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Cross sectional survey of meningococcal C immunisation in children looked after by local authorities and those living at home

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Children under the care of a local authority by voluntary agreement or by order of a court often have poor physical and mental health.¹ On 31 March 2001, 75 601 children in England, Scotland, and Wales were looked after by local authorities. In 1998, the government invested £885m in social services through the Quality Protects programme² (Children First in Wales) to improve public care. Compliance with immunisation schedules is an important health performance indicator of these programmes, although lack of immunisation may reflect neglect before, rather than after, a child enters public care. The national meningococcal C vaccine campaign³ in 1999 provided a unique opportunity to measure immunisation uptake in public care, unbiased by historical health neglect. We compared immunisation rates in children looked after by local authorities with that in children at home.

Participants, methods, and results

Nine health districts participated in the study: Southampton; Greenwich; Basildon; Shropshire, Telford, and

Wrekin; Stoke-on Trent; South Tyneside; Calderdale and Huddersfield; Edinburgh; and Cardiff and the Vale of Glamorgan. These were selected because they were the districts of members of a national advisory group. We ascertained the meningococcal C immunisation status of all children on 31 March 2001 from district immunisation databases. We collected data using standardised forms by age (0-4, 5-9, 10-15, 16-18 years) and immunisation category (immunised, not immunised, or unknown). Babies under 2 months were classified as appropriately immunised. We identified children looked after by local authorities from social services records and subtracted the number from the total population by age category to determine the number of children at home. Immunisation status was unknown for 6.5% of children in public care. We excluded missing data from the denominator to calculate unbiased vaccination failure rates. Data were analysed using SAS software (version 8).

Overall, 995/3028 (33%) of children in public care did not receive meningococcal C vaccine compared with 72 841/501 516 (15%) of children at home. Uptake decreased with age in both groups. Children in public

Percentages of children in public care and children living at home who were not immunised against meningitis C in nine health districts and risk ratios for not being immunised. Numbers for the percentages are available on bmj.com

District	Age 0-4 years*			Age 5-9 years*			Age 10-15 years†			Age 16-18 years			All ages		
	% in public care	% at home	Risk ratio	% in public care	% at home	Risk ratio	% in public care	% at home	Risk ratio	% in public care	% at home	Risk ratio	% in public care	% at home	Risk ratio
A	14	8	1.82	29	11	2.66	32	11	2.76	48	26	1.85	31	12	2.58
B	31	12	2.48	30	14	2.13	35	20	1.76	34	36	0.95	33	19	1.76
C	30	30	0.98	53	13	4.12	59	9	6.40	71	9	7.66	53	13	4.17
D	6	11	0.54	18	5	3.67	31	5	5.92	41	17	2.45	24	8	2.91
E	6	12	0.53	—	—	—	16	7	2.30	37	11	3.34	17	10	1.76
F	—	—	—	68	30	2.27	48	38	1.27	64	46	1.39	57	37	1.56
G	—	—	—	7	11	0.63	22	7	3.11	49	20	2.45	22	10	2.17
H	—	—	—	—	—	—	37	11	3.28	—	—	—	37	11	3.28
I	—	—	—	—	—	—	35	13	2.68	—	—	—	35	13	2.68
All	22	12	1.79	31	14	2.28	34	14	2.40	46	22	2.11	33	15	2.26

Risk ratios represent the proportion of children in public care not immunised divided by the proportion of children at home not immunised. A risk ratio >1 indicates that children in public care are less likely to have been immunised than children at home.

*Data were not available for ages 0-4 years in districts F-I nor for ages 5-9 years in district E.

†Aggregated data for all school aged children in districts H and I.



Full data for the table are available on bmj.com

care were less likely to be vaccinated than those at home unless they were under 5 years of age in districts C, D, and E or aged 5-9 in district G (table). Retrieving data was difficult in all but one district, which had electronic records of looked after children. No district had a joint health and social services database.

Comment

Overall, children looked after by local authorities were more than twice as likely to not receive meningococcal C vaccine than children at home (risk ratio 2.17 adjusting for age and district, 95% confidence interval 2.06 to 2.28, Mantel-Haenszel method). Because universal childhood meningococcal C vaccination was introduced recently, we were able to study the effectiveness of public care without bias from historical health neglect. Although sampling was opportunistic, our findings are likely to be generalisable as immunisation indices for children in public care in the districts surveyed all fell within one standard deviation of the national mean.⁴

We did not examine the reasons for failure to immunise. However, during 2001, 16% of children in public care moved placement more than three times.⁴ This instability creates potent risk factors, including missed school based immunisation and discontinuity of primary care. The reversed risk ratio for young children in some districts may reflect greater stability in their placements, primary care organisation of the pre-

school campaign, or targeting of vulnerable children by health visitors.⁵

We suggest two ways forward. Firstly, health services should be made accountable for immunisation uptake as well as social services. Secondly, effective shared information systems between health and social services need to be introduced. Together these measures would better protect our most vulnerable children from disease.

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Herd immunity from meningococcal serogroup C conjugate vaccination in England: database analysis

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In November 1999, the United Kingdom introduced routine meningococcal serogroup C conjugate vaccination for infants. The vaccine was also offered to everyone aged under 18 years in a phased catch-up programme.¹ The first to be vaccinated were adolescents, and the entire programme was completed by the end of 2000. On the basis of direct protection provided by the vaccine,^{1 2} this catch-up programme was likely to be cost effective.³

Maiden et al described a 67% reduction (from 0.45% to 0.15%) in the prevalence of nasopharyngeal carriage of serogroup C meningococci in adolescents before and after the vaccination programme.⁴ A fall in meningococcal carriage would be expected to reduce exposure among unvaccinated children and therefore to enhance the effectiveness of meningococcal conjugate vaccine. We present rates of disease in vaccinated and unvaccinated children to provide the first evidence of an indirect effect from meningococcal conjugate vaccine.

Methods and results

Since December 1999 we have investigated the vaccination history of all cases of serogroup C disease confirmed by the meningococcal reference unit of the Public Health Laboratory Service in age groups

targeted for immunisation.¹ We collected data on vaccination coverage from immunisation coordinators and departments of child health in England.⁵ Between 1 July 2001 and 30 June 2002, we identified a total of 37 cases in the cohorts targeted for catch-up vaccination, eight (22%) in vaccinated children and 29 (78%) in unvaccinated children. We compared cases in unvaccinated children from each age group in the 2001-2 cohort with those in the same age groups for the period from 1 July 1998 to 30 June 1999. The denominator was mid-1999 population estimates from the Office for National Statistics for the age group, adjusted for the proportion of each cohort vaccinated.

Overall, in the age groups targeted for catch-up vaccination, a reduction of 67% (95% confidence interval 52% to 77%) in the attack rate occurred, with a range of 48% to 80% across the age groups (table). A smaller fall occurred in adults not eligible for vaccination (aged ≥ 25 years), for whom the incidence declined by 35% (20% to 49%) from 0.53 (193/36 315 726) to 0.34 (123/36 315 726) per 100 000.

Because of possible underestimation of coverage⁵ we recalculated the attack rates, assuming that coverage was 10% higher in adolescents and 5% higher in other children (based on our experience with other vaccines). The resulting overall estimate was of a 52% reduction (95% confidence interval 30% to 77%) in

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