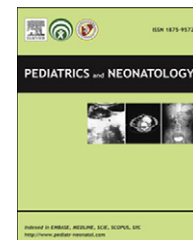


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## ORIGINAL ARTICLE

# Parents' Views About the Vaccination Program in Taiwan

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Received Mar 11, 2010; received in revised form Jul 13, 2010; accepted Jul 23, 2010

## Key Words

awareness;  
parents' attitude;  
vaccine

**Purpose:** To investigate parents' views about new vaccines, we surveyed the attitudes and awareness toward immunization program among parents of children younger than 14 years in Taiwan.

**Methods:** Parents of children were invited to complete a questionnaire in a tertiary referral medical center in Kaohsiung, southern Taiwan from 2006 to 2008. A total of 535 questionnaires were completed. We used descriptive data for the analysis of parents' views and attitudes toward the current vaccination program in Taiwan.

**Results:** Of the 535 respondents, most parents (93%) did not think the current vaccination program was satisfactory. Few (approximately 8%) preferred self-paid vaccines. About 63% of parents believed that the new (self-paid) vaccines provided more protection, whereas 48% deemed them too expensive. The most popular reason for preferring the new vaccines was greater protection (73%). One-half of parents considered the new vaccines to be expensive. Regarding parental awareness of side effect of vaccination, fever was the most well known and of greatest concern (91%). Most parents (68%) had good awareness of conjugated pneumococcal vaccines, and only few (13%) had heard of the human papilloma virus vaccine. Most parental information of vaccines came from pamphlets at the hospital (56%).

**Conclusion:** We found the awareness of parents about new vaccines to be insufficient. They also considered the new vaccines to be expensive.

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## 1. Introduction

Immunization programs are recognized by the World Health Organization as the most effective investment of a public health care system for the prevention of infectious diseases. They have had a considerable impact on the reduction of morbidity and mortality, especially in pediatric patients.<sup>1</sup> In 1948, diphtheria toxoid was the first vaccine introduced in Taiwan; it made a great impact given the sanitary conditions of the time. Since then, a variety of immunizations were launched and highly developed throughout Taiwan's public health history.

Taiwan's government has successfully provided primary immunizations, which led to overall vaccine coverage of more than 90% in 1999<sup>2</sup> and around 95% in 2008<sup>3</sup> for "obligatory" vaccines. At present, vaccines may be categorized as obligatory and new. Obligatory vaccines are administered free of charge to the public, whereas most new vaccines require self-payment by the vaccinee. The current obligatory immunization program in Taiwan caters primarily to infants up to the age of 18 months and includes vaccines for bacille Calmette-Guerin, hepatitis B (HepB), diphtheria-tetanus-pertussis, oral poliomyelitis, measles-mumps-rubella, varicella, influenza (for children younger than 9 years), and Japanese encephalitis. In high-risk areas for hepatitis A, such as the aboriginal regions of Taiwan as well as Kinmen Island and Matsu Island, children receive an additional free dose of the hepatitis A vaccine.

Thanks to new biotechnologies, new (self-paid) vaccines have been developed, including diphtheria, tetanus, acellular pertussis (DTaP) and inactivated polio vaccine (IPV) (DTaP-IPV), DTaP-HepB-*Hemophilus influenzae* type B (Hib)-IPV, pneumococcal polysaccharide 23-valent, 7-valent pneumococcal conjugate, hepatitis A, human papillomavirus (HPV), varicella, influenza, and oral rotavirus vaccine. The National Vaccine Fund was established in 2008, and its target is to provide free-of-charge vaccines to children younger than 5 years and who are at high risk for pneumococcal infection in 2009, DTaP-Hib-IPV vaccines for children younger than 2 years in 2010, and seven-valent pneumococcal conjugate vaccines for all children in 2012. The fund addresses the challenge of extra expenses for the new vaccines for those who are disadvantaged.

Although most parents know about obligatory vaccines, information regarding parents' views about new vaccines is scarce. The aim of our study was to identify parents' views about new vaccines and the current childhood immunization program.

## 2. Methods

From 2006 to 2008, using a randomized, anonymous, and voluntary questionnaire, we conducted a descriptive and demographic study designed to identify the parents' views about the childhood immunization program in Taiwan. The questionnaire was evaluated by six pediatric specialists to check the validity of the items. The content validity index was 90%. Data were collected from 535 parents of children aged 0–14 years old, who went to our pediatric outpatient department, and the completed questionnaires were collected immediately and data were coded and entered

into SPSS for statistical analysis (SPSS Inc., Chicago, IL, USA).

The DTaP-Hib-IPV vaccine was self-paid before March 2010, and influenza vaccine was self-paid for children between 3 and 6 years old and older than 9 years during the study period.<sup>4</sup>

The questionnaire included the following questions to assess parents' attitudes toward immunization: (1) Which factor was the most important for selecting a vaccine?; (2) Why did you choose a new "self-paid" vaccine?; and (3) How could the National Health Insurance program be improved?

The questionnaire included two multiple-choice statements to assess the awareness of parents about vaccines: one about asking if the parents have ever heard about self-paid vaccines, such as DTaP-IPV, DTaP-Hib-IPV, DTaP-HepB-Hib-IPV pneumococcal polysaccharide, seven-valent pneumococcal conjugate vaccine, hepatitis A, the HPV, varicella (for children born after 2003), influenza, and oral rotavirus vaccine, another question about the side effects of the new vaccines, and used nonmultiple choice questions to learn what sources the parents used to learn about the new vaccines as well.

Finally, we asked this Yes/No question: Did you know you have to bring the health check handbook every time your child is vaccinated?

### 2.1. Statistical Analysis

We used descriptive statistical analysis (number and percentage) to display the characteristics of parental awareness and attitudes. All analyses were performed using the SPSS for Windows version 12.0.

## 3. Results

There were 539 parents who were approached for this study, and 535 (98.6%) questionnaires were completed and returned. The study population was mainly composed of married couples living in an urban environment. Demographic characteristics of the parents who responded to the questionnaire are summarized in Table 1. With regard to educational attainment, 91% of paternal education and 92% of maternal education were educated  $\geq$  12 years (high school or higher). Income analysis revealed that 59% of paternal income and 46% of maternal income were between US\$7200 and US\$18,000 per year. The principal caregivers of the child were usually the mother (42.0%), both parents (41.1%), and the grandparents (10.3%).

Table 2 summarizes the parental attitudes expressed toward vaccination. Many parents (45.5%) preferred free immunizations. Most parents (62.7%) believed that the new (self-paid) vaccines provided more protection, whereas 48.1% of parents polled deemed them too expensive. Nevertheless, 42.1% thought the fewer injections required by combination vaccines would be less stressful for the child. The most popular reasons given by respondents for preferring the new vaccines were greater protection (73.1%), fewer serious side effects (36.0%), and the recommendations of health care professionals (39.3%).

Table 3 shows parents' awareness about the immunizations. The side effects of new vaccines of most concern

**Table 1** Demographics of parents who responded to our questionnaires

| Characteristics                       | n (%), (n = 535) |
|---------------------------------------|------------------|
| Paternal education (yr)               |                  |
| Less than high school                 | 25 (4.6)         |
| High school                           | 112 (20.9)       |
| University                            | 106 (19.8)       |
| Master and/or doctorate               | 31 (5.7)         |
| Maternal education (yr)               |                  |
| Less than high school                 | 20 (3.7)         |
| High school                           | 112 (20.9)       |
| University                            | 90 (16.8)        |
| Master and/or doctorate               | 18 (3.3)         |
| Paternal income per year (US dollars) |                  |
| Low, ≤\$7200                          | 12 (2.24)        |
| Middle, \$7200–\$18,000               | 159 (29.7)       |
| High, ≥\$18,000                       | 99 (18.5)        |
| Maternal income per year (US dollars) |                  |
| Low, ≤\$7200                          | 77 (14.39)       |
| Middle, \$7200–\$18,000               | 111 (20.7)       |
| High, ≥\$18,000                       | 52 (9.7)         |
| Principal guardian of the child       |                  |
| Both father and mother                | 220 (41.1)       |
| Mother                                | 225 (42.0)       |
| Grandparents                          | 55 (10.3)        |
| Father                                | 5 (0.9)          |
| Others                                | 30 (5.6)         |

**Table 2** Parental attitudes toward new vaccines

| Expressed attitudes   | n (%), (n = 535) |
|---|------------------|
| The current vaccination program is enough   |                  |
| Yes   | 37 (6.9)         |
| No  | 498 (92.1)       |
| Most important factor for the selection of a vaccine                                    |                  |
| Free charge vaccines  | 243 (45.5)       |
| Minimal side effects  | 192 (36.0)       |
| Self-paid   | 42 (7.9)         |
| Following others advice   | 22 (4.1)         |
| Grandparents' advice  | 10 (1.9)         |
| Opinions about the new vaccines   |                  |
| Provides more protection  | 335 (62.7)       |
| Too expensive   | 257 (48.1)       |
| Minimizes stress  | 225 (42.1)       |
| Too many types  | 212 (39.7)       |
| Has not heard about any new vaccines  | 51 (9.6)         |
| Recommendations for existing vaccination policy   |                  |
| New vaccines should be offered completely free-of-charge                                | 280 (52.4)       |
| Self-paid vaccine should be partially paid for by the National Health Insurance program | 250 (46.8)       |
| High-risk groups should be vaccinated for free  | 107 (20.0)       |
| The current self-paid immunization program is fine                                      | 7 (1.3)          |

**Table 3** Parental awareness about new vaccines and health check handbook

| Awareness   | n (%), (n = 535) |
|---|------------------|
| Side effects of vaccine   |                  |
| Fever   | 488 (91.4)       |
| Irritability  | 227 (42.5)       |
| Decreased appetite  | 137 (25.7)       |
| Erythema and edema  | 133 (24.9)       |
| Skin rashes   | 127 (23.8)       |
| Sleepy  | 95 (17.8)        |
| Did you know you are expected to bring the "health check handbook" every time you bring your child for vaccination? |                  |
| Yes   | 402 (75.3)       |
| On my doctor's advice   | 32 (6.0)         |
| Self-consciously  | 370 (69.3)       |
| No  | 133 (24.7)       |
| Forgotten   | 51 (9.6)         |
| Missing or Lost   | 1 (0.2)          |
| National Health Insurance program card  | 73 (13.7)        |

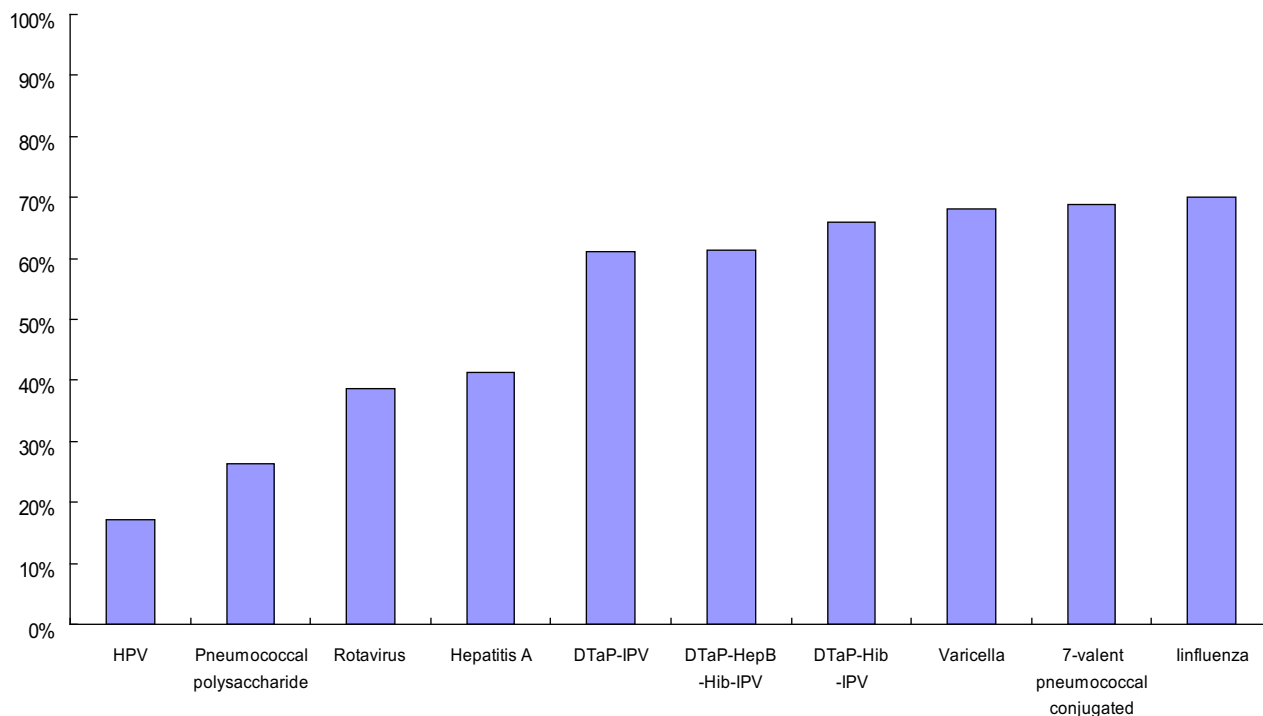
were fever (91.4%) and irritability (42.5%). Three-quarters (75.3%) always brought their health check handbook when visiting the outpatient clinic with their child, and 6.0% of the parents did so based on their physician's advice. For those who did not bring the book with them, 9.6% always forgot to bring it and 13.7% believed that having the health insurance card on hand was sufficient for recording their visits to the clinic for vaccination.

We analyzed the questions that identified the awareness of parents about the new vaccines—41% of them knew about the vaccine for hepatitis A, 38% were familiar with the rotavirus vaccine, and 26% recognized the streptococcus polysaccharide vaccine; on the other hand, 87% parents had never heard of the HPV vaccine (Figure 1).

Overall, 56% of respondents learned about childhood vaccinations from pamphlets provided by the health care provider, 49% from physicians and nurses, 40% from newspaper or magazines, and 11% from their own searches on the Internet (Figure 2).

#### 4. Discussion

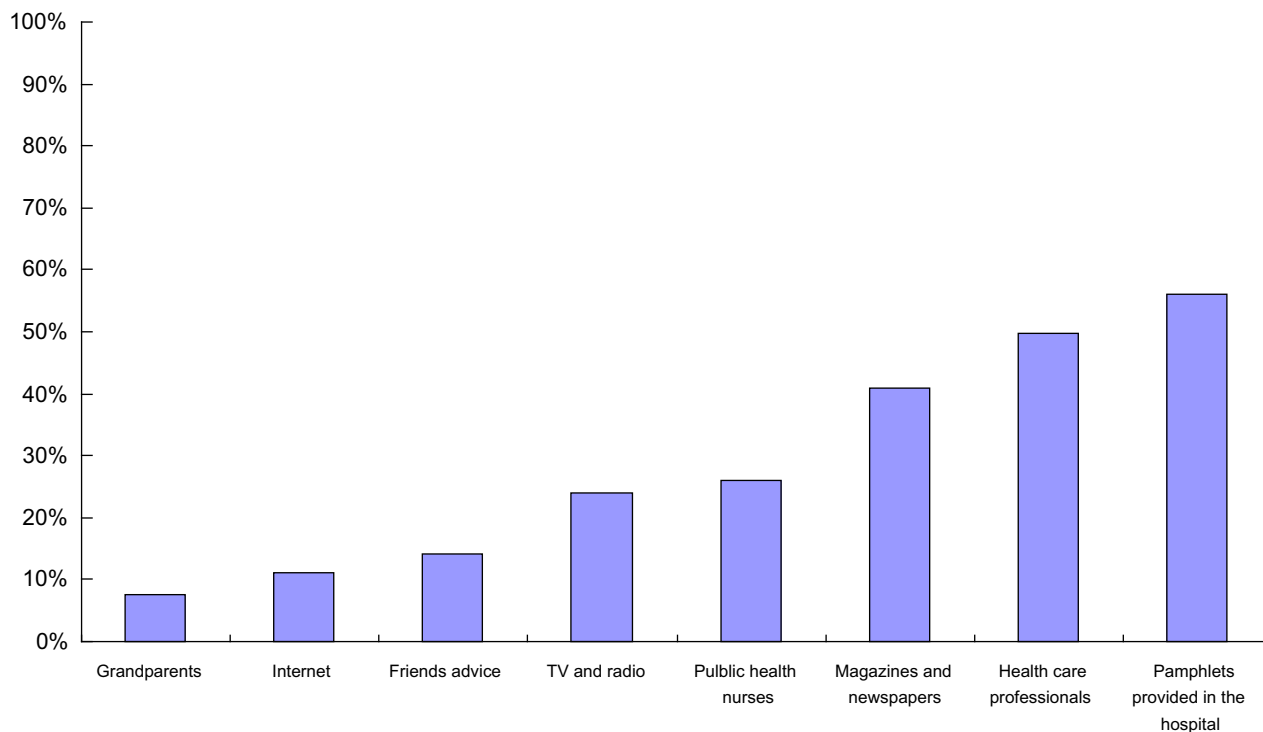
It is widely accepted that childhood immunization programs have played a great part in the prevention of many diseases; hence, vaccination coverage is an indirect way to assess child health care from the point of view of public health. Naturally, parents' awareness about vaccines plays significant roles in the vaccination rate. Several studies have reported that a failure to complete immunization was associated with poverty, lack of insurance, inconvenient transportation systems, inappropriate clinic hours, long office waits, the cost of vaccines, and the lack of knowledge of the parents.<sup>5–7</sup> In this series, we demonstrated parents' insufficient information about new vaccine and the negative effect of high cost on their behavior with respect to vaccination. To promote pediatric immunization coverage in Taiwan, these two factors must be improved.



**Figure 1** Parental awareness of the new vaccines. DTaP-HepB-Hib-IPV = diphtheria, tetanus, acellular pertussis-hepatitis B-*Hemophilus influenzae* type B-inactivated polio vaccine; DTaP-Hib-IPV = diphtheria, tetanus, acellular pertussis-*Hemophilus influenzae* type B-inactivated polio vaccine; DTaP-IPV = diphtheria, tetanus, acellular pertussis-inactivated polio vaccine; HPV = human papillomavirus.

Our study confirmed that mothers are the principal guardians of the children. Luman et al<sup>8</sup> have shown that mothers with multiple children and little education have the highest risk of having undervaccinated children. In this

series, most mothers were well educated, up to the degree of high school or higher. However, they still had little knowledge about some new vaccines, especially HPV vaccine. The insufficient awareness of parents about new



**Figure 2** Parents' source of information about new vaccines.

vaccines may result in undervaccination of their children. Therefore, special care should be taken to reach out to all mothers, increase their awareness, and encourage them to vaccinate their children.

In this series, fever was the most concerned side effect of new vaccines. Traditionally, childhood fever is a nightmare for most parents and is the main reason for visits to the Pediatric Emergency Room in Taiwan. Actually, the new vaccines minimize the side effects, including fever. Most fever related to vaccination is transient and does not result in systemic effect. If the parents are well educated about the side effects of new vaccine, they may have less anxiety about side effects and be desirous to bring their children for vaccination.

In this series, most parents did not think the current vaccinations are enough in Taiwan. Although the free DTaP-Hib-IPV vaccine has been widely available since March 2010, more new vaccines should be included in the current immunization program to meet the expectation of most parents or at least make more available as a self-paid option.

To improve childhood immunization coverage, attention should be drawn to the health check handbook, which includes a vaccination schedule inside and future vaccination dates written on the card. We noticed that 13% of parents in our survey failed to bring along the handbook on their child's visits to the clinic, apparently because they thought that the National Health Insurance card provided all the information needed about their child's vaccination. Therefore, it is important to highlight the contents of the handbook and feature it in educational programs that promote pediatric immunization.

Our study showed that pamphlets (56%) and health care workers (49%) were the main sources of information about vaccines, followed by the mass media (40%). Other previous studies demonstrated that parental satisfaction with their children's vaccinations was proportionally related to their physician's communication skills (including listening and answering all questions).<sup>9–11</sup> Parental misconceptions may lead to undervaccination.<sup>12,13</sup> Take the case of the influenza vaccine as an example, the parents did not want to bring their children for vaccination because they believed there were alleged links connecting thimerosal-containing vaccines to autism in children. Parker et al<sup>14</sup> reported there was no link between thimerosal-containing vaccines and autism after a critical review of published original data. In Taiwan, there were also misconceptions of mortality related to the H1N1 vaccine. After a detailed investigation, the Center for Disease control, Taiwan, Republic of China announced correctly that mortality had been proved unrelated to the H1N1 influenza vaccine.<sup>15</sup> Health care providers are the ideal persons to correct these misconceptions and can dedicate sufficient time to discuss vaccine safety with worried parents.<sup>13</sup> Higher vaccination coverage is associated with greater knowledge of vaccination.<sup>12</sup> Therefore, having well-trained health care professionals

has been one of the cornerstones for implementing a successful childhood immunization program in Taiwan.

Several limitations need to be specified in this series. This was a single-center investigation without a large number of patients. The questionnaire may partially show the relationship between childhood immunization and parents' view. Therefore, a multicenter study with large cohorts is suggested.

In conclusion, we found the awareness of parents about new vaccines to be insufficient. They also considered the vaccines to be expensive.

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