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Case Fatality in Breast Cancer: Interplay of Attendance at Breast Screening & Cancer Treatment

Nathalie J Massat[1], Daniela Tataru[2], Dharmishta Parmar[1], Peter D Sasieni[1] and Stephen W Duffy[1]

[1] Centre for Cancer Prevention, Wolfson Institute of Preventive Medicine, Queen Mary University of London, London

[2] Knowledge & Intelligence Team London, Public Health England, London

Background & Objective

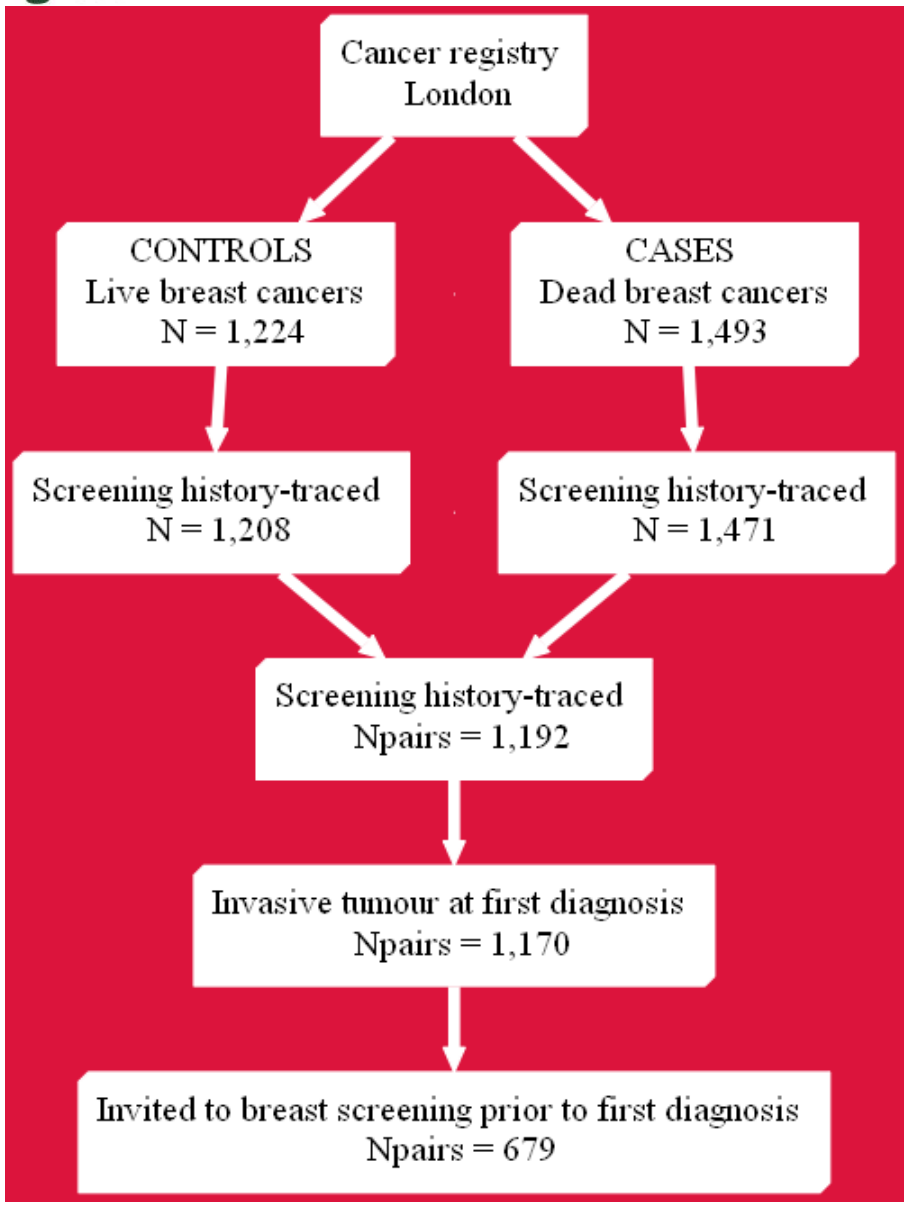
- Invasive breast cancer: 2nd most common cause of cancer death among UK women
- Population mammographic screening shown to reduce breast cancer mortality in Randomised Controlled Trials started in '60s/'70s
  - ➢ National Breast Screening Programme implemented in England in 1988
- Cancer treatment is constantly evolving:

  In the UK, introduction of endocrine therapy around 10 years after programme inception

- **Need to understand role of Screening Programme on breast cancer fatality in current context of treatment offered by National Health Service**

Study design

- Matched case-control nested within English Breast Screening Programme
  - London region
- Cases died of primary breast cancer during 2008-2009
- Cases first diagnosed aged 47-89 & since 1990
- Control received similar first diagnosis in 6 months prior to case diagnosis
- Control known to be alive at case death
- Control matched for date of birth & area of residence
- Matched pairs first diagnosed with invasive breast tumour
- Matched pairs invited to breast screening at least once prior to first diagnosis


Cancer registry
London
CONTROLS
Live breast cancers
N = 1,224
CASES
Dead breast cancers
N = 1,493
Screening history-traced
N = 1,208
Screening history-traced
N = 1,471
Screening history-traced
Npairs = 1,192
Invasive tumour at first diagnosis
Npairs = 1,170
Invited to breast screening prior to first diagnosis
Npairs = 679

Population characteristics

Variable	Controls (N = 679)	Cases (N = 679)
Year of diagnosis (N, %)		
1990*(1991)*-1994**	13 (2%)	13 (2%)
1995-1999	69 (10%)	69 (10%)
2000-2004	207 (31%)	196 (29%)
2005-2009	390 (57%)	401 (59%)
Median age at diagnosis (range)	63.0 (49.9 – 82.5)	63.2 (50.2 – 82.6)
Median age at death (range)	N/A	68.2 (51.6 – 84.2)

Breast screening

		Controls (N = 679)	Cases (N = 679)
Median age at first invitation (range)		52.4 (40.1 – 73.1)	52.4 (39.5 – 70.3)
Median number of invitations to screening (range)		3 (1 – 10)	3 (1 - 8)
N (%)	**1**	136 (20%)	164 (24%)
	2	153 (23%)	155 (23%)
	2+	390 (57%)	360 (53%)
Median age at first breast screen (range) – *among attenders*		53.5 (46.3 – 73.5)	53.8 (46.1 – 70.3)
Median number of breast screens (range)		2 (0 – 7)	1 (0 – 8)
N (%)	**0**	92 (13%)	182 (27%)
	1	167 (25%)	170 (25%)
	1+	420 (62%)	327 (48%)
Median time since last breast screen (range) – *among attenders*		1.2 yrs (0 days – 18.2 yrs)	2.5 yrs (10 days – 19.2 yrs)

Statistical Methods

- Comparison of cases with controls with respect to attendance at breast screening using conditional logistic regression
- Adjustment was made for:
  - Treatment received within 6 months of diagnosis,
    i.e. surgery, chemotherapy, radiotherapy and endocrine therapy
  - Tumour characteristics (Pathology) at diagnosis,
    i.e. laterality and size, stage and grade of disease, and invasion of regional lymph nodes
- Collinearity between variables was found to be negligible

Results

Exposure to screening	Adjustment	Controls / Cases	Odds Ratio	95% CI (p-value)
Never screened	_	92 / 182 (20%)	**1.00**	_
Screened ≥1	None	587 / 497 (80%)	0.40	0.30 - 0.54 (<0.001)
	Treatment	*ibid*	0.51	0.35 – 0.71 (<0.001)
	Pathology	*ibid*	0.69	0.47 - 1.01 (0.06)
	Pathology & Treatment	*ibid*	0.71	0.47 – 1.06 (0.09)

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Time since last breast screen	Adjustment	Controls / Cases	OR	95% CI (p-value)
Never screened	_	92 / 182 (20%)	**1.00**	_
>36 months	None	190 / 211 (30%)	0.62	0.43 – 0.91 (0.01)
3-36 months	None	146 / 166 (23%)	0.51	0.35 – 0.73 (<0.001)
≤3 months	None	251 / 120 (27%)	0.21	0.14 – 0.30 (<0.001)
>36 months	Pathology	*ibid*	0.74	0.46 – 1.17 (0.2)
3-36 months	Pathology	*ibid*	0.83	0.54 – 1.30 (0.4)
≤3 months	Pathology	*ibid*	0.49	0.31 – 0.78 (0.003)
>36 months	Pathology & Treatment	*ibid*	0.73	0.45 – 1.18 (0.2)
3-36 months	Pathology & Treatment	*ibid*	0.88	0.55 – 1.40 (0.6)
≤3 months	Pathology & Treatment	*ibid*	0.51	0.31 – 0.83 (0.007)

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Summary & Conclusion

- Cancer treatment accounted for small part of effect of breast screening attendance on risk of fatality from breast cancer
- Characteristics of tumour at diagnosis accounted for large part of effect

➢ Tumour pathological profile, rather than cancer treatment is the major mediator of improved survival observed with screening

- Attendance at breast screening remained a predictor of reduced risk of fatality from breast cancer after accounting for pathology and treatment

- Role of potential biases to be investigated, esp. self-selection bias (volunteer bias)

Acknowledgements

Dave Graham (HSCIC, England) for extracting screening histories

Amanda Dibden (QMUL, London) for performing data checks

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Thank you