UNIVERSITY OF ABERDEEN
Centre of Academic Primary Care

Is smoking more harmful for women living in Scotland than those living elsewhere in the UK?

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RCGP oral contraception study: recruitment

23,000
Pill users

&

23,000
Never users

1968/69

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23,000
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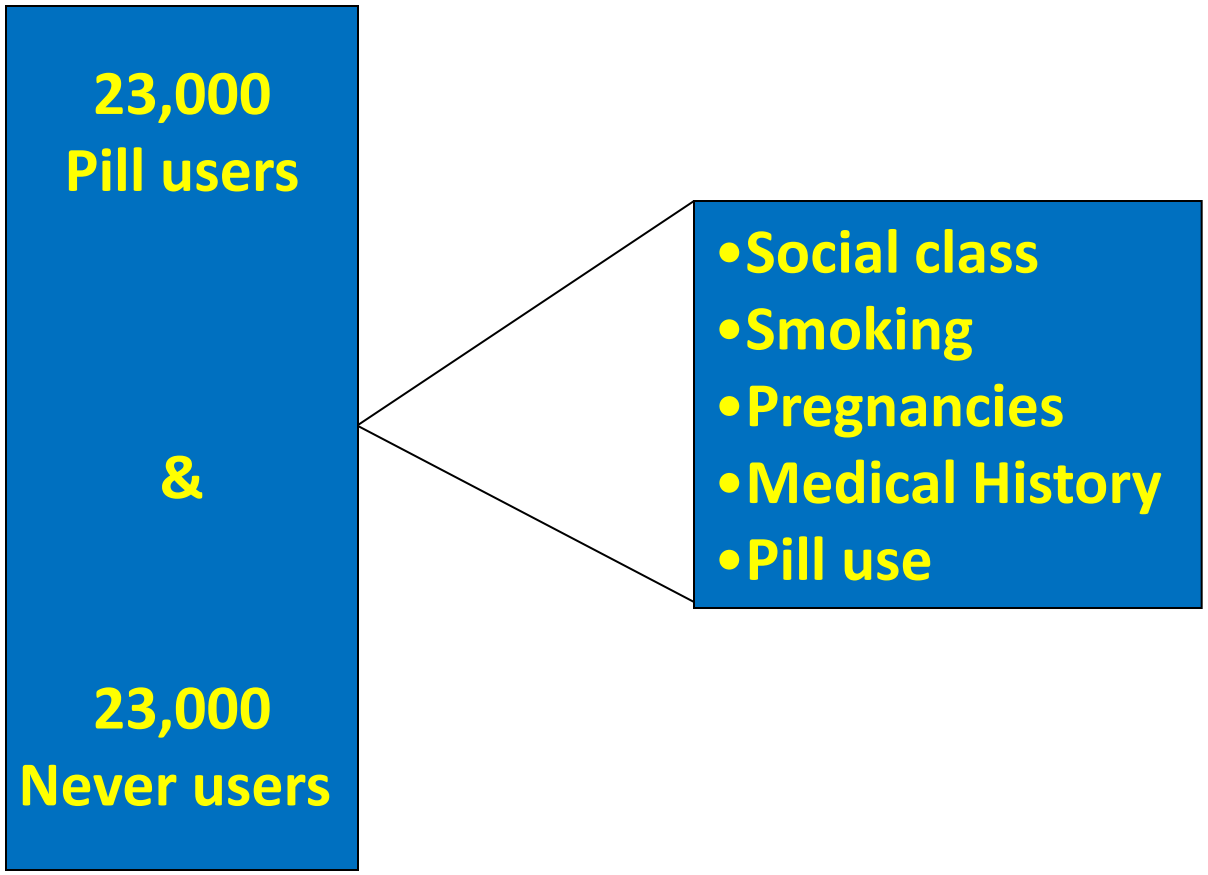
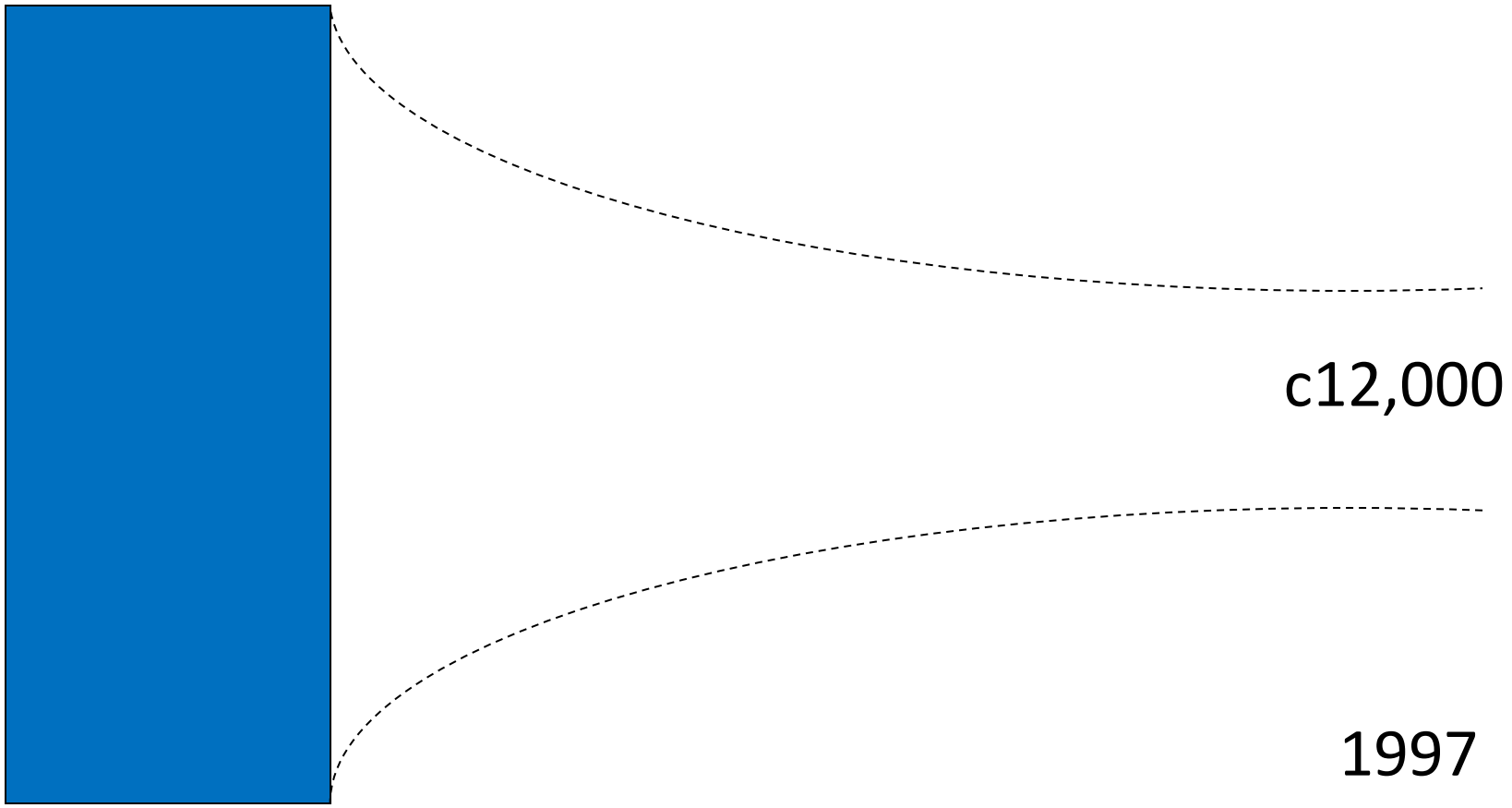
1968/69

No participant identifiers- unique study number

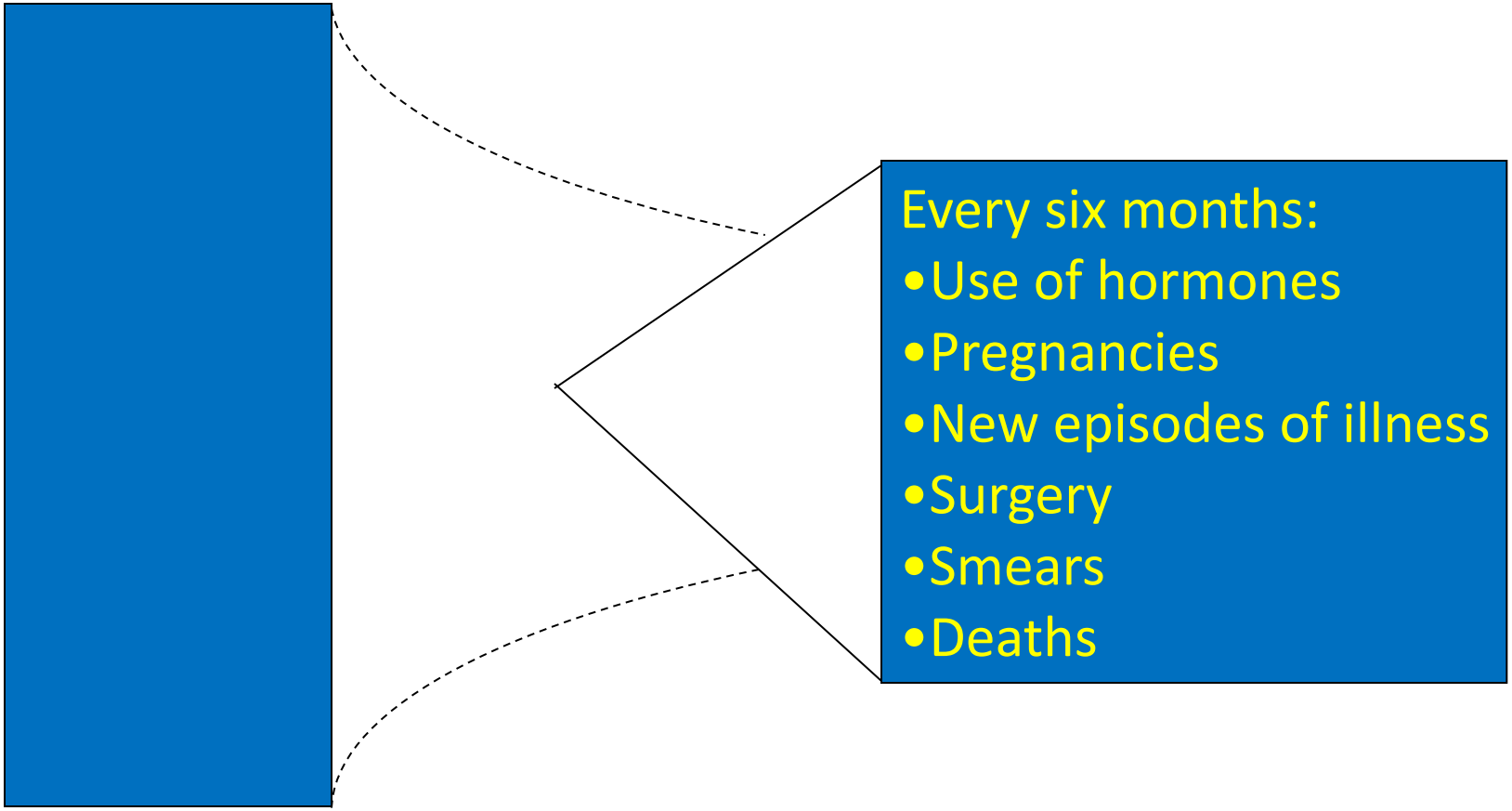
RCGP oral contraception study: recruitment



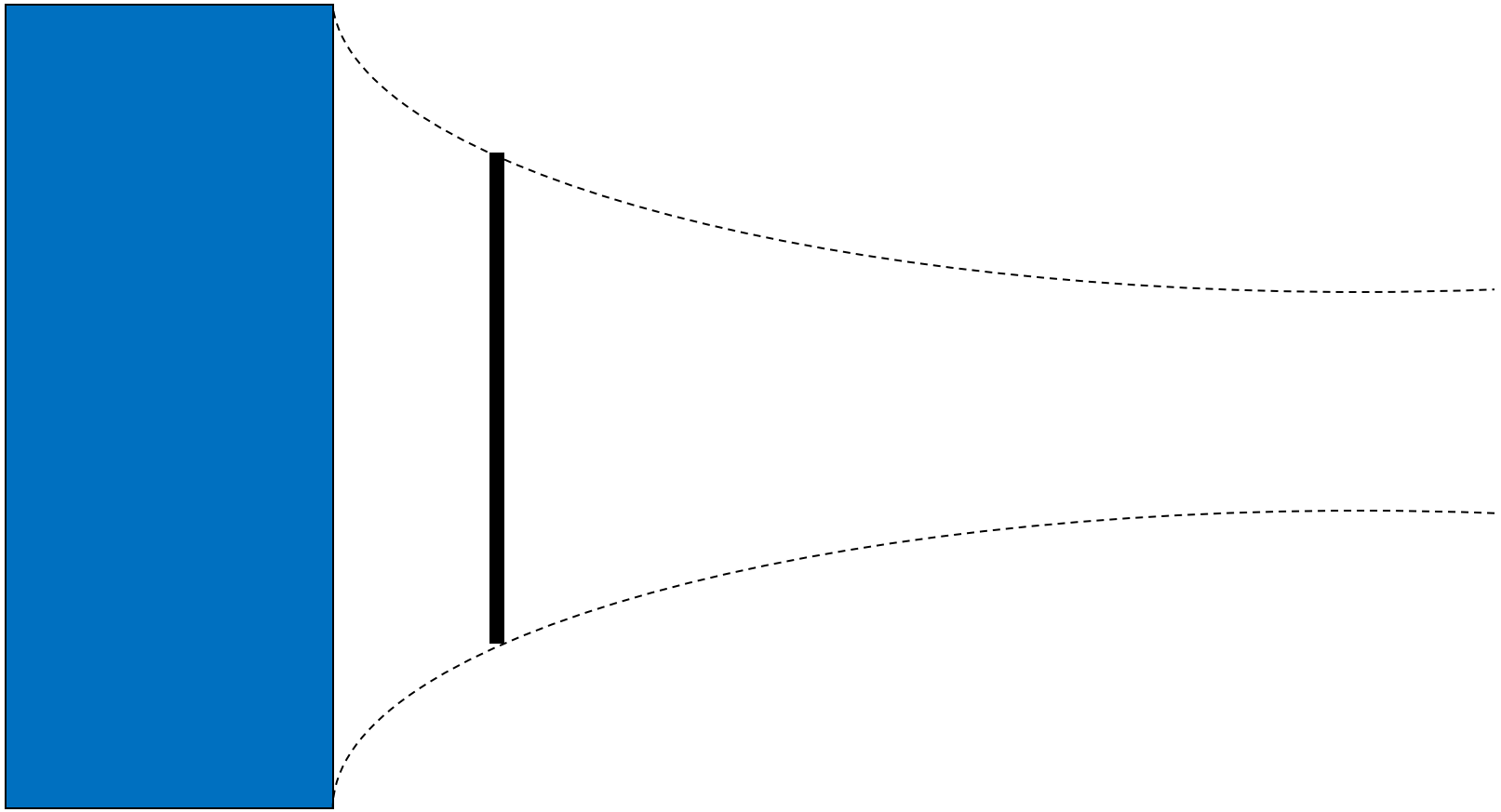
RCGP oral contraception study: main follow-up



RCGP oral contraception study: main follow-up

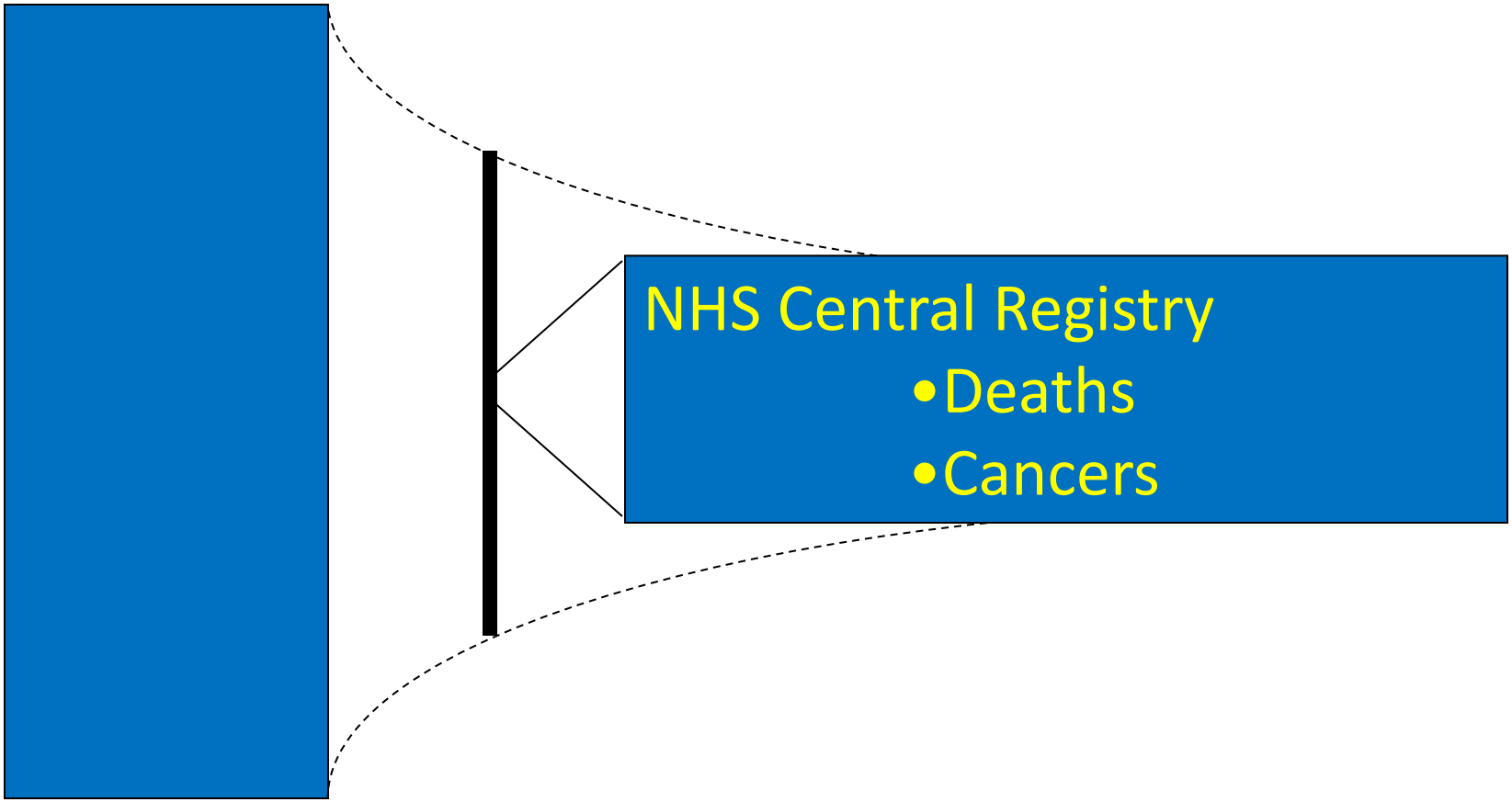


RCGP oral contraception study: ONS ‘flagging’



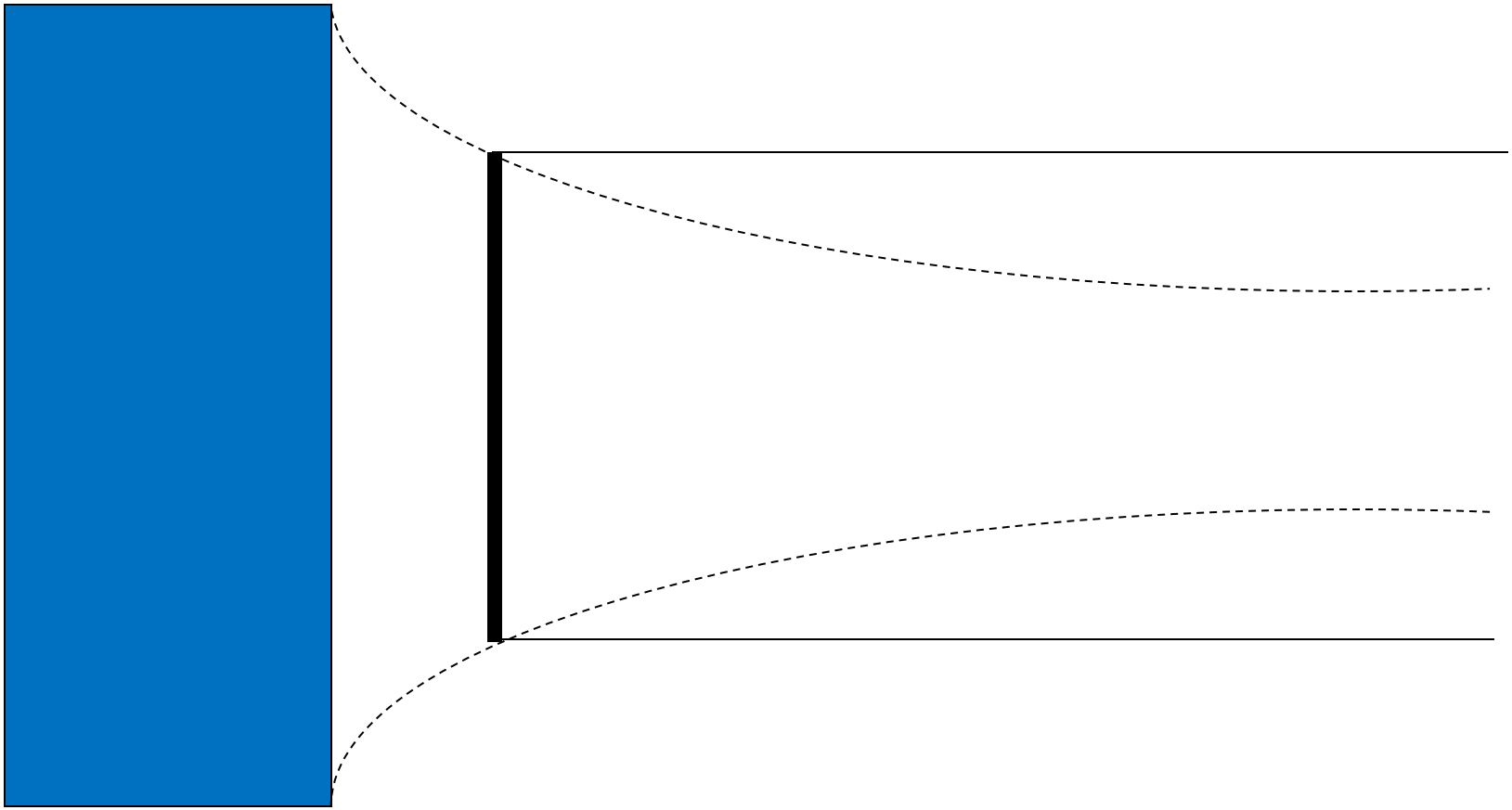
Mid 1970s

RCGP oral contraception study: ONS ‘flagging’



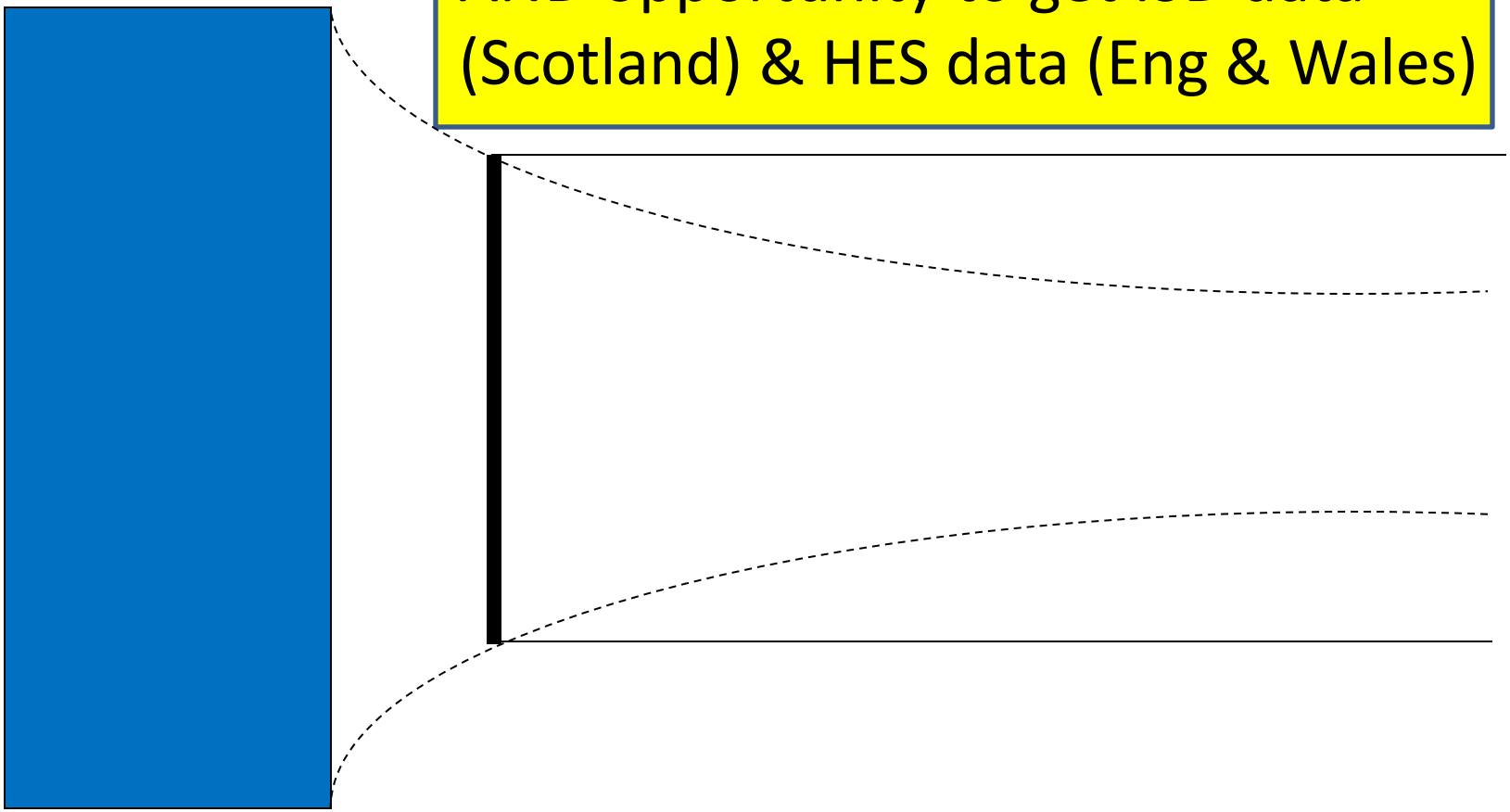
Mid 1970s

ONS flagging ensures complete follow-up for deaths and cancers from the point of flagging



ONS flagging ensures complete follow-up for deaths and cancers from the point of flagging

AND opportunity to get ISD data (Scotland) & HES data (Eng & Wales)



Scotland subset

- In 2009, ISD in collaboration with the General Register Office identified all flagged women recruited in Scotland (n=4655)

- ISD then identified all hospital episode information on the SMR 01 database for the nested cohort

- We then matched the ISD data to that already on the OCS database, using a unique study number to maintain confidentiality

Aim

To examine the relationship between smoking at a young age and future risk of hospital admission and death among the subset of women living in Scotland and recruited to the UK-wide Royal College of General Practitioners' (RCGP) Oral Contraception Study (OCS)

Analysis - mortality

- Relationship between smoking status at recruitment and survival time was examined using Cox regression
- Model was then fitted adjusting for age and social class at recruitment and the time-dependent covariates parity, OC use and history of serious illness
- Cause specific mortality outcomes were each analysed using competing risks, combined with the time-dependent approach for adjusted analyses

Analysis - hospital admissions

- An unadjusted Cox regression model was fitted from time of recruitment to date of hospital admission, censored at date of death or end of follow-up

- Models adjusting for age and social class at recruitment and time-dependent covariates of parity, OC use and history of serious illness were also conducted

Mortality results

- 197/2063 (9.5%) of non-smokers died
- 210/1142 (18.4%) of women who smoked <15 died
- 236/916 (25.8%) of women who smoked 15+ died by end of follow-up

Risk of all & cause specific mortality

	Number of cigarettes smoked daily at recruitment	
	<15	15+
Cause of death	Adjusted[1] HR (95% CI)	Adjusted[1] HR (95% CI)
All causes (n=643)	**1.99 (1.74 to 2.27)**	**2.81 (2.47 to 3.20)**
Any cancer (n=283)	**1.95 (1.61 to 2.36)**	**2.52 (2.08 to 3.05)**
Circulatory disease (n=191)	**2.24 (1.74 to 2.87)**	**2.87 (2.24 to 3.68)**
Respiratory disease (n=55)	1.11 (0.53 to 2.34)	**7.23 (4.28 to 12.20)**
Other causes not specified (n=114)	**1.95 (1.43 to 2.66)**	**2.49 (1.82 to 3.40)**

[1]Adjusted for age and social class at recruitment and history of serious illness, pill status and parity

Hospital admission results

	Number of cigarettes smoked daily at recruitment		
	Non-smoker (N=2063) N (%)	<15 (N=1142) N (%)	≥15 (N=916) N (%)
Hospital admission for any reason	1807 (87.6)	1019 (89.2)	829 (90.5)

Reason for hospital admission	Number of cigarettes smoked daily at recruitment	
	<15	≥15
	Adjusted[1] HR (95% CI)	Adjusted[1] HR (95% CI)
First admission for any reason	1.05 (0.98 to 1.12)	**1.08 (1.01 to 1.15)**
Infectious & parasitic diseases	1.10 (0.99 to 1.20)	**1.21 (1.09 to 1.34)**
Cancer site:		
Breast	1.07 (0.85 to 1.33)	0.93 (0.72 to 1.20)
Uterine body	**2.91 (1.29 to 6.50)**	1.47 (0.52 to 4.06)
Ovary	1.48 (0.88 to 2.49)	0.84 (0.42 to 1.67)
Invasive cervix	**3.35 (1.47 to 7.61)**	**2.68 (1.08 to 6.64)**
Other reproductive	**3.13 (1.46 to 6.73)**	2.08 (0.85 to 5.05)
Lung	**3.93 (2.55 to 6.06)**	**7.19 (4.76 to 10.9)**
Large bowel & rectum	1.03 (0.67 to 1.58)	1.36 (0.89 to 2.08)
Other	**1.96 (1.66 to 2.32)**	**1.92 (1.60 to 2.30)**

[1]Adjusted for age and social class at recruitment and history of serious illness, pill status and parity

	Number of cigarettes smoked daily at recruitment	
	<15	≥15
Reason for hospital admission	Adjusted[1] HR (95% CI)	Adjusted[1] HR (95% CI)
Diabetes mellitus	1.12 (0.88 to 1.42)	1.26 (0.98 to 1.62)
Other endocrine disease	**1.26 (1.09 to 1.45)**	**1.47 (1.27 to 1.69)**
Mental health problems	**1.64 (1.33 to 2.02)**	**2.41 (1.97 to 2.94)**
All circulatory disease	**1.17 (1.06 to 1.28)**	**1.36 (1.23 to 1.50)**
Ischaemic heart disease	**1.56 (1.33 to 1.82)**	**1.93 (1.65 to 2.26)**
Other heart disease	**1.36 (1.12 to 1.64)**	**2.09 (1.75 to 2.49)**
Cerebrovascular disease	1.22 (0.93 to 1.58)	**2.05 (1.61 to 2.61)**
Other circulatory disease	1.03 (0.92 to 1.14)	**1.25 (1.12 to 1.40)**
Respiratory disease	**1.50 (1.32 to 1.70)**	**2.08 (1.83 to 2.35)**
Digestive disease	**1.15 (1.05 to 1.25)**	**1.28 (1.16 to 1.40)**
Genitourinary disease	1.05 (0.97 to 1.14)	0.95 (0.86 to 1.04)
Other conditions not specified	**1.11 (1.04 to 1.19)**	**1.15 (1.07 to 1.23)**

[1]Adjusted for age and social class at recruitment and history of serious illness, pill status and parity

Are the women living in Scotland different to the women living elsewhere?

- Examined this using mortality data for entire RCGP Oral Contraception Study cohort
- Separate lifetables for women recruited in Scotland and elsewhere
- Cox regression combining location with smoking

Lifetable

Survival to age	Proportion of women surviving					
	Scotland			Elsewhere in the UK		
	Non-smoker	<15	≥15	Non-smoker	<15	≥15
50	99%	99%	99%	98%	98%	97%
60	97%	94%	92%	96%	94%	91%
70	91%	84%	75%	92%	87%	79%
80	77%	53%	46%	79%	70%	57%
85	59%	28%	11%	68%	59%	44%
Median survival age (years)	89.3	82.0	79.7	90.0	88.4	83.8

Risk of mortality by location

Cause of death	Location at recruitment: Elsewhere in UK <15 Adjusted[1] HR (95% CI)	Elsewhere in UK 15+ Adjusted[1] HR (95% CI)	Scotland <15 Adjusted[1] HR (95% CI)	Scotland 15+ Adjusted[1] HR (95% CI)
All causes	**1.53 (1.46 to 1.61)**	**2.36 (2.25 to 2.48)**	**2.05 (1.85 to 2.26)**	**2.88 (2.62 to 3.16)**
Any cancer	**1.32 (1.22 to 1.42)**	**2.14 (1.99 to 2.30)**	**1.89 (1.64 to 2.18)**	**2.41 (2.10 to 2.77)**
Circulatory disease	**1.78 (1.61 to 1.96)**	**2.77 (2.51 to 3.05)**	**2.72 (2.27 to 3.25)**	**3.50 (2.94 to 4.18)**
Respiratory disease	**2.21 (1.86 to 2.63)**	**3.52 (2.98 to 4.16)**	0.72 (0.40 to 1.32)	**4.71 (3.53 to 6.27)**
Other causes not specified	**1.57 (1.39 to 1.76)**	**2.02 (1.78 to 2.28)**	**2.15 (1.71 to 2.71)**	**2.73 (2.17 to 3.44)**

Strengths & limitations

- Prospective design
- Can examine long-term effects of smoking in terms of hospital admissions as well as death
- Smoking information at recruitment only - likely to have underestimated the effects of smoking
- Adjusted for a number of important possible confounders but residual confounding still possible

Conclusions

- Our study provides a powerful reminder of the harmful effects of smoking in young women, both in terms of mortality and hospital admissions

- There is a suggestion that these harmful effects are worse in women who smoke and who live in Scotland compared with smokers residing elsewhere

Acknowledgements

- Dr Clifford Kay who established and ran the study for its first 26 years, and the many GPs who contributed data
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