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Mortality and dementia a study of death certificates and the MRC CFAS

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University of Nottingham

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1. Why?

- Theory - relation between prevalence, incidence and mortality
- Practical - advice to patients and relatives
- Health policy - healthy life expectancy, modelling effects of changes in treatment

Why?

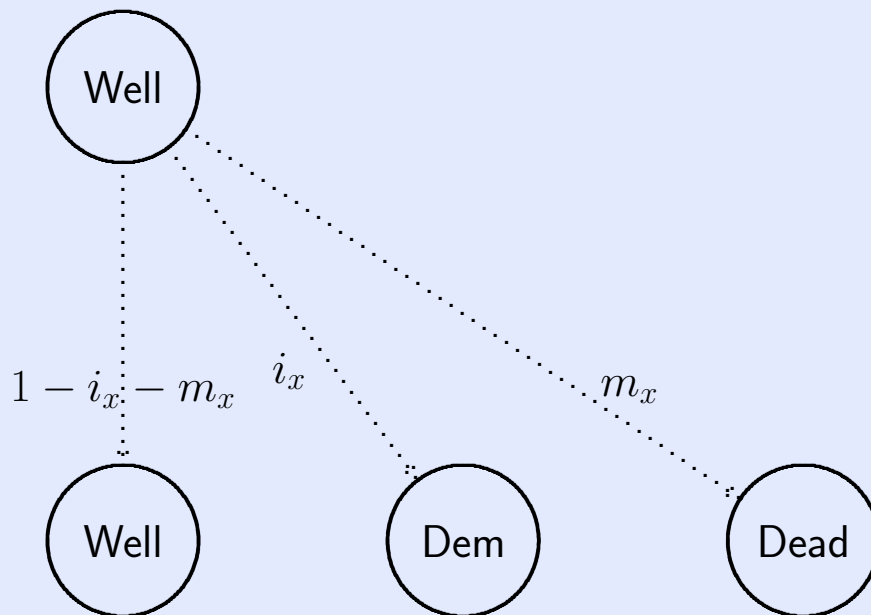
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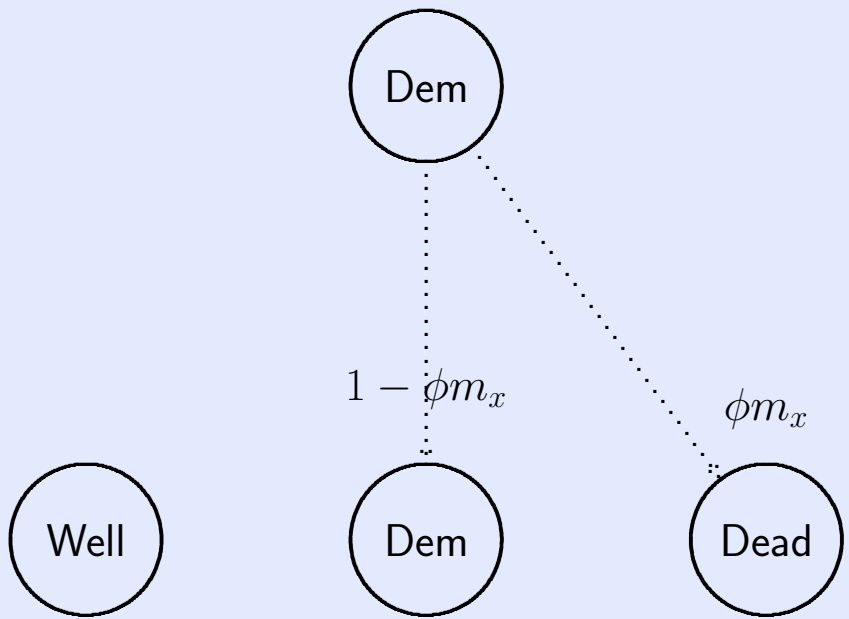
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1.2. Theory



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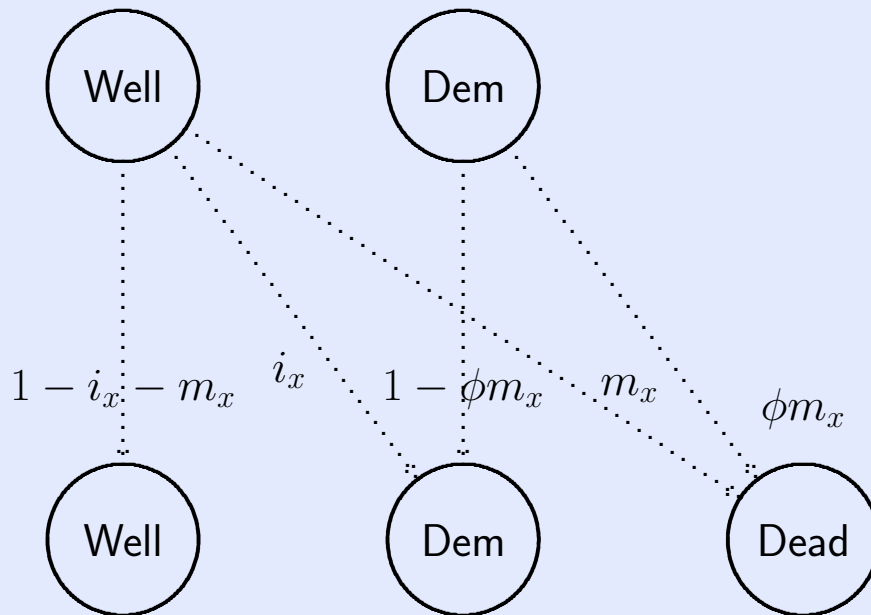
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1.3. Theory



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1.4. Community studies

Systematic review of community studies found 68 studies of dementia or cognitive impairment and mortality. Only 6 of these had published enough detail to enable a meta-analysis

Study	OR	95% ic
Bonaiuto ^a	7.88	3.71 to 16.75
Davidson ^a	4.39	2.29 to 8.05
Saz ^b	3.7	2.0 to 6.7
Juva	3.45	1.78 to 6.72
Meller	2.08	1.56 to 2.77
Evans	1.80	1.13 to 2.85
Pooled	2.63	2.17 to 3.21

^aAdjusted for age and sex

^bAdjusted for age, sex and education

1.5. Community studies

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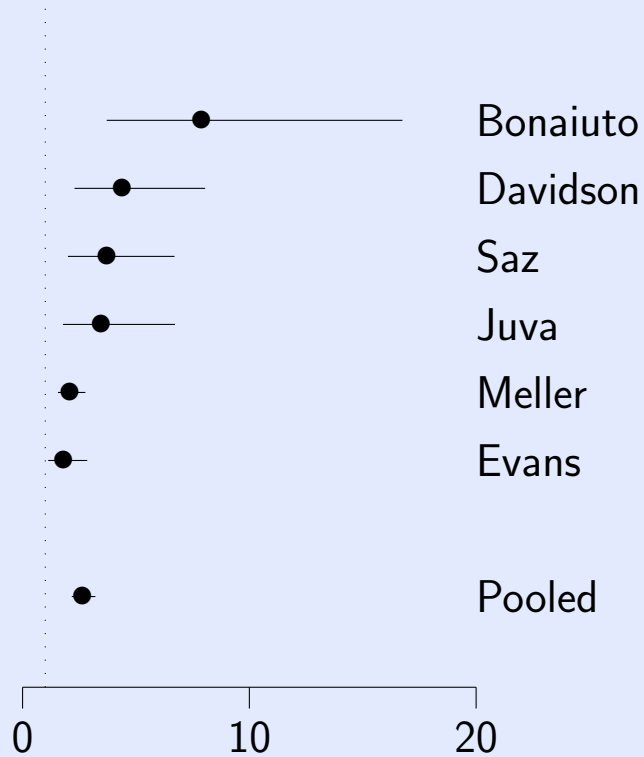
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1.6. Summary

Effect	Studies	Result
AD v VaD	4	Greater for VaD
Sex	9	Women higher risk in 9 of 16 comparisons
Severity	2	From logistic regression $\chi^2_2 = 7.99$, more severe higher risk
Age	3	From logistic regression $\chi^2_1 = 3.82$, smaller risk for older

Summary of effect modifiers for mortality and dementia and depression

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1.7. What do we know now?

- Elevated risk which increases with severity.
- Possibly greater for VaD and possibly less for increased age.

What do we not know?

- What they die of
- What happens for other dementias

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2. Death certificate studies

Study	Where?		Diagnosis
Newman	Canada	1965-83	Dementia
Martyn	E and W	1968-78	Dementia
Jordan	US	1968-73	Dementia
Flaten	Norway	1969-83	Dementia
Chandra	US	1971, 73-78	Dementia
Forbes	Canada	1974-91	Dementia
Jorm	Australia	1979-85	Dementia, Alz
Kirby	E and W	1979-96	Dementia, Alz
Aylin	E and W	1979-96	Dementia, CJD
Imaizumi	Japan	1979-90	Alz
Anon	US	1979-87	Alz
Hoyert	US	1979-91	Alz
Hoyert	US	1979-96	Alz
Tassinari	Italy	1980-89	Dementia
Lanska	US	1986	Dementia
Wilkins	Canada	1990-1993	Dementia

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2.1. Summary of death certificate studies

- Secular trend - rises, but senility falls
- Age - rises
- Region - varies
- Sex - varies
- Race - white > black (only studied in US)

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2.2. The importance of the topic

Lanska (1998)

595000 people die each year in the US with dementia. For comparison

- 531000 with cancer,
- 490000 with ischaemic heart disease,
- 150000 with cerebro vascular accident.

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3. Sensitivity and specificity

Ganguli and Rodriguez (1999)

Conducted 8 year follow-up in a community cohort 65 and over. 527/1422 died, with certificates

CFAS

13000 people 65 and over up to 10 years 2360 with a certificate and diagnosis.

3.1. Results

	Ganguli Δ		CFAS Δ	
	Dementia	No dem	Dementia	No dem
Dem	41	4	176	44
Other CNS	54	54		
Other	77	297	687	1453
Total	172	355	863	1497

Ganguli $\kappa = 0.28$

CFAS $\kappa = 0.21$

	Ganguli			CFAS		
	95% ic	95% ic	95% ic	95% ic	95% ic	95% ic
Sensitivity	24	18	31	20	18	23
Specificity	99	97	99	97	96	98
PPV	91	79	98	80	74	85
NPV	92	89	94	68	66	70

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3.2. Logistic model - I

	Ganguli					
	95% ic					
Stage	22.6	2.9	174.7			
Alz probable	3.5	1.1	10.6			
Institution	3.8	1.6	9.0			
	CFAS					
	95% ic			95% ic		
Sex (M)	0.79	0.55	1.13	0.84	0.56	1.26
Age	1.00	0.97	1.03	0.98	0.95	1.01
Hospital	0.61	0.44	0.83	0.62	0.43	0.90
Delay 80 wks+	1.33	0.97	1.83	1.33	0.92	1.92
Dementia	10.15	6.76	15.23			
O3				1.00		
O4				1.30	0.87	1.93
O5				1.41	0.77	2.60

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3.3. Logistic model - II

		95% ic	
Age	1.00	0.97	1.02
Sex (M)	0.79	0.55	1.13
Hospital	0.60	0.44	0.83
Delay 80 wks+	1.36	0.99	1.88
Well	1.00		
O3	9.15	5.97	14.04
O4	11.98	7.32	19.59
O5	13.21	6.73	25.92

4. Causes of death

Wilkins et al. (1999)

Death certificates in Canada

CFAS more than 8000 certificates

	CFAS	Wilkins	
		Can	US
65-74	$23/1497 = 1.5$	1.8	1.3
75-84	$194/3800 = 5.1$	6.1	4.4
85+	$254/2916 = 8.7$	9.2	7.7
95+	$30/330 = 9.1$		

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4.1. CFAS data

Relation between mention of dementia on death certificate and mention of other causes

		95 % ic	
Pneumonia	2.23	1.86	2.68
Chronic skin ulcer	2.20	0.93	5.00
Senility	2.15	1.61	2.88
Fall (unspecified)	5.37	1.08	26.67
Septicemia	0.18	0.04	0.71
Neoplasia	0.22	0.15	0.31
Cardiac disease	0.34	0.27	0.42
Aortic aneurism	0.09	0.01	0.62

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5. What next

- Symptoms in life and mention of dementia
- Cause of death and post mortem
- Does this throw any light on vCJD?

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K Wilkins, G F Parsons, J F Gentleman, and W F Forbes. Deaths due to dementia: an analysis of multiple-cause-of-death data. *Chronic Diseases in Canada*, 20(1):26–35, 1999.