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Ear infection and subsequent hearing impairment: findings from a prospective longitudinal study of Australian children

Vas Yieng, Anthony Hogan & Lyndall Strazdins

School of Sociology



Middle ear infection a common childhood disease

- Most children experience middle ear infection
 - 50% of children by age 3 and most by 7 yrs
 - Morris & Leach, 2009; Pirozzo & Del Mar, 2001; Rovers et al., 2004
- Potential Impacts
 - Conductive hearing loss with subsequent impacts on speech, language, education, and psycho-social outcomes
- Significant costs to society up \$400 mil (Access Economics 2009)



A prospective study

- Longitudinal study of ear infection
- Examine potential association between ear infection and any subsequent hearing impairment
- 6 years' data
- Both indigenous and non-indigenous children



The longitudinal study of Australian children

- Tracking 10,000 children across Australia
- 2 cohorts
 - 0-1 yrs ~ B baby cohort
 - 5,107 children
 - 4-5 yrs ~ K kid cohort
 - 4,983 children
- LSACs seeks to identify key factors influencing child development



Study design

- 2 stage clustered sampling design
- Randomly selected from Medicare database
- Data collected f-2-f every 2 years
 - 2004; 2006; 2008; 2010
 - Additional between interview mail out surveys
- LSACs broadly representative
 - Some under-representation of
 - Lower educated, single parent, NESB, and families in rental properties
 - An 'advantaged' sample



Key questions

- Exposure question
 - Does the child have any of these ongoing problems
 - Ear infection (yes, no)
- Outcome variable
 - Does the child have any of these ongoing problems
 - Hearing problems (yes, no)

 - Some hearing questions were omitted between waves resulting in an incomplete dataset



Demographic characteristics

Study child – sex	B Cohort	K Cohort
Female	48.9 (2,497)	49.1 (2,446)
Study child – indigenous status		
Study child – yes	4.5 (230)	3.8 (187)
Study child – main language at home		
English	89.2 (4,555)	87.5 (4,359)
Parent 1 – employment status		
Employed	49.7 (2,531)	57.4 (2,852)
Unemployed	3.2 (165)	3.8 (188)
Not in labour force	47.1 (2,400)	38.9 (1,932)
Parent 1 – school completion		
Year 12+	66.7 (3,404)	58.1 (2,895)
Year 10/11	28.3 (1,443)	34.9 (1,739)
Year 9 or less	5.0 (256)	6.9 (344)
Remoteness area		
Highly accessible	54.8 (2,800)	53.8 (2,655)
Accessible	23.3 (1,188)	23.5 (1,159)
Moderately accessible	16.5 (840)	17.3 (855)
Remote/ very remote	4.3 (221)	4.4 (217)
SEIFA economic resources		
Below median	44.4 (2,269)	45.8 (2,284)
SEIFA education and occupation		
Below median	47.3 (2,413)	49.8 (2,483)



Prevalence of ear infections

Age (year)	Ear infection % (n)		Hearing problems% (n)	
	B cohort	K cohort	B cohort	K cohort
0/1	3.9% (200)		0.7% (37)	
2/3	5.5% (254)		n/a	
4/5	5.6% (244)	7.9% (394)	2.0% (89)	3.3% (164)
6/7	5.0% (212)	5.5% (244)	2.8% (120)	n/a
8/9		n/a		2.5% (110)
10/11		3.3% (139)		2.1% (89)



Longitudinal analyses of ear infection - B

Ear infection by age		Ear infection % prevalence (n) and crude Odds Ratios [95% Confidence Intervals]					
		2/3 year		4/5 year		6/7 year	
		Yes	OR [95%CI]	Yes	OR [95% CI]	Yes	OR [95%CI]
B cohort							
0/1	No	4.7% (206)		5.0% (211)		4.7% (190)	
	Yes	25.8% (47)	6.6 [4.6-9.5]	17.8% (31)	3.4 [2.2-5.2]	11.7% (19)	1.8 [1.0-3.1]
2/3	No			4.3% (171)		4.3% (167)	
	Yes			27.8% (64)	8.7 [6.3-12.0]	18.0% (38)	4.9 [3.3-7.2]
4/5	No					3.5% (134)	
	Yes					30.4% (70)	12.2 [8.7-17.1]



Longitudinal analyses of ear infection - K

Ear infection by age		Ear infection % prevalence (n) and crude Odds Ratios [95% Confidence Intervals]			
		6/7 year		10/11 year	
		Yes	OR [95%CI]	Yes	OR [95%CI]
K cohort					
4/5	No	3.7% (151)		2.3% (89)	
	Yes	26.8% (93)	9.6 [7.2-12.8]	15.5% (50)	7.7 [5.3-11.1]
6/7	No			2.0% (74)	
	Yes			27.6% (61)	19.1 [13.2-27.8]



B Ear infection and hearing problems

(excluding hearing impairment at baseline)

Ear infection by age		Hearing problems % prevalence (n) and crude Odds Ratios [95% Confidence Intervals]			
		4/5 year		6/7 year	
		Yes	OR [95%CI]	Yes	OR [95% CI]
B cohort					
0/1	No	1.9% (78)		2.6% (106)	
	Yes	3.7% (6)	2.0% [0.9-4.7]	7.2% (11)	2.9 [1.5-5.5]
2/3	No	1.8% (73)		2.6% (99)	
	Yes	4.5% (10)	2.5% [1.3-5.0]	6.9% (14)	2.8 [1.6-5.0]
4/5	No			2.2% (83)	
	Yes			12.1% (27)	6.2 [3.9-9.8]



K Ear infection and hearing problems

(excluding hearing impairment at baseline)

Ear infection by age		Hearing problems % prevalence (n) and crude Odds Ratios [95% Confidence Intervals]					
		8/9 year			10/11 year		
		Yes	OR [95%CI]	Yes	OR [95%CI]		
K cohort							
4/5	No		1.5% (59)		1.4% (51)		
	Yes		7.3% (20)	5.1 [3.0-8.6]	5.7% (15)	4.4 [2.4-7.9]	
6/7	No		1.4% (54)		1.2% (44)		
	Yes		12.0% (23)	9.1 [5.8-16.0]	9.7% (18)	8.9 [5.1-15.8]	



Ear infection and hearing problems

(excluding hearing impairment at baseline)

Ear infection B cohort 0/1 to 6/7 year	% (n)	Hearing problems at 6/7 year OR [95% CI]	Ear infection K cohort 4/5 to 10/11 year	% (n)	Hearing problems at 10/11 year OR [95% CI]
Never	86.8 (4,380)	Ref	Never	89.2 (4,296)	Ref
Once	9.8 (493)	3.9 [2.5-6.1]	Once	8.8 (422)	4.8 [2.6-8.9]
Twice	2.9 (148)	8.6 [5.0-15.0]	Twice	1.6 (77)	18.8 [9.1-38.8]
Three times+	0.5 (25)	29.9 [12.3-73.2]	Three times+	0.5 (24)	44.2 [17.2-113.8]



Observations

- Ear infections were associated with the report on ongoing hearing problems
- Follow-up is necessary for children with repeated episodes of ear infection
- Raises issues of prevention and more effective management of the condition



Strengths and limitations

- Strengths
 - Size, representativeness of LSACs sample
 - Repeated measures
- Limitations
 - Self report
 - Nature of questions used



Acknowledgements

- Study conducted with an unconditional grant from GSK
- Findings reported are those of the author and should not be attributed to FaHCSIA, AIFS or ABS