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Knowledge and Attitudes toward Vaccination among Mothers of Children with Chronic Illnesses

Betul ALAY [1], Emine Ergul SARI [2] Ozlem POLAT [3], Sadik Sami HATIPOGLU [2]

[1] *Department of Family Medicine; Bakırköy Dr. Sadi Konuk Training and Research Hospital, Istanbul, Türkiye*
[2] *Department of Pediatrics, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Istanbul, Türkiye*
[3] *Department of Pediatric Intensive Care Unit, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Istanbul, Türkiye*

Abstract

Aim: This study aimed to evaluate adherence to the national vaccination schedule among children with chronic illnesses, mothers' knowledge and uptake of special vaccines outside routine immunization, and the reasons for missed or delayed vaccinations.

Methods: Mothers of children aged 1 month to 5 years who were being followed for chronic illnesses and presented to the hospital for any reason were included in this cross-sectional study. Data were collected through face-to-face interviews using a structured questionnaire. Statistical analyses were performed using the NCSS (Number Cruncher Statistical System) 2020 software (Kaysville, Utah, USA).

Results: The study included mothers of 150 children with chronic illnesses. Overall, 86.7% of mothers reported that their children were vaccinated on time, while 10.0% had overdue vaccinations, 1.3% had no information about vaccination status, and 2.0% did not vaccinate their children. The most commonly reported reasons for incomplete routine vaccinations were lack of time (9.3%), fear of side effects (2.7%), concern about contracting other illnesses (0.7%), and lack of information (0.7%). Although 62.0% of mothers were aware of special vaccines, 86.0% had not administered them to their children. The main reasons for not administering special vaccines were lack of information (44.7%), perceiving them as unnecessary (23.3%), and high cost (9.3%). Despite generally high vaccination coverage, 61.3% of mothers agreed with the statement, "I am afraid my child will experience side effects from vaccines."

Conclusion: Although most children with chronic illnesses were vaccinated according to the national schedule, full vaccination coverage remained limited to 86.7%. Frequent hospital visits related to chronic illness, time constraints due to hospital admissions, and concerns about vaccine side effects were the main barriers to complete vaccination. Close monitoring of vaccination schedules in primary care, regular reminder systems, and targeted parental education during both primary care and hospital visits are essential to address vaccination gaps in this vulnerable population.

Keywords: Chronic illness; Childhood chronic disease; Immunization; Vaccination schedule; Special vaccines; Parental knowledge; Vaccine hesitancy

Correspondence: Dr. Emine Ergul SARI, Department of Pediatrics, Bakırköy Dr. Sadi Konuk Training and Research Hospital, Istanbul, Türkiye
E-mail: drergulsari@gmail.com **ORCID-ID:** 0000-0003-0161-4154
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Introduction

Chronic illness is defined as a condition that affects physical and/or mental functioning, may be congenital or acquired, and cannot be completely cured despite ongoing treatment. In childhood, chronic illnesses most commonly include allergic diseases such as asthma, eczema, and allergic rhinitis, as well as neurological disorders including epilepsy and neuromuscular diseases. Other important chronic conditions in children include diabetes mellitus, Down syndrome, cystic fibrosis, and sickle cell anemia. In this population, infectious diseases represent a major cause of morbidity, complications, and mortality, making effective preventive strategies particularly important [1].

Vaccination is one of the most effective preventive measures in public health and plays a critical role in protecting children with chronic illnesses, who are more vulnerable to severe infections than their healthy peers. In addition to individual protection, vaccination contributes to herd immunity by reducing the circulation of infectious agents within the community. When vaccination coverage reaches a sufficient level, indirect protection is also provided to unvaccinated or immunocompromised individuals, thereby strengthening community resistance to outbreaks [2,3]. Herd immunity has been shown to significantly reduce the incidence, morbidity, and mortality associated with vaccine-preventable diseases, particularly during epidemics [4,5].

The follow-up of children with chronic illnesses often requires frequent visits to healthcare facilities, which may negatively affect adherence to routine vaccination schedules. In addition, concerns about vaccine safety, lack of information, and socioeconomic factors may influence parental vaccination decisions. In Turkey, several optional vaccines are licensed and recommended but are not included in the national vaccination schedule, which may further complicate vaccination practices among families of chronically ill children.

In this study, we aimed to evaluate adherence to the national vaccination schedule among children aged 1 month to 5 years with chronic illnesses, assess mothers' knowledge and uptake of optional vaccines not included in the national schedule, and examine the relationship between vaccination practices and maternal sociodemographic characteristics, number of siblings, and children's health status. Furthermore, we sought to identify the reasons for missed or delayed vaccinations and to evaluate how parental knowledge about vaccines influences vaccination practices.

Methods

This was a single-center, cross-sectional study with prospectively collected data, conducted at the Department of Pediatrics of Bakırköy Dr. Sadi Konuk Training and Research Hospital between May 1 and August 1, 2022, following approval from the Clinical Research Ethics Committee of Bakırköy Dr. Sadi Konuk Training and Research Hospital (approval date: April 18, 2022; decision no.: 2022-08-08).

Mothers of children aged 1 month to 5 years who presented to the pediatric emergency department, outpatient clinics, or were hospitalized during the study period were eligible for inclusion if their children were being followed and treated for a chronic illness or were newly diagnosed with, or suspected of having, a chronic condition. Mothers who were not in an appropriate mental or emotional state to complete the questionnaire or whose children had a contraindication to live vaccines were excluded.

During the study period, all eligible mothers who met the inclusion criteria and agreed to participate were consecutively enrolled. A formal sample size calculation was not performed; the final sample size (n=150) was determined by the number of eligible participants available during the study period.

Data were collected through face-to-face interviews using a structured questionnaire. The survey included items on the child's age, type of chronic illness, frequency of healthcare visits, and hospitalization history, as well as maternal age, marital status, occupation, and other sociodemographic characteristics. Information regarding the presence of ill or deceased siblings was also recorded. Vaccination-related variables included the child's vaccination status, adherence to

the national vaccination schedule, administration of vaccines on time, knowledge of routine and special vaccines, and reasons for missed or delayed vaccinations. In addition, mothers' knowledge and attitudes toward vaccination were assessed using a series of standardized questions.

The questionnaire was developed by the authors based on relevant literature and national immunization guidelines and was reviewed for content clarity prior to data collection.

The vaccination knowledge score was calculated based on five items assessing factual knowledge and perceived understanding of vaccines. Each correct or affirmative response was assigned one point. "No opinion" responses were excluded from the score calculation. The total score was converted to a 0–100 scale, with higher scores indicating greater vaccine-related knowledge. Internal consistency of the score was acceptable (Cronbach's alpha = 0,82).

Statistical Analysis

Statistical analyses were performed using the NCSS (Number Cruncher Statistical System) 2020 software (Kaysville, Utah, USA). Descriptive statistics were presented as mean ± standard deviation, median (minimum–maximum), and number (percentage), as appropriate. Normality was assessed using visual and analytical methods and non-parametric tests were applied when data were not normally distributed, particularly for vaccination knowledge scores. Comparisons between more than two groups were performed using the Kruskal–Wallis test, while the Mann–Whitney U test was used for pairwise comparisons to identify the source of significant differences. A p value of <0.05 was considered statistically significant.

Results

Participant Characteristics

The study included mothers of 150 children aged between 1 month and 5 years who were being followed for chronic illnesses. The mean age of the children was 1.85 ± 1.52 years, with a median age of 2 years (range: 0–4 years). Nearly half of the children were aged 0–1 year (46.0%), while 32.7% were aged 2–3 years and 21.3% were 4 years old. Children were most frequently followed in the Pediatric Allergy and Immunology Department (n=44, 29.3%), followed by Pediatric Neurology (n=25, 16.7%), Pediatric Metabolic Diseases (n=19, 12.7%), Genetics (n=17, 11.3%), and Pediatric Nephrology (n=13, 8.7%). Smaller proportions of patients were followed in Pediatric Endocrinology (n=11, 7.3%), Child and Adolescent Psychiatry (n=7, 4.7%), Surgical Departments (n=7, 4.7%), Pediatric Cardiology (n=2, 2.7%), and Pediatric Gastroenterology (n=3, 2.0%). Most mothers were aged 25–35 years (51.3%), followed by those older than 35 years (33.3%). The majority of participants were married (94.7%) and unemployed/housewives (86.7%). Regarding education level, 71.3% had completed primary or high school, while 19.3% had an undergraduate or postgraduate degree. Most families reported a monthly income as moderate (75.3%). One-third of mothers had two children (35.3%), and 4.0% reported a history of a deceased child (Table 1).

Healthcare Utilization

Healthcare utilization patterns during the previous year are summarized in Table 2. Visits to family health centers were reported as 4–7 times by 46.0% of participants, while 11.3% reported eight or more visits. Pediatric outpatient clinic visits were frequent, with 45.3% reporting 4–7 visits and 22.7% reporting eight or more visits. Emergency department utilization was notable, with nearly half of the children presenting four or more times (49.4%). Hospital admissions were reported by 58.0% of participants, most commonly one or two admissions within the past year. **Vaccination Status and**

Practices

Vaccination status and related practices are presented in Table 3. According to maternal reports, 86.7% of children were vaccinated on time, whereas 10.0% had overdue vaccinations, 1.3% of mothers had no information about vaccination status, and 2.0% reported not vaccinating their children. Among mothers reporting incomplete routine vaccinations, the most common reasons were lack of time (9.3%) and fear of vaccine side effects (2.7%).

Awareness of special vaccines not included in the national vaccination schedule was reported by 62.0% of mothers; however, only 14.0% had administered these vaccines to their children. The most frequently reported reasons for not administering special vaccines were lack of information (44.7%), perceiving the vaccines as unnecessary (23.3%), and high cost (9.3%) (Table 3).

Table 1. Sociodemographic and Clinical Characteristics of the Participants (n = 150)

Variable	n (%) / Mean ± SD
Child's Age (years)	
Mean ± SD	1.85 ± 1.52
Median (Min–Max)	2 (0–4)
0–1 years	69 (46.0)
2–3 years	49 (32.7)
4 years	32 (21.3)
Mother's Age (years)	
18–25	23 (15.4)
25–35	77 (51.3)
>35	50 (33.3)
Marital Status	
Married	142 (94.7)
Single	8 (5.3)
Employment Status	
Housewife	130 (86.7)
Employed	20 (13.3)
Education Level	
Illiterate	14 (9.3)
Primary–High school	107 (71.3)
Undergraduate/Postgraduate	29 (19.3)
Monthly Income Level	
Low	15 (10.0)
Moderate	113 (75.3)
High	22 (14.7)
Number of Children	
1 child	39 (26.0)
2 children	53 (35.3)
3 children	36 (24.0)
≥4 children	22 (14.7)
History of Deceased Child	
No	144 (96.0)
Yes	6 (4.0)

Table 2. Healthcare Visits in the Last Year (n = 150)

Variable	n (%)
Visits to Family Health Centers (ASM)	
0–3 times	64 (42.7)
4–7 times	69 (46.0)
≥8 times	17 (11.3)
Visits to Pediatric Outpatient Clinics	
0–3 times	48 (32.0)
4–7 times	68 (45.3)
≥8 times	34 (22.7)
Visits to Emergency Services	
0–3 times	76 (50.7)
4–7 times	37 (24.7)
≥8 times	37 (24.7)
Hospital Admissions	
None	63 (42.0)
1–2 times	70 (46.7)
≥3 times	17 (11.3)

Table 3. Mothers' Knowledge and Attitudes Regarding Vaccination Practices (n = 150)

Variable	Category	n (%)
Vaccination Status		
Vaccinating on time	Yes	130 (86.7)
	Has overdue vaccines	15 (10.0)
	No information	2 (1.3)
	Does not vaccinate	3 (2.0)
Reasons for Missing Routine Vaccines*		
Vaccines complete	—	130 (86.7)
Lack of time	—	14 (9.3)
Fear of side effects	—	4 (2.7)
Fear of contracting other illnesses	—	1 (0.7)
Lack of information	—	1 (0.7)
Awareness of Special Vaccines		
Yes	—	93 (62.0)
No	—	57 (38.0)
Administration of Special Vaccines		
Yes	—	21 (14.0)
No	—	129 (86.0)
Reasons for Not Administering Special Vaccines†		
Lack of information	—	67 (44.7)
High cost	—	14 (9.3)
Does not find it necessary	—	35 (23.3)
Lack of time	—	7 (4.7)
Drug–vaccine interaction	—	2 (1.3)
Fear of side effects	—	2 (1.3)
Influence of social media and environment	—	2 (1.3)

*Multiple responses allowed. †Among mothers who did not administer special vaccines.

Knowledge and Attitudes Toward Vaccination

Mothers' responses to statements assessing knowledge and attitudes toward vaccination are summarized in Table 4. Approximately half of the mothers (49.3%) believed they had sufficient knowledge about vaccines, while 44.0% did not. Fear-related attitudes were common, with 61.3% reporting concern about vaccine side effects and 80.7% expressing concern that their child could contract diseases from unvaccinated children. Trust in physicians was high; 84.7% of mothers reported trusting the information provided by their doctor, and 83.3% stated that they could comfortably discuss vaccine-related concerns.

Vaccine Knowledge Scores

Comparisons of vaccine knowledge scores according to awareness and vaccination practices are shown in Table 5. Mothers who were aware of all routine vaccines had significantly higher knowledge scores than those with partial or no awareness ($p < 0.001$). Similarly, awareness and administration of special vaccines were both associated with significantly higher knowledge scores ($p < 0.001$). Mothers who reported willingness to vaccinate their children if informed about special vaccines also demonstrated significantly higher knowledge scores (Table 5).

Figure 1 summarizes the study population, key vaccination outcomes, and actionable clinical implications. Among children aged 1 month to 5 years with chronic illnesses (n = 150), most were vaccinated on time according to the national immunization schedule (86.7%); however, delayed vaccination (10.0%) and non-vaccination (2.0%) were still observed. Although awareness of special vaccines was moderate (62.0%), actual uptake remained low (14.0%). The main barriers to complete vaccination included frequent healthcare utilization and time constraints, fear of vaccine side effects, and insufficient knowledge regarding special vaccines. The figure highlights practical intervention points, emphasizing vaccination status checks at every healthcare encounter, reminder systems, and targeted parental education integrated into both primary care and hospital-based settings.

Table 4. Distribution of Survey Questions on Knowledge and Attitudes Regarding Vaccination (n = 150)

Statement	Yes n (%)	No n (%)	No opinion n (%)
I believe I have sufficient knowledge about vaccines.	74 (49.3)	66 (44.0)	10 (6.7)
My family doctor has sufficiently informed me about childhood vaccinations.	98 (65.3)	51 (34.0)	1 (0.7)
I have my child receive all vaccines included in the National Vaccination Schedule.	136 (90.7)	11 (7.3)	3 (2.0)
I have my child receive or plan to receive special vaccines not yet included in the schedule (e.g., influenza, rotavirus, meningococcal).	32 (21.3)	111 (74.0)	7 (4.7)
I am afraid my child will contract diseases from unvaccinated children at schools or playgrounds.	121 (80.7)	25 (16.7)	4 (2.7)
I want my child to build immunity by contracting diseases.	32 (21.3)	111 (74.0)	7 (4.7)
I am afraid my child will experience side effects from vaccines.	92 (61.3)	52 (34.7)	6 (4.0)
I believe vaccines are produced by pharmaceutical companies mainly for profit.	33 (22.0)	78 (52.0)	39 (26.0)
I did not vaccinate my child due to anti-vaccine posts on social media.	6 (4.0)	137 (91.3)	7 (4.7)
It is my responsibility as a parent to track my child's vaccinations.	144 (96.0)	4 (2.7)	2 (1.3)
It is my doctor's responsibility to track my child's vaccinations.	134 (89.3)	12 (8.0)	4 (2.7)
I trust the information I receive from my doctor about vaccines.	127 (84.7)	8 (5.3)	15 (10.0)
I can comfortably discuss my vaccine-related concerns with my family doctor.	125 (83.3)	21 (14.0)	4 (2.7)
Vaccines stimulate the immune system to help fight serious infectious diseases.	100 (66.7)	7 (4.7)	43 (28.7)
Vaccines are one of the most effective tools against infectious diseases.	104 (69.3)	13 (8.7)	33 (22.0)
Childhood vaccines have reduced the frequency of diseases such as measles, chickenpox, and polio.	103 (68.7)	7 (4.7)	40 (26.7)
Vaccination of children with chronic illnesses reduces serious infections such as pneumonia and meningitis.	83 (55.3)	9 (6.0)	58 (38.7)

Table 5. Comparison of Vaccine Knowledge Scores According to Vaccine Awareness and Practices

Variable	Category	Vaccine Knowledge Score (Mean ± SD)	Median (Min-Max)	*p-value*
Awareness of Routine Vaccines	None	28.57 ± 37.70	0 (0–100)	<0.001†
	Some	70.08 ± 31.89	75 (0–100)	
	All	76.63 ± 31.24	100 (0–100)	
Awareness of Special Vaccines	Yes	74.73 ± 29.60	75 (0–100)	<0.001‡
	No	49.12 ± 42.51	50 (0–100)	
Administration of Special Vaccines	Yes	86.90 ± 31.24	100 (0–100)	<0.001‡
	No	61.43 ± 36.84	75 (0–100)	
If Informed About Special Vaccines, Would You Vaccinate?	Yes	70.17 ± 32.19	75 (0–100)	<0.001†
	No	55.48 ± 38.12	75 (0–100)	
	Already administers	53.22 ± 40.69	50 (0–100)	

†Kruskal–Wallis test. ‡Mann–Whitney U test. Values are presented as mean ± standard deviation and median (minimum–maximum). $p < 0.05$ was considered statistically significant.

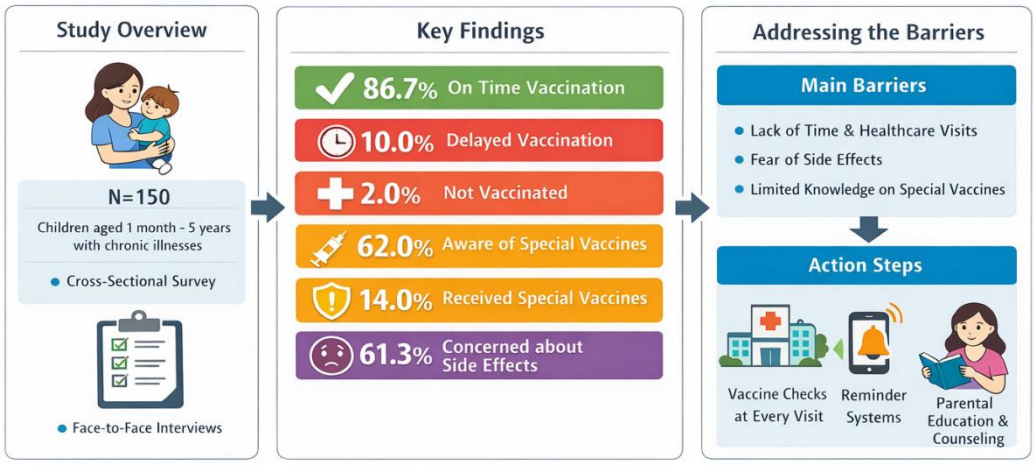

Figure 1. Vaccination status, barriers, and clinical action points among children with chronic illnesses

Discussion

In this study, we evaluated adherence to the national vaccination schedule, maternal knowledge and attitudes toward vaccination, and the uptake of special vaccines among children with chronic illnesses. Although the majority of children were vaccinated on time, full adherence to the national vaccination schedule was achieved in only 86.7% of participants. This finding is clinically important, as children with chronic illnesses are at increased risk for severe infections and related complications, making optimal vaccination coverage essential in this vulnerable population [1,6,7].

The vaccination coverage observed in our study appears slightly lower than the rates reported for the general pediatric population in Turkey, where routine childhood vaccination coverage is generally high [8,9]. The reduced coverage among children with chronic illnesses may be explained by frequent hospital visits, repeated admissions, and competing medical priorities that can disrupt routine preventive care [10,11]. Indeed, lack of time due to healthcare utilization was the most commonly reported reason for delayed or missed vaccinations in our cohort. Similar findings have been reported in studies focusing on children with complex or chronic medical conditions [12,13].

Fear of vaccine side effects emerged as another important factor influencing vaccination practices. Despite high trust in physicians and strong acceptance of routine vaccines, more than half of the mothers reported concerns about potential side effects. This finding is consistent with previous studies demonstrating that vaccine-related fears persist even among parents who generally comply with vaccination schedules [14-16]. Such concerns may be amplified in families of chronically ill children, where heightened anxiety regarding the child's health status can increase sensitivity to perceived risks [3]. Addressing these concerns through tailored counseling and clear risk–benefit communication is therefore critical [17].

Awareness and uptake of special vaccines not included in the national vaccination schedule were notably low. Although nearly two-thirds of mothers were aware of special vaccines, only a small proportion had administered them. Lack of information was the most frequently cited barrier, followed by the perception that these vaccines were unnecessary and concerns about cost. These findings are in line with previous reports indicating that optional or non-funded vaccines are less frequently utilized, particularly in populations with increased healthcare needs [4,18,19]. Insufficient integration of these vaccines into routine counseling practices may further contribute to low uptake among families of children with chronic illnesses.

Maternal knowledge levels were strongly associated with both awareness and administration of special vaccines. Mothers who were aware of routine and special vaccines, as well as those who had administered special vaccines, demonstrated significantly higher vaccine knowledge scores. This association underscores the central role of parental knowledge in shaping vaccination behaviors and has been consistently reported in

the literature [14,20]. Importantly, mothers who stated that they would vaccinate their child if adequately informed also had higher knowledge scores, suggesting that targeted educational interventions may have a direct and positive impact on vaccine uptake.

Trust in healthcare providers was high in our study, with most mothers reporting confidence in their physicians and comfort in discussing vaccine-related concerns. Previous studies have highlighted physician recommendation as one of the strongest determinants of parental vaccination decisions [21,22]. Family physicians and pediatricians are therefore well positioned to identify missed vaccinations, provide individualized counseling, and offer timely reminders during both routine visits and hospital encounters. Given the frequent contact of children with chronic illnesses with healthcare services, every clinical encounter should be considered an opportunity to review vaccination status and reinforce preventive care.

Overall, our findings highlight that vaccination gaps among children with chronic illnesses are not primarily driven by vaccine refusal but rather by structural barriers, insufficient information, and persistent safety concerns. Strengthening coordination between primary care and hospital-based services, implementing reminder systems, and providing focused parental education may substantially improve vaccination coverage in this high-risk group [10,17,22].

Several limitations should be considered when interpreting the findings. The single-center design may limit generalizability. Vaccination status and maternal knowledge were based on self-reported data and may be affected by recall and social desirability bias. The cross-sectional design precludes causal inferences, and the absence of a healthy control group limits comparisons with the general pediatric population. In addition, the questionnaire was developed for this study and did not undergo extensive psychometric validation.

These findings underscore the need for proactive vaccination follow-up and targeted parental education integrated into both primary care and hospital-based encounters, ensuring that children with chronic illnesses do not miss routine or special vaccines during periods of intensive healthcare utilization.

In conclusion, although most children with chronic illnesses were vaccinated in accordance with the national immunization schedule, full adherence remained suboptimal and was mainly influenced by frequent healthcare utilization, time constraints, and persistent parental safety concerns rather than vaccine refusal. These findings highlight the importance of proactive vaccination follow-up and targeted parental education integrated into both primary care and hospital-based encounters to prevent missed routine and special vaccinations in this vulnerable population.

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Conflict of Interest

The authors declare that they have no conflicts of interest related to this study.

Data Availability

The datasets generated and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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