

Examination of the impact of shifting practice from plain film mammography to digital mammography

Presented by

Rachel Farber

Sydney Medical School, School of Public Health



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Background

- Most breast screening programmes worldwide have replaced the use of screen-film mammography with full-field digital mammography
- Digital mammography
 - Takes an electronic image of the breast
 - Allows images to be stored and transmitted electronically
 - Potentially decrease time between screen and results
- While FFDM provides significant technical and practical advantages over SFM in the provision of population screening programs, the effect of this move on health outcomes remains unclear.

Review Questions

In asymptomatic women attending routine breast cancer screening:

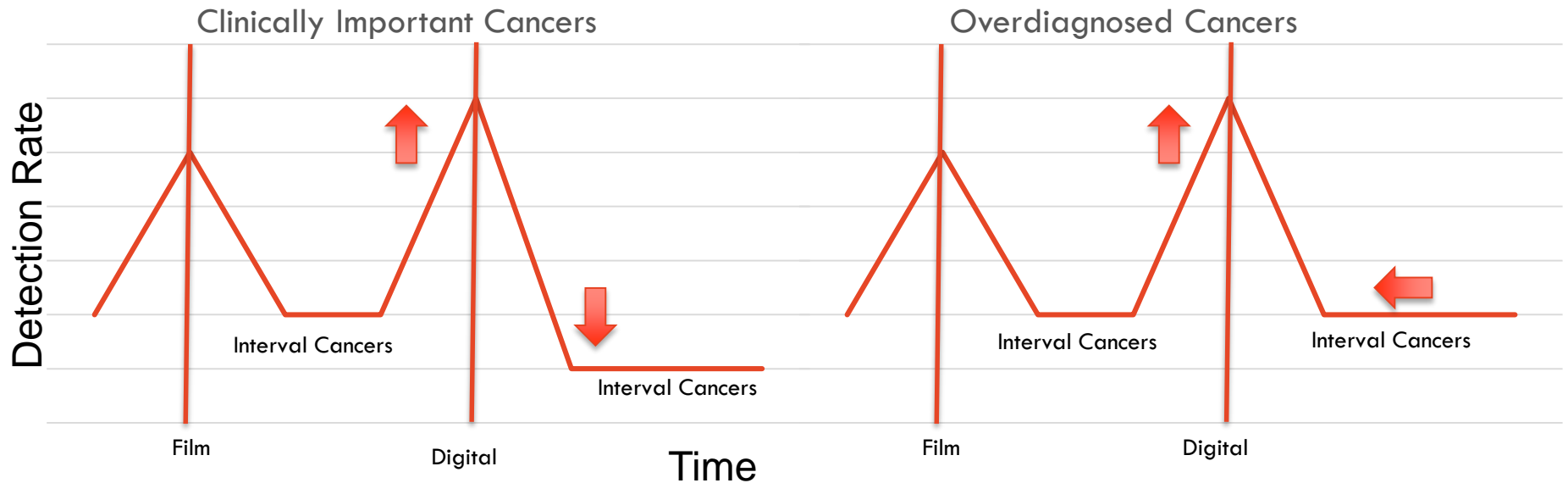
1. What impact has the transition from film mammography to digital mammography had on health outcomes?
2. What are the benefits and harms of the effect of this move as measured by detection rates and interval cancer rates?
3. If there is increased detection of cancers with the change in technology, to what extent does this reflect increased detection of clinically important cancers compared to overdiagnosed cancers?

Methodology - measuring the benefits and harms

- Screen-detected cancers (including DCIS)
 - Diagnosed by a positive screening result in asymptomatic women
 - Detection rates
 - number of women diagnosed with screen-detected breast cancer per 1 000 screened women
- Interval cancers (including DCIS if applicable)
 - Diagnosed after a negative screening result and before the subsequent scheduled screening
 - Typically present clinically
 - Interval rates
 - number of interval cancers per 1 000 screened women

Methodology - measuring the benefits and harms

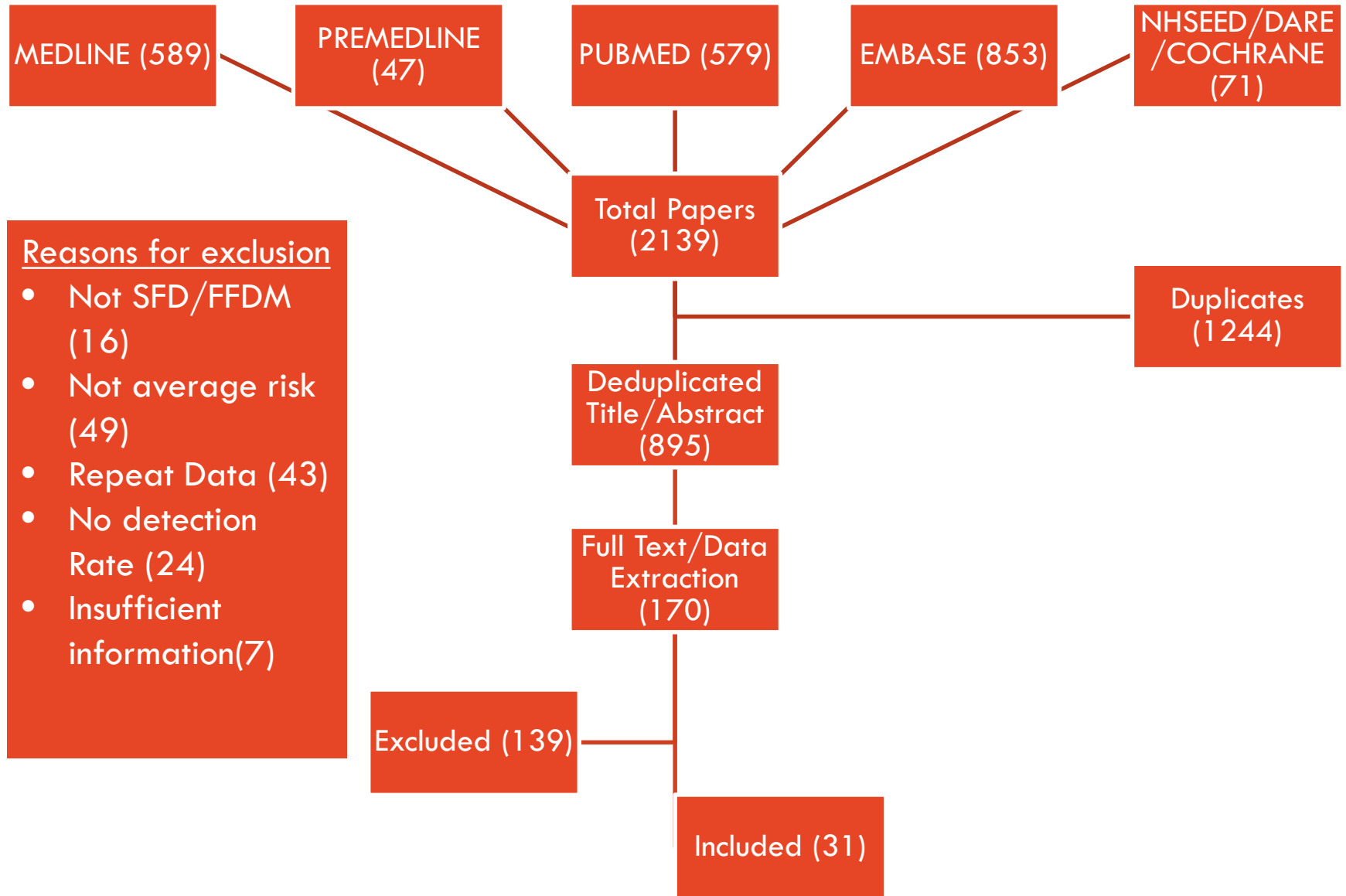
- Detection of clinically important and rapidly progressing cancers
 - Increase in the detection rate ↑
 - Decrease in the interval cancer rate ↓
- Detection of overdiagnosed or slow progressing cancers
 - Increase in the detection rate ↑
 - No, or minimal, change in the interval cancer rate



Systematic Review

- Collate all published data that compares SFM to FFDM drawn from the same population of:
 - asymptomatic women
 - who are at average risk of breast cancer
 - report screen-detection cancer rates and/or interval cancer rates.
- Synthesises the results to assess the overall impact that the shift from SFM to FFDM has had on screen-detection rates and interval rates.
- We are also comparing changes in measurements of:
 - Positive predictive values: Proportion of women with a positive screening examination who are diagnosed with breast cancer
 - Recall rates: Number of women with a positive screening examination per 1000 screened women
 - False positive recall rate: Number of women with a positive screening examination who are not diagnosed with breast cancer per 1000 screened women
- Additional subgroup analyses examines the differences in screening frequency, age, breast density, and screening round.

Search Updated: 18/03/18



Included Studies- by country

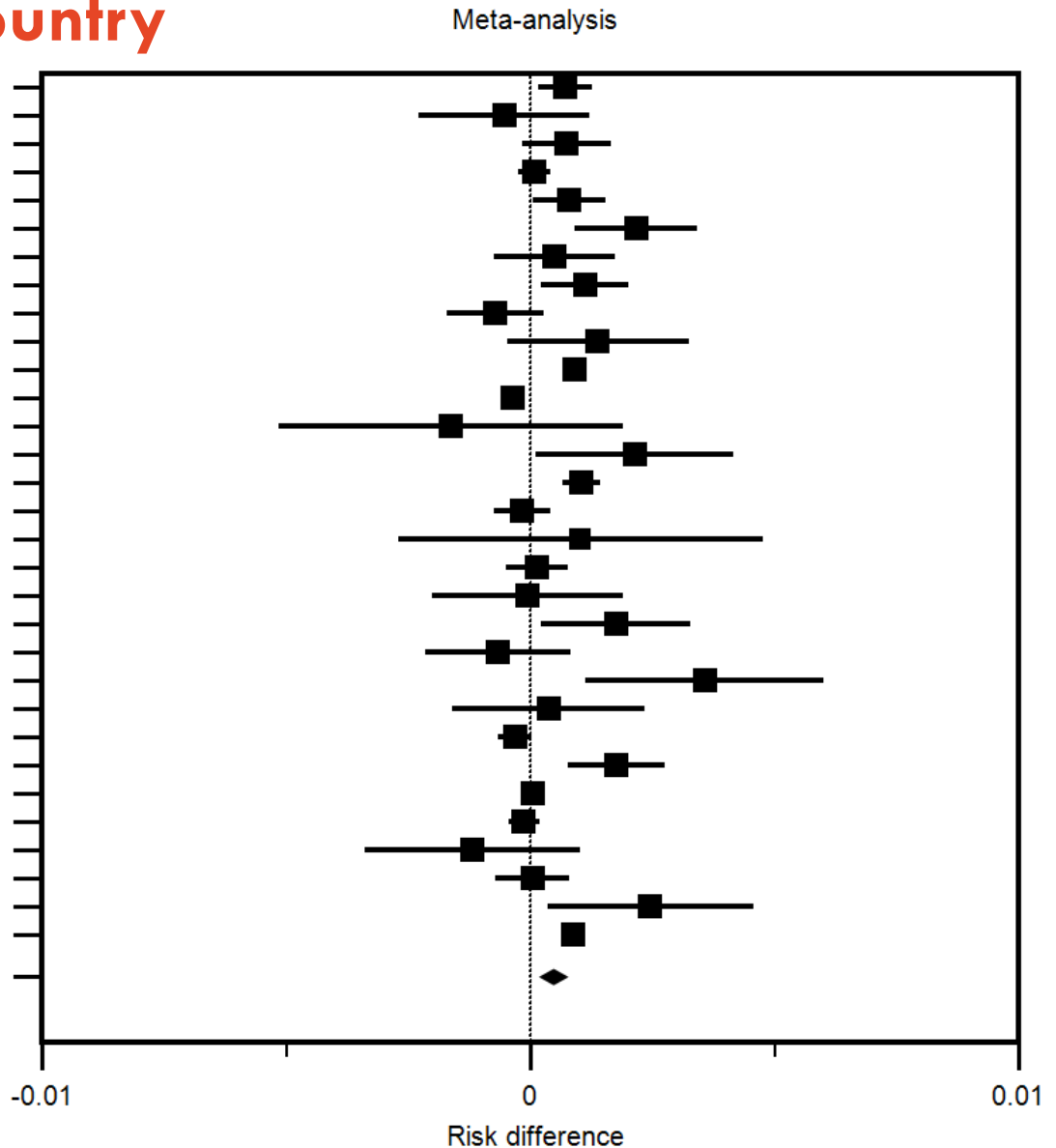
Country	Number of studies	Years of Data	Age Range	Total number of screening
Belgium	2	2001-2009	50-69	311,600
Canada	4	2007-2012	40-74	1,650,832
Finland	1	1999-2008	50-59	51,033
France	1	2008-2010	50-74	88,937
Ireland	1	2005-2007	50-64	188,823
Italy	2	2004-2012	45-74	116,206
Netherlands	1	2004-2011	50-74	7,343,327
Norway	3	1996-2010	45-69	1,864,972
Spain	5	1990-2012	45-69	4,445,390
Sweden	1	2000-2005	46-74	35,742
UK	3	2000-2010	40-70	107,844
United States	7	1997-2009	40-89	4,795,070

Forest plot of difference in film vs digital screen-detection rates by country

- Belgium, Timmermans, 2017
- Belgium, Van Ongeval, 2010
- Canada, Caines, 2011
- Canada, Chiarelli/ Prummel, 2013/2016
- Canada, Theberge, 2016
- Finland, Lipasti, 2010
- France, Seradour, 2014
- Ireland, Hambly, 2009
- Italy, Campari, 2016
- Italy, Del Turco, 2007
- Netherlands, Sankatsing, 2018
- Norway, Hofvind, 2014
- Norway Skaane-Oslo I, 2003
- Norway, Skaane-Oslo II, 2007
- Spain, Blanch, 2013
- Spain, Domingo, 2011
- Spain, Romero, 2011
- Spain, Sala, 2015
- Spain, Sala, 2009/2011
- Sweden, Heddson, 2007
- UK, Jones, 2011
- UK, Perry, 2011
- UK, Vinnicombe, 2009
- United States, Dabbous, 2017
- United States, Glynn, 2011
- United States, Henderson, 2015
- United States, Kerlikoske, 2011
- United States, Lewin, 2006
- United States, Pisano, 2005
- United States, Vernacchia, 2009
- Sums

Total (random effects)

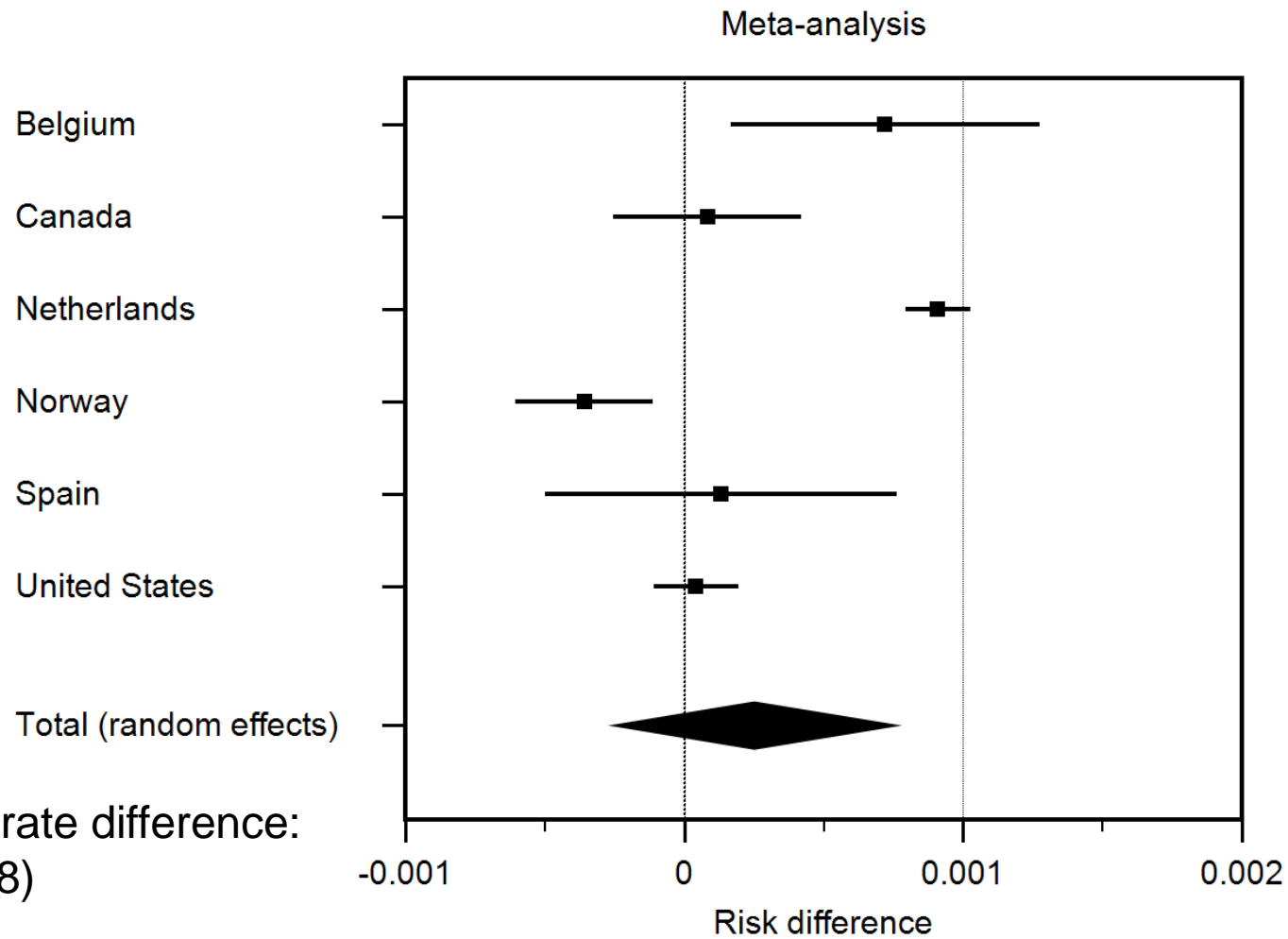
Screen-detected rate difference:
0.5 (CI:0.2 to 0.07) per 1000
women



Included Studies with interval cancer

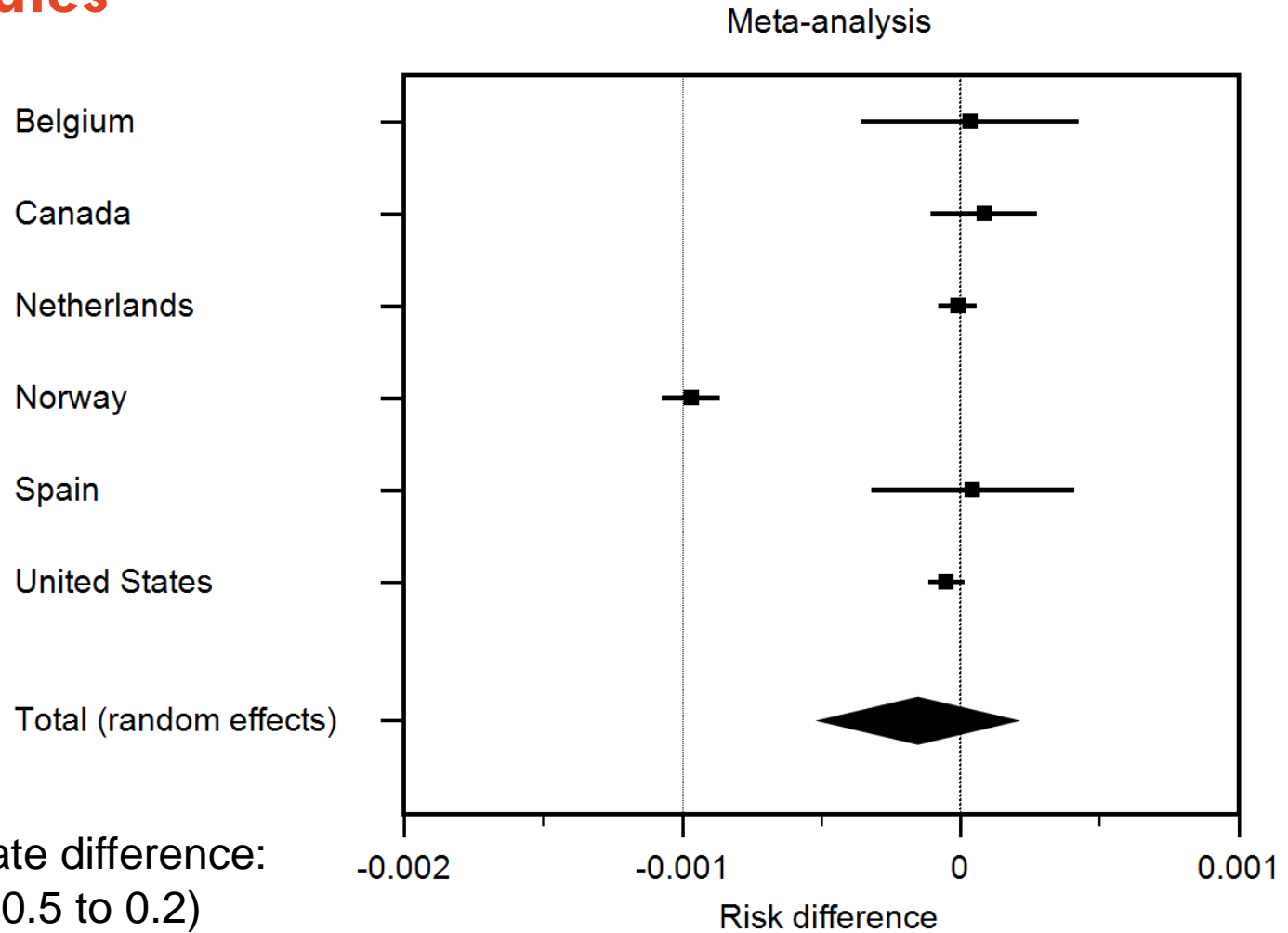
	Screen-detected cancer rate			Interval cancer rate		
	Film	Digital	Difference	Film	Digital	Difference
Belgium	5.2	5.9	0.7	2.7	2.8	0.0
Canada	4.9	5.0	0.1	1.6	1.6	0.1
Netherlands	5.3	6.3	0.9	2.2	2.2	0.0
Norway	5.6	5.2	-0.4	1.8	2.0	0.2
Spain	4.2	4.3	0.1	1.4	1.4	0.0
United States	4.4	4.5	0.0	0.8	0.7	-0.1

Forest plot of difference in film vs digital screen-detection rates by country with interval rates



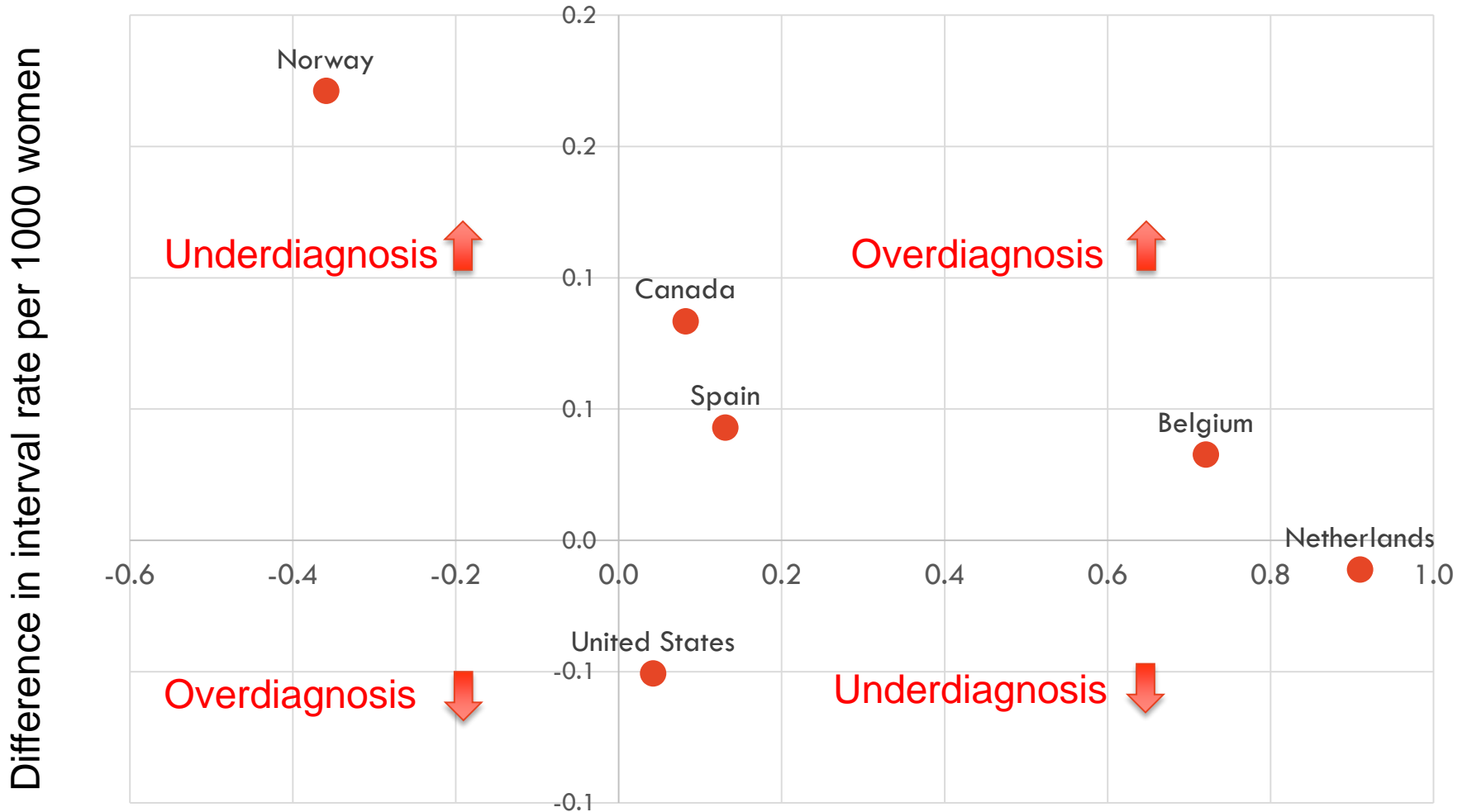
Screen-detected rate difference:
0.3 (CI: -0.3 to 0.8)
per 1000 women

Forest plot of difference in film vs digital interval cancer rates



Interval rate difference:
-0.2 (CI: -0.5 to 0.2)
per 1000

Difference in film vs digital in included studies with interval cancers



Difference in screen-detected rate per 1000 women

Conclusion

- Overall there has been a small increase in screen-detected cancers with the transition from film to digital mammography screening
- The effect of this practice shift on interval cancers remains unclear
- Reinforces the need to assess these effects for future changes such as 3D mammography
- Broader aim to establish a methodological framework and model to be used for assessing future changes in cancer screening programs

Thank you

Co-authors and supervisors:

Dr Katy Bell, Dr Kevin McGeechan,

Professor Nehmat Houssami, Professor Alexandra Barratt



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