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Evaluation of immunization practices in Naples–Italy

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Abstract

This paper reports the results of a survey on vaccination coverage among children born in January 1995 and residing at the beginning of the study (March 1998) in the city of Naples, Italy. The percentages vaccinated, at various times from birth, with oral polio vaccine (OPV), have been compared with those found in a similar survey conducted at the end of 1985 regarding the cohort of children born in June 1983.

By the fourth month of life 67% of the 1995 cohort were vaccinated with the first doses of OPV, an increase of about 26% on that found in the 1983 cohort. Similar results were found with the second doses. Among the 1995 cohort 49% were vaccinated with the third dose of OPV within the thirteenth month of life; the corresponding value for the 1983 cohort was 33%.

Within the twenty-fourth month of life, in the 1995 cohort, 86% completed the primary cycle of vaccination with OPV; the corresponding figure for the 1983 cohort was 65%. At the end of the third year of life 80% of the 1995 cohort received the fourth dose of OPV. A significant association has been found between socioeconomic status and coverage level.

Keywords: Vaccination coverage; Vaccination registers; Antipolio vaccine

1. Introduction

Immunization has been among the most successful public health activities in Italy, as witnessed by the elimination of indigenous poliomyelitis caused by wild polioviruses in 1983 [1] and of diphtheria and tetanus in infancy and young adulthood. In Italy, immunization with oral polio vaccine (OPV), diphtheria-tetanus (DT) and Hepatitis B (HBV) vaccines is mandatory; primary immunization is three doses, administered at 3, 5 and 11 months of life; a fourth dose of OPV is given at age three and DT is given at 6 years. Vaccination for measles, rubella, mumps, pertussis and haemophilus influenzae (HIB) is recommended.

The effectiveness of local public health services in performing immunization (mandadory or recommended) varies between the regions of Italy and also varies within regions and Local Health Units, and between health districts [2]. At a local level, mainly in deprived metropolitan areas, delay and evasion occur, and this could create and maintain the potential for epidemics [3], that could be realised in emergency situations and/or because of immigration from endemic areas. It is responsibility of primary health services to offer actively the prophylaxis and to verify periodically the existence of epidemic potentials at district or sub-district level. The timing of vaccinations is a powerful indicator of the effectiveness of primary health services, as well as the level of coverage within the second year of life [4]. The recent introduction (1999) in Italy of the sequential schedule, with the first two doses of inactivated polio vaccine (IPV) followed by two doses of OPV, requires the highest attention to the timing of immunization [5]. Delays that could affect the extent of herd immunity together with evasion (both clustered) in the presence of immigration from endemic areas could lead to an epidemic, even in the presence of a high level (>90%) of coverage at regional level.

In Italy, the last four cases of poliomyelitis in unvaccinated children were notified (and confirmed) from the Naples area in 1981–82 [1]. Seroepidemiological and immunization coverage surveys [6,7] conducted in this area found delays and evasion, clustered in socio economically deprived areas. Naples, with 1 million population, is the third largest city after Rome and Milan. Among the 8 largest Italian cities (others: Turin, Palermo, Genoa, Bologna and Florence) Naples ranks first for population density, family size, percent illiterate, percent of young people searching

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for first occupation, average number of people per room, percent of non owner occupancy and is third to last for percent with university degree [8].

The negative pattern of immunization practices, as ascertained at the beginning of the eighties, prompted local and regional authorities to review operational procedures of primary health services responsible for immunization to upgrade their effectiveness.

The aim of this study was to evaluate the immunization coverage among children born in 1995 in the city of Naples, and to compare coverage levels with those obtained from a similar survey conducted in 1985, among children born in 1983 [7].

2. Materials and methods

The study population was all children residing in the Local Health Unit ASL NA1 (Naples city) at the beginning of the study (March 1998) and born in January 1995. This Health Unit has 10 health districts. A vaccination history was collected from vaccination registers for each child. In the case of lack of information, about the primary cycle of three doses, home visits ascertained immunization status from vaccination certificates. The same procedure was used for the cohort of children born in June 1983 and residing in the same area in September 1985.

The immunization coverage was evaluated at health district level. Using the same indicators adopted to rank Naples among the largest Italian cities, it has been possible to categorise city quarters in three socio-economic levels: 5 high level, 15 medium and 9 low level [8].

The percentage of vaccinated children at the fourth month of life for the first doses, at the seventh month for the second doses, at the thirteenth, twenty-fourth and thirty-sixth month for the third doses of OPV, DT and HBV (HBV only for 1995 cohort) were calculated.

For the 1995 cohort, the percentage of children vaccinated against measles at the twenty-fourth and thirty-sixth month, and the percent vaccinated with the fourth dose of OPV at thirty-sixth months were also calculated.

3. Results

Nine-hundred and thirty-seven children were born in January 1995 and registered as resident at the beginning of the study. For 71, home visits were performed because the registers indicated a lack of one or more doses of the primary cycle of mandatory vaccinations. Twenty-nine of these (3% of the total) were no longer resident. For 32 children information on vaccination history was collected, and the parents of the other 10 refused the interview and their children were considered unvaccinated. The analyses refer to OPV vaccination, as DT and HBV were almost always performed at the same time.

Table 1 shows the percentage of vaccinated children within: the fourth month of life for the first dose of OPV,

Table 1
The percentage of immunized children by OPV dose and age, by district, by cohort

District	Cohort	*n*	1st OPV 4th month (%)	2nd OPV 7th month (%)	3rd OPV 13th month (%)	1st OPV 24th month (%)	3rd OPV 24th month (%)	3rd OPV 36th month (%)
1	1995	51	88	76	67	96	90	92
	1983	65	65	55	38	81	66	
2	1995	82	82	82	66	100	91	96
	1983	144	67	58	51	92	81	
3	1995	106	73	74	57	95	86	95
	1983	172	64	58	37	89	70	
4	1995	82	83	91	66	100	98	99
	1983	90	73	71	50	88	80	
5	1995	105	52	62	45	94	83	94
	1983	106	33	56	17	80	58	
6	1995	78	63	67	41	95	86	92
	1983	165	45	39	30	72	52	
7	1995	88	69	65	47	97	86	97
	1983	208	45	39	27	84	62	
8	1995	70	69	64	43	94	76	91
	1983	153	55	45	39	78	62	
9	1995	154	62	60	37	96	82	95
	1983	205	50	36	26	82	64	
10	1995	92	49	59	37	93	84	91
	1983	167	46	40	30	79	58	
Total	1995	908	67	69	49	96	86	95
Range (95% CI)			49–88 (70–64)	59–91 (66–72)	37–67 (45–52)	93–100 (95–97)	76–98 (83–88)	91–99 (93–96)
Total	1983	1475	53	47	33	82	65	
Range (95%CI)			73–33 (50–56)	36–71 (45–40)	51–17 (31–36)	72–92 (80–84)	52–81 (62–67)	

Table 2
The percentage of vaccinated children by OPV dose and age by socio economic level of quarters of residence (95% confident limits), 1995 cohort

Socio economic level of quarter of residence	*n*	1st OPV 4th month (%)	2nd OPV 7th month (%)	3rd OPV 13th month (%)	1st OPV 24th month (%)	3rd OPV 24th month (%)	3rd OPV 36th month (%)
High	133	85 (77–90)	86 (78–91)	66 (57–74)	98 (94–100)	95 (89–98)	96 (91–99)
Medium	461	68 (63–72)	68 (63–72)	46 (41–51)	96 (94–98)	85 (81–88)	95 (92–97)
Low	314	59 (53–64)	63 (58–69)	46 (50–52)	95 (91–97)	83 (78–87)	94 (90–96)
p (X^2 for trend)		<0.01	<0.01	<0.01	<0.04	<0.01	>0.05
All quarters	908	67	69	49	96	86	95

the seventh month for the second dose, the thirteenth month for the third dose, the twenty-fourth month for the first and third dose and the thirty-sixth for the third dose of OPV, by district and cohort year. Among the 1995 cohort, 67% (district range: 49–88%) received the first dose of OPV within the fourth month of life, compared to 53% (district range: 33–73%) among the 1983 cohort. Less than half of children (district range 37–67%) had the third dose of OPV within the thirteenth month of life and 86% (district range: 76–98%) within the twenty-fourth month, compared to 33% (district range: 17–51%) and 65% (district range: 52–81%), respectively, among the 1983 cohort.

Ninety five percent (district range: 91–99%) resulted vaccinated with 3 doses of OPV at the thirty-sixth month of life.

Table 2 shows the percentage vaccinated in the 1995 cohort by socio economic level. Children residing in quarters with high socio economic levels were more likely to be vaccinated than those living in medium-low level quarters. In particular, the percentage of children vaccinated with the third dose of OPV within twenty-fourth months was 95% in high socio economic quarters, compared to 85 and 83% among those living in medium and low level quarters, respectively, (OR = 3.36, CL:1.53–8.74).

Table 3 shows the percentage of children in the 1995 cohort vaccinated with the fourth dose of OPV by age 3 years and against measles in the second and third year of life, by district and aggregated quarters. Overall, 80% of children received the fourth dose of OPV (district range: 67–85%) but in low socio economic quarters it was only 74%.

Only 35% (district range: 13–61%) and 51% (district range: 17–71%) were vaccinated against measles within the second and third year of life, respectively. Children living in high socio economic quarters were twice as likely to be vaccinated within the third year of life against measles as those living in less advantaged areas (OR = 2.17, CL: 1.45–3.26).

4. Discussion

At city level, immunization coverage was similar to that found in the 1998 national survey [2]. This study shows that the suboptimal immunization coverage in Naples city masks huge differences between health districts and city quarters, with a strong association between socio economic level and immunization coverage. These results confirm the existence of delay in immunization and evasion.

Table 3
The percent of children vaccinated (95% confidence limits) with the fourth dose of OPV, and against measles (MCV), within the indicated periods, by district and quarters aggregation, 1995 cohort

District	4th OPV within the 3rd year of life	MCV within	
		2nd year (%)	3rd year (%)
1	80	61	71
2	85	48	61
3	83	44	69
4	87	54	65
5	77	18	28
6	82	26	50
7	77	13	17
8	80	19	31
9	81	43	69
10	67	26	41
Quarters: High socio economic level	84 (77–90)	56 (48–65)	67 (58–75)
Medium socio economic level	83 (79–86)	38 (34–43)	58 (53–62)
Low socio economic level	74 (69–79)	22 (17–26)	34 (29–39)
p (X^2 for socio economic trend)	<0.01	<0.01	<0.01
All children ASL NA1	80 (77–83)	35 (32–38)	51 (47–54)

If the increase of coverage from the 1983 cohort is noticeable, there is evidence of the need for further efforts from the primary health services to reduce delay and evasion, especially in the most deprived quarters.

Active recall of unvaccinated children, and if necessary a home visit, should be normal practice after one-two months delay from the scheduled time, especially for first and second doses [4]. Delay in completing the last two doses of OPV should receive particular attention in the view of need to maintain herd immunity.

Studies performed in other regions [9] and Local Health Units (unpublished results) confirm the existence of this problem, mainly in deprived sectors of metropolitan areas. Also similar problems are reported in other countries [10].

It seems [2] that the most important risk factor for delay or evasion is the concurrent contraindication (often false) in deprived sectors of the population. Without systematic recall, children may remain unvaccinated for long time. Computerisation of immunization centres could help to identify delays as soon as possible. An improvement in immunization coverage could be obtained if periodic evaluation of immunization practices were performed [11].

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