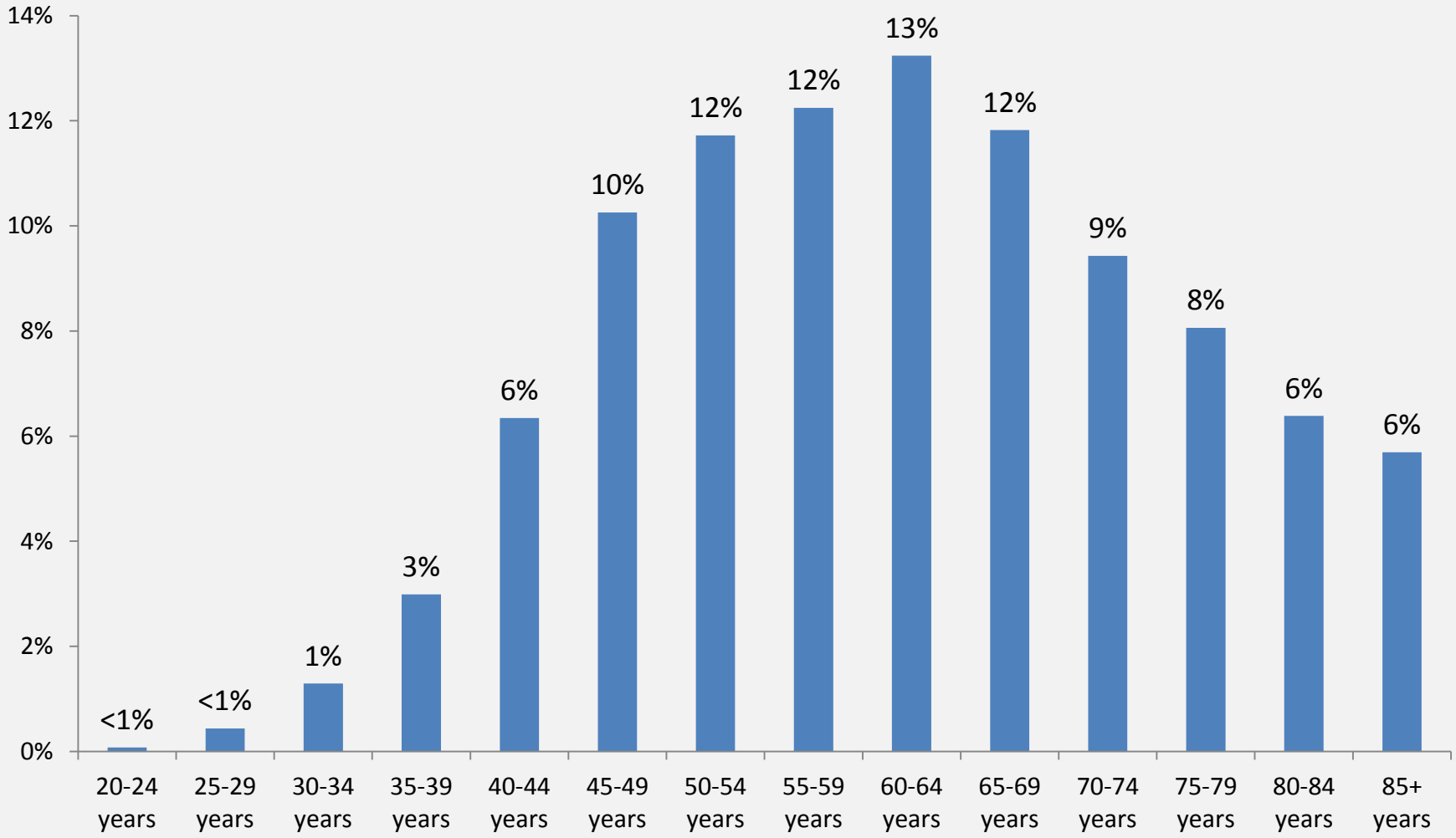
Under the ACA, only the USPSTF recommendations determine coverage for preventive services

- **The USPSTF is charged with evaluating evidence and issuing recommendations about clinical preventive services**
- **The USPSTF is *not* charged with making decisions about insurance coverage, or considering insurance coverage in their deliberations**
- **Health Plans may choose to cover services the USPSTF has graded "C" or "D"**

“C” Ratings are unavoidable, but can be problematic

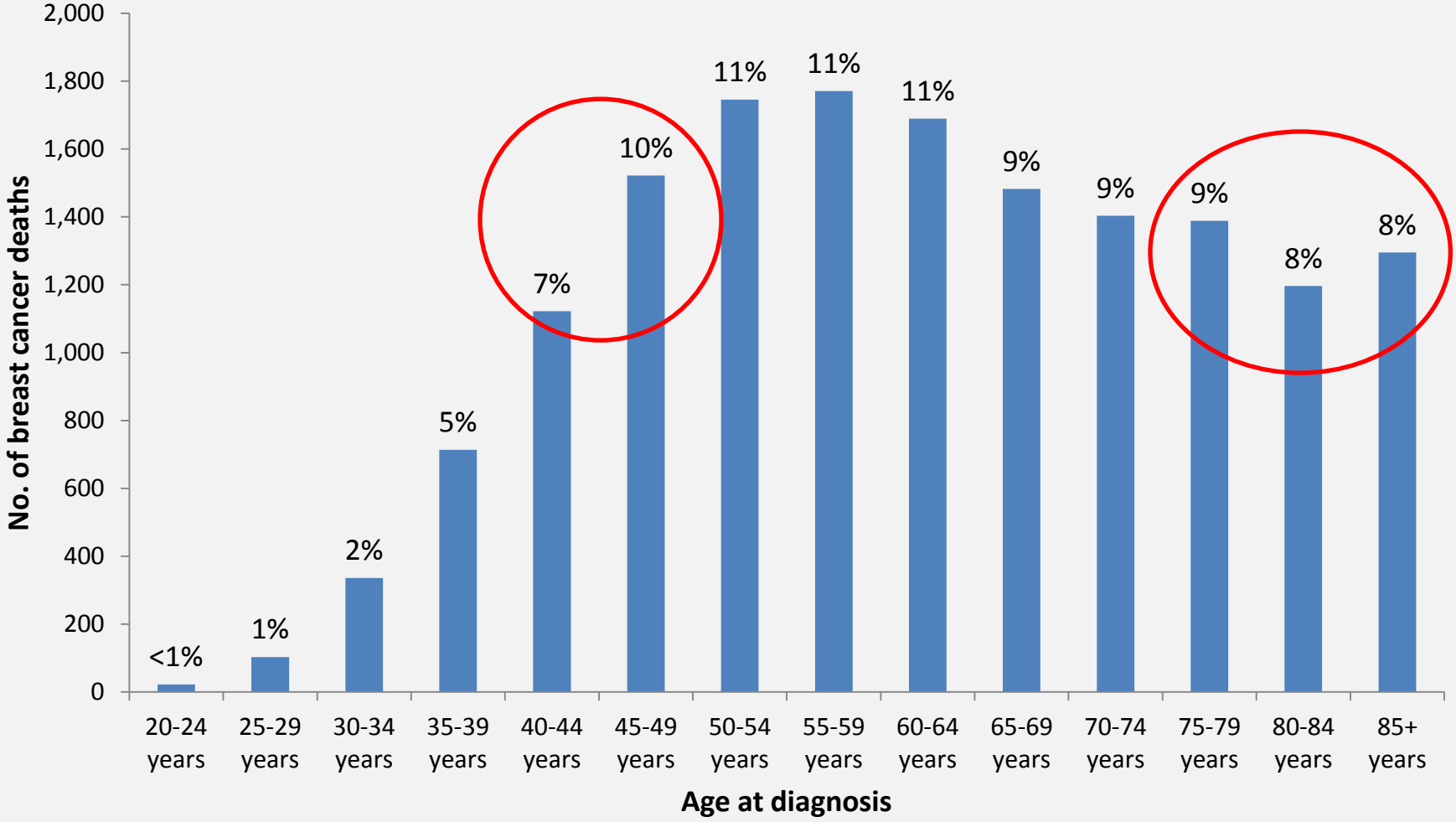
- **Problems with Evidence**
  - Data on benefits and harms may be limited
  - Benefits and harms are dissimilar metrics
  - Measuring benefits is a challenge
    - Which outcome?
    - When is it measured?
    - Relative vs. Absolute vs. Both
    - Benefits vary by risk
  - Not all adults experience harms the same way
- **Problems with Implementation**
  - Is the recommendation to individuals, or based on the population?
  - Who should judge the value of the benefit?
  - Who makes the decision about the impact of risks, and their acceptance or rejection
  - Is there a policy threshold for acceptable levels of benefit and risk?

Age distribution of invasive female breast cancer cases, 2007-2011



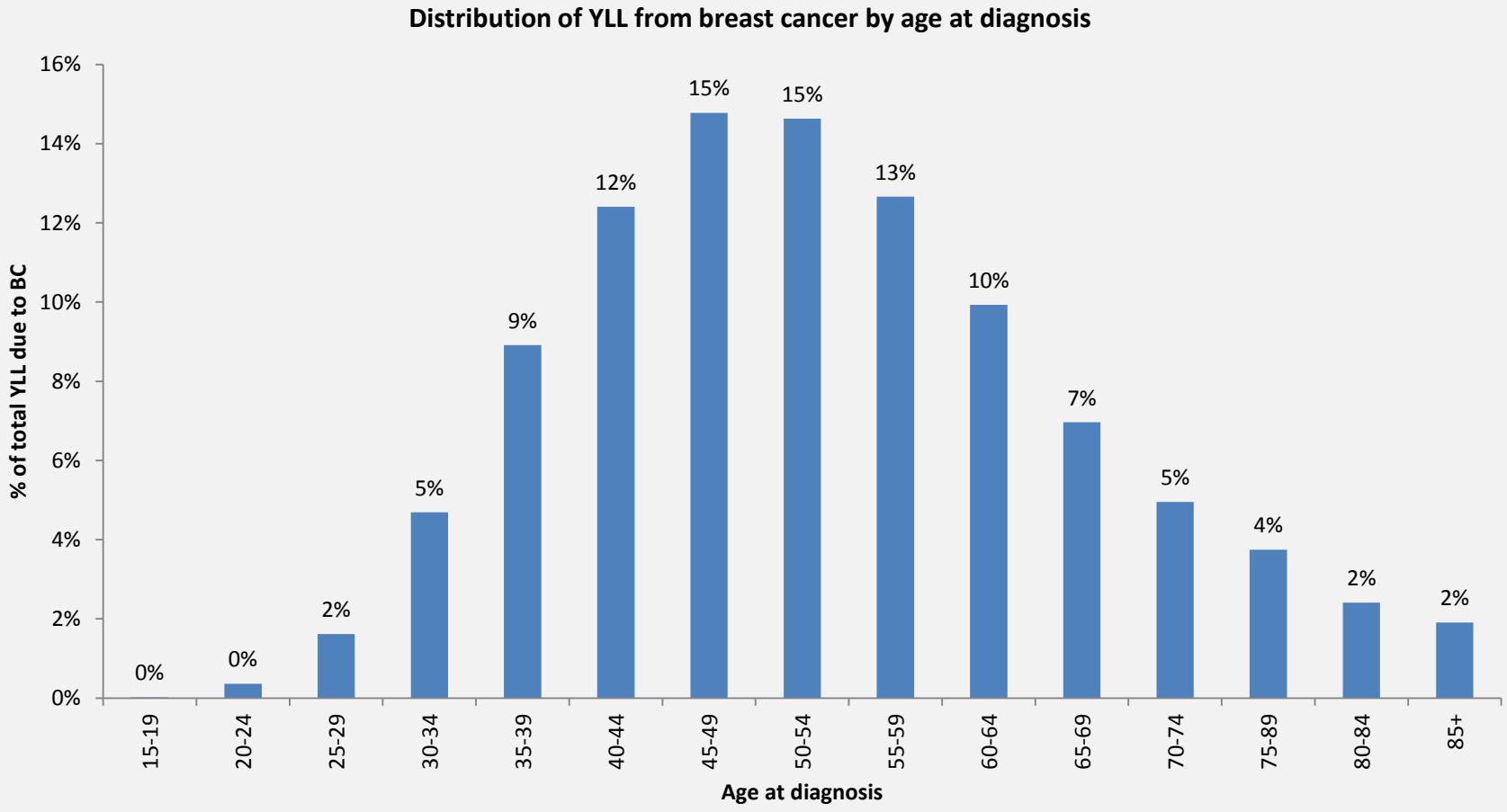
Source: SEER 18 registries.

Distribution of breast cancer deaths by age at diagnosis, 15 year follow-up, 2007-2011



Source: SEER 9 registries, patients followed for 15 years after diagnosis.

Years of Potential Life Lost by Age at Diagnosis, 15 year follow-up, SEER 2007-2011



Informed/Shared Decisions for Women Under Age 50

- Emphasize that it is best to consider risk of breast cancer over a lifetime
- Emphasize that breast cancer is a leading cause of death in younger women
- Emphasize that younger women benefit in the same way from mammography as older women
- Emphasize that it is common to be called back for an additional study
- Emphasize that the risk of being diagnosed with a breast cancer that never would have caused a problem is possible, but very low, less than 1%

OK, Let’s not end on a discouraging note

Conclusion, So how do we fix this?

- **Improving Guidelines & Guidelines Utilization**
  - **Lack of consensus on methodology—Get engaged in influencing guidelines development methodology**
  - **Different estimates of benefit and harm? –This is a scientific advocacy issue….instead of saying "experts can disagree," explain *why one interpretation of the evidence is superior to another. DO THIS LOCALLY!***
  - **Lack of agreement on thresholds and goals—Do research on what the target population wants**

Conclusion, So how do we fix this?

- **Improving Guidelines & Guidelines Utilization**
  - **Lack of knowledge and awareness of the details - Develop strategies to educate clinicians and the public**
  - **Lack of incentives to implement guidelines in clinical practice –Advocate for payment reform and other incentives for Primary Care**
  - **Variations in coverage for the continuum of cancer screening – Educate plans, and create a consumer movement**

Thank you

- Collaborators & Contributors:
- Stephen W. Duffy, MSc
- László Tabár, MD
- Tony Hsiu-Hsi Chen, PhD
- Amy Ming-Fang Yen, PhD
- Sherry Yueh-Hsia Chiu, PhD
- EUROSCREEN Evaluation Group
- Carol DeSantis, MPH
- Joannie Tieulent