

# Delays in primary vaccination of infants living in Western Saudi Arabia

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## ABSTRACT

**Objectives:** Vaccination is one of the most cost-effective means of preventing serious infectious diseases. Several studies from developing and developed countries documented considerable delays in the administration of primary vaccinations. Our objectives were to study the circumstances and contributing factors to such delays in order to design preventative measures.

**Methods:** Parents of consecutive infants seen during a routine vaccination visit at King Abdul-Aziz University Hospital, Jeddah, Kingdom of Saudi Arabia were included prospectively between September 2000 and February 2001. Structured interviews were performed using a 20-item questionnaire. Vaccinations were considered delayed if they took place 4 or more weeks after the designated time.

**Results:** During the study period, 227 structured interviews were conducted. All approached parents agreed to participate. The mother was interviewed in 97% of cases. Infant's ages ranged between 2-52 months (mean

3.4, standard deviation (SD) 5.1). The majority of the parents were married (98%), and 83% of the mothers were housewives. Most families (79%) had other older children. In most infants (91%), the primary vaccinations were given on time. In the remaining 9%, vaccinations were 1-38 months late (mean 3.8, SD 8.1). The most common reasons for such delays were difficulties with the appointment (30%) and non-febrile upper respiratory tract illness (20%). In only 3 (15%) infants, was the delay based on physician's advice, and only 2 (10%) had a real contraindication. Most of these parents (65%) were not concerned at all regarding the vaccination delay, and only 2 (12%) were highly concerned.

**Conclusions:** Delays of primary vaccination of infants, although uncommon, continue to occur in our region. Improved parental education and timely scheduling of follow-up appointments can easily prevent such delays.

**Keywords:** Infant, delay, primary, vaccination, immunization.

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Vaccination is one of the most cost-effective means of preventing serious infectious diseases. The wide spread use of vaccines led to a global eradication of a number of infectious diseases such as small pox. In the United States of America (USA) for example, vaccines almost eliminated congenital rubella, tetanus, and diphtheria, and significantly reduced the incidence of pertussis, rubella, measles, and mumps.<sup>1</sup> Several studies from the underdeveloped and developing countries documented considerable delays in the

administration of primary vaccinations.<sup>2,3</sup> Even in developed countries, the vaccination coverage was not always optimal.<sup>4,5</sup> This delay is problematic, as children need to be protected early in life when they are most susceptible to infectious diseases. Parental problems that have social implications were frequently cited as the main reasons for delayed vaccinations.<sup>6</sup> However, missed opportunities also exist when inappropriate contraindications are used to deny vaccination to children in need. General practitioners and pediatricians may have doubts

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about the real contraindications to primary vaccinations.<sup>7</sup> These authors observed reluctance to immunize children when presented with some false contraindications.<sup>7</sup> It is needless to say that low rates of vaccination at a given time will not prevent the occurrence of epidemics in such population. Delays in the administration of primary vaccinations of Saudi children have received limited study. Knowledge of the circumstances of such delays and contributing or correlating factors would help in designing preventative measures. We aimed to study this issue and explore the possible contributing and correlating factors to delays of primary vaccinations in a regional population of Saudi Arabia. We hypothesized that the majority of such delays could be easily prevented.

**Methods.** Parents of consecutive infants seen during a routine well baby clinic visit at King Abdul-Aziz University Hospital (KAUH), Jeddah, Kingdom of Saudi Arabia (KSA) were identified prospectively. Structured interviews with these parents were performed between September 10, 2000 and February 10, 2001. King Abdul-Aziz University Hospital is a multispecialty adult and pediatric hospital providing primary care to the Jeddah area, as well as secondary and tertiary care for most of the regional population of Western KSA. The well baby clinic is designed for routine follow-up examinations and counseling of healthy infants and children, and for providing routine immunizations. The primary vaccination schedule provided by KAUH is summarized in **Table 1**. These vaccinations are obligatory and provided free of charge. Birth certificates are provided to the parents only after completing these immunizations. Before consenting to the study, the approached parents were assured that taking part in the study is voluntary, their identity will remain anonymous, and that the quality of their child's future care at KAUH would not be affected if they choose not to participate. One pediatrician supervised and conducted the interviews using a structured 20-item questionnaire. The questionnaire was worded on a simple reading level in Arabic or English languages and examined the family's socio-demographic characteristics (**Table 2**). Vaccinations were considered delayed if they took place 4 or more weeks after the designated time (**Table 1**). Other questions regarding the reasons for the delay and who was primarily responsible for that decision were included. A final Likert scale item,<sup>8</sup> regarding whether the parents were concerned about the vaccination delay was also added. Response categories to the Likert scale item were: 1) not at all, 2) somewhat, 3) moderately, and 4) very much. Statistical analyses were performed using Epi Info, Version 6.<sup>9</sup> Tabular data was examined by Chi-square statistics. A p-value less than 0.05 was considered statistically significant.

**Results.** During the study period, 227 structured interviews were conducted. All approached parents agreed to participate. The mother was interviewed in 97% of cases. Most of the interviews (93%) were conducted during the first 3 well baby clinic visits. Overall, infant's ages ranged between 2-52 months (mean 3.4, standard deviation (SD) 5.1). The majority of the parents were married (98%), and 83% of the mothers were housewives. Most families (79%) had other older children, ranging in number between 1-12 (mean 3.8, SD 2.1). **Table 2** shows a summary of some demographic characteristics of the study sample. In most infants (91%) the primary

**Table 1** - Primary vaccination schedule at King Abdul-Aziz University Hospital, Jeddah, Kingdom of Saudi Arabia.

Visit	Vaccine
At Birth	BCG + Hepatitis B
2 Months	Oral Polio + DTP + Hib + Hepatitis B
4 Months	Oral Polio + DTP + Hib
6 Months	Oral Polio + DTP + Hib + Hepatitis B
12 Months	MMR
18 Months	Oral Polio + DTP + Hib
4-6 Years	Oral Polio + DTP + MMR
BCG - bacillus Calmette-Guérin DTP - Diphtheria-tetanus-pertussis, Hib - Hemophilus influenzae MMR - measles-mumps-rubella	

**Table 2** - Some demographic characteristics of the study sample (n=227).

Demographics	Results in the study sample
Mother's age	20-45 years (mean 29, SD 6)
Father's age	22-80 years (mean 37, SD 8)
Saudi nationality	124 (56%)
<b>Parent's education</b>	
1- None	3% fathers / 5.5% mothers
2- School grade	62% fathers / 67% mothers
3- College or university	35% fathers / 27.5% mothers
<b>Father's employment</b>	
1- Unemployed	2%
2- Professional	12%
3- Regular/office work	63%
4- Student	1.5%
5- Labor worker	12.5%
6- Retired	1.5%
7- Businessman	7.5%
<b>Family's monthly income</b>	
1- < 1000 SR (267 USD)	1.5%
2- 1000-2999 (267-799)	29%
3- 3000-6999 (800-1867)	49%
4- 7000-10,000 (1868-2667)	15.5%
5- > 10,000 (2668)	5
SR - Saudi Riyals; USD - United States Dollars; SD - standard deviation	

**Table 3** - Reasons for delaying the primary vaccinations (n=20).

Reasons	n (%)
Appointment related delays	6 (30)
Runny nose or cough without fever	4 (20)
Febrile illness	2 (10)
Social reasons preventing the visit	2 (10)
Medical illness (obstructive jaundice)	1 (5)
Prematurity	1 (5)
Not available	4 (20)
n - number	

vaccinations were given on time. In the remaining 20 (9%), vaccinations were 1-38 months late (mean 3.8, SD 8.1). The majority (95%) had a 1-4 month delay. The reasons provided by the parents justifying such delays are summarized in **Table 3**. In only 3 (15%) infants this delay was based on advice by a physician. Parent's responses to the Likert scale item revealed that 11 (65%) were not at all concerned regarding the vaccination delay, and only 2 (12%) were highly concerned. Vaccination delay and concerns about it did not correlate significantly with any of the socio-demographic characteristics of the study sample.

**Discussion.** The study results suggest that delays of primary vaccination, although uncommon, continue to occur in our region. Most infants (91%) in our sample received their primary vaccinations on time. The majority of the delays were for a few months (mean 3.8 months). It is clear from our data that timely scheduling of follow-up appointments, which was the most common reason behind the delays, could easily prevent most of these delays. Other investigators found parental problems that have social implications as the main reasons for delayed vaccinations.<sup>6</sup> Improved parental education regarding the importance of coming to the scheduled visit for evaluation, even if the child was sick, is needed. In fact, in only a minority (15%) of our infants the delay was based on physician's advice and only 2 (10%) had a real contraindication. Two thirds of these parents were not concerned at all regarding the vaccination delay. Again, better education would improve this risky attitude. Vaccination promoting programs have been shown to produce dramatic improvement in vaccination rates.<sup>10</sup> Other investigators developed a centralized computerized monitoring system to serve populations with insured medical coverage.<sup>11</sup> In KSA, vaccinations are provided free of charge. Completing the schedule is mandatory before obtaining birth certificates and admitting the child to school. This policy proved very effective in maintaining high vaccination rates among all sectors of our community.

There are some limitations to our study. First, the study sample is relatively small with a small percentage of infants having delayed vaccinations. This may explain why the various socio-demographic characteristics did not significantly correlate to vaccination delays or to the level of parental concerns. The study sample is also somewhat biased toward younger infants (mean age = 3.4 months). This is the result of our hospital policy of encouraging parents of healthy infants to receive their future vaccinations in the primary care centers close to their homes. Therefore, delays of later vaccinations could not be assessed accurately in the current study. In fact, a population-based survey of 170 children's vaccination records documented considerable delays in the administration of measles-mumps-rubella (MMR) and 4th dose diphtheria-pertussis-tetanus (DPT) vaccines, particularly in children vaccinated by private physicians rather than at public health clinics.<sup>2</sup> Our sample was otherwise representative of the various community sectors living in Jeddah.

We conclude that delays of primary vaccination of infants, although uncommon, continue to occur in our region. In most cases, improved parental education and timely scheduling of follow-up appointments can easily prevent such delays.

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