

ORIGINAL ARTICLE

Pediatricians' Role in Caring for Preschool Children in Taiwan Under the National Health Insurance Program

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Background/Purpose: The National Health Insurance (NHI) covers more than 98% of the 22 million people in Taiwan. Referral is not mandated, therefore, competition among specialties exists in caring for preschool children. The aim of this study was to analyze the utility of outpatient services among preschool children to investigate the pediatricians' role in their care. We also analyzed how the density of specialists induces demand by using the NHI database.

Methods: We used the systematic sampling file, CD20040, from the bureau of NHI, Taiwan, as the data source for our analysis. We linked the file to the registries for medical personnel and the board-certified specialists to analyze the specialty distribution. We also linked to the registry for contracted medical facilities to analyze the distribution in different levels of hospitals.

Results: In total, 56,144 outpatient visits for preschool children were analyzed. Among these, 59.1% of outpatient services for preschool children were provided by pediatric specialists, 20.7% by otolaryngologists, 13.5% by family medicine specialists, and the other 6.7% by general practitioners. Most of the visits occurred in a primary care setting (84.1%). As children grew older, a significant decline in the pediatric specialists' visit rate and an increase in the otolaryngologists' visit rate were observed in the primary care setting. Young children visited pediatric specialists more frequently. The pediatric specialists' visit rate was higher in the northern urban areas. It was also significantly correlated with the density of pediatricians.

Conclusion: Otolaryngologists compete with pediatricians in the primary care of preschool children in Taiwan. The proportion of visits to pediatric specialists was correlated significantly with the density of pediatricians in different counties. The NHI should modify its policy to make the medical system more equitable. [*J Formos Med Assoc* 2009;108(11):849–855]

Key Words: health manpower, medical specialties, preschool children

The National Health Insurance (NHI) has been an important social welfare program in Taiwan since 1995. It is a compulsory program and covers more than 98% of the 22 million people in Taiwan.¹

Under the NHI of Taiwan, patients can choose their physicians, and referral is not mandated. It is basically a fee-for-service system.² As a result,

physicians of every specialty can receive reimbursement by providing outpatient visits for pediatric patients. Furthermore, because upper respiratory infection is the most commonly encountered condition in the outpatient service in Taiwan,³ there is significant competition among pediatricians, otolaryngologists and general practitioners,

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especially in primary care settings. Preschool children need not only medicine, but also comprehensive care, including evaluation of growth and development,⁴ provision of health education,⁵ identification of those with special health care needs, and provision of long-term continuous care.^{6,7} Therefore, well-trained pediatricians are the most suitable personnel to provide comprehensive care. However, under Taiwan's NHI policy, the provider is not encouraged to offer such care and the consumer is not induced to seek it.

Under the NHI of Taiwan, the utility of outpatient care for preschool children has never been approached. The utility of primary care can also be influenced by accessibility.⁸ However, whether the utility is different between urban and rural areas in Taiwan has never been analyzed. The aim of the present study was to investigate by using the NHI database whether pediatricians take a major role in providing primary care for preschool children, and how their density induces demand under the NHI of Taiwan.

Patients and Methods

This was a cross-sectional study. The data source was the systematic sampling file, CD20040, which was released officially from the Bureau of NHI (BNHI) of Taiwan for academic use. According to the BNHI, the systematic sampling method was applied to sample randomly a representative subset of the entire database of outpatient visits in 2004. The size of the subset from each month was determined by the ratio of the amount of data in each month to that of the entire year. The systematic sampling was performed for each month to choose randomly a representative subset. This sampling database was obtained by combining the subsets from 12 months. The sampling database of CD20040 was 0.2% of the entire database. Each data unit represents an outpatient visit.

We linked CD20040 to the registry for medical personnel and the supplementary registry for board-certified specialists (DOC) to analyze the specialty distribution for outpatient visits. We also

linked the data to the registry for contracted medical facilities (HOSB) to analyze the distribution in different levels of hospitals. We limited our analysis to patients aged ≤ 6 years. The level of medical service was determined by the HOSB file for 2004. The population statistics were obtained from the website of the Ministry of the Interior (MOI), Taiwan. The analysis unit was the number of visits.

SAS version 9.0 was applied for data retrieval. SPSS version 12.0 (SPSS Inc., Chicago, IL, USA) was used for data analysis. The Pearson correlation coefficient was used to analyze the supply of the specialists and the use of supplies. A p value less than 0.05 was defined as statistically significant.

Results

In total, the data for 561,772 outpatient visits were retrieved from the sampling file (CD20040). After the exclusion of data for patients > 6 years old, a total of 69,839 outpatient visits remained in the data set. We further excluded specialties other than pediatrics, otolaryngology, family medicine, and general practice because physicians specializing in other fields of medicine are seldom involved in providing primary care in Taiwan. After all the exclusions, the data for 56,144 outpatient visits were included for analysis.

Number of outpatient visits by preschool children to primary care providers, specialists, and different hospital levels

The sampling rate was 0.2%, which means that there were 28,072,000 outpatient visits by preschool children annually to physicians in the four specialties. According to the data from the MOI, the population of preschool children was about 1.24 million in 2004. This means that each preschool child in Taiwan had an average of 19 visits annually. Fifty-nine percent of the preschool children's outpatient visits were to see pediatric specialists. Twenty percent of those patients visited otolaryngologists. About 13% visited family medicine specialists (Table 1). We further analyzed the

number of outpatient visits according to the different specialties among different levels of medical services. Most of the outpatient services (84.1%) were provided in primary care settings, and most

of these primary care settings were private clinics. Only about half of the preschool children (54%) visited pediatric specialists in primary care settings compared with 60–75% who visited different levels of hospitals. An interesting coincidence is the significant growth in the proportion of visits that were made to otolaryngologists in primary care settings (Table 2). If we look at the impact of age, it is clear that children aged < 1 year were those who most frequently saw pediatric specialists (72%). However, the proportion of visits to pediatricians declined as children grew older, especially among children aged 5–6 years (51%). In contrast, the percentage of children who visited otolaryngologists increased from 12% among infants < 1 year old to 25% among children aged 5–6 years (Figure 1).

Table 1. Number of outpatient visits of children aged 0–6 years to specialists in different fields*

Specialists	n
PED	33,203 (59.1)
ENT	11,601 (20.7)
FM	7559 (13.5)
GP	3781 (6.7)
Total	56,144 (100)

*Data presented as n (%). PED = pediatricians; ENT = otolaryngologists; FM = family medicine practitioners; GP = general practitioners.

Table 2. Number of outpatient visits of children aged 0–6 years to specialists in different fields among different levels of medical services*

	PED	ENT	FM	GP	Total
Medical centers	2202	150	15	254	2621 (4.7)
Regional hospitals	2776	178	93	243	3290 (5.9)
Community teaching hospitals	998	36	24	26	1084 (1.9)
Community hospitals	1578	86	159	73	1896 (3.4)
Primary care clinics	25,578	11,142	7233	3118	47,071 (84.1)
Total	33,132	11,592	7524	3714	55,962 (100)

*Data presented as n or n (%). PED = pediatricians; ENT = otolaryngologists; FM = family medicine practitioners; GP = general practitioners.

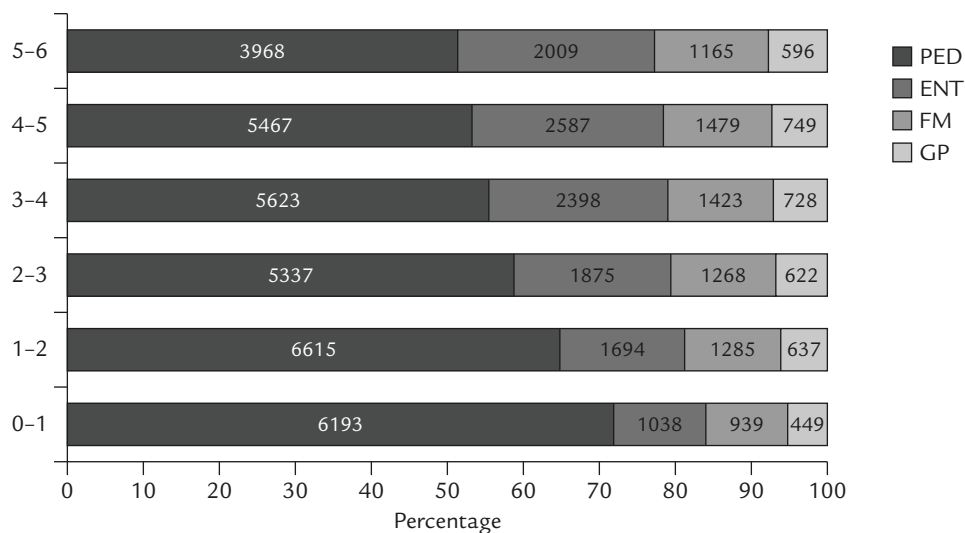


Figure 1. Distribution of outpatient visits to different specialists among preschool children by age.

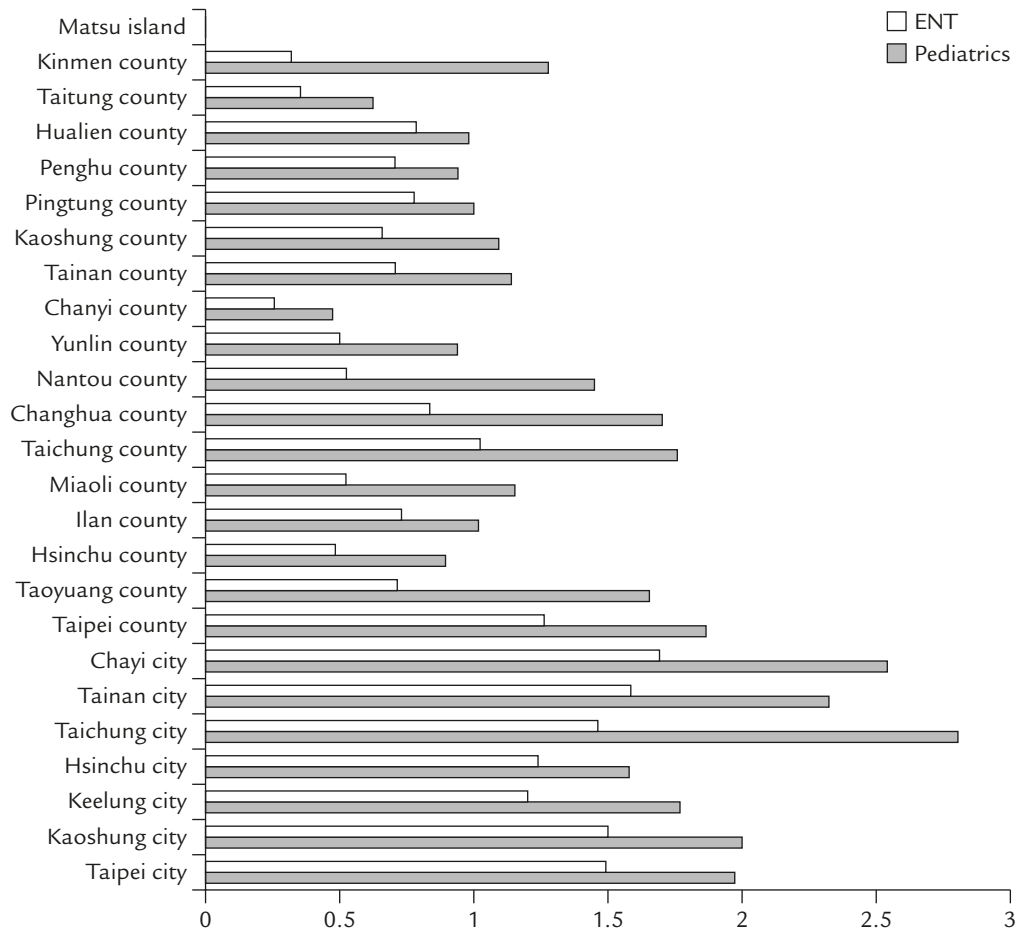


Figure 2. Density of specialists per 1000 preschool children in primary care settings.

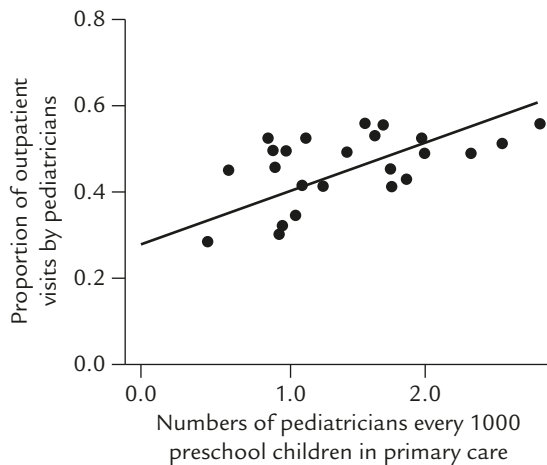


Figure 3. Correlations among the distribution of pediatricians' and pediatric specialists' visit rates in primary care settings.

Correlations between density of specialists and their visit rate

The number of pediatricians and otolaryngologists for every 1000 preschool children in different

counties was calculated according to the population data from the MOI (Figure 2). Generally speaking, the density of pediatricians and otolaryngologists was higher in the northern urban counties or major cities in Taiwan. In contrast, the density was lower in the rural counties and the offshore islands. In fact, there were no pediatric specialists on the offshore islands. We further analyzed the correlation between the density of specialists and their visit rate and found a positive and significant correlation. The correlation coefficient was 0.64 ($p=0.01$) (Figure 3).

Discussion

We found that about half of the outpatient visits by preschool children were to see pediatric specialists. The proportion was lower in primary care settings compared with that in community

hospitals, regional hospitals, and medical centers. We also found that there was competition between otolaryngologists and pediatricians in the primary care settings. The proportion of visits to pediatricians declined as children grew older because the visits to otolaryngologists increased. We also found that the proportion was correlated significantly with the density of pediatric specialists at the primary care level in different counties.

It is still somewhat controversial as to whether school-age children, adolescents and young adults should be cared for by pediatricians, family practitioners, or internists. However, it is seldom doubted that pediatricians are the most suitable personnel for caring for preschool children. Furthermore, preschool children are the main source of outpatient visits of pediatricians in primary care settings in Taiwan. Therefore, we included only children aged ≤ 6 years.

In total, about 19.6% of the outpatient visits were excluded. These visits were held by doctors in many different specialties. Among these, 6.2% were held by internists, 3.2% by surgeons, and 2.6% by ophthalmologists. We excluded these because we thought these visits belonged to special needs and we wanted to reflect the real competition in primary care provision. Outpatient visits by traditional Chinese medicine practitioners is sampled in another systemic sampling file, therefore, we did not include these data.

In Taiwan, there is open competition for medical services. Patients can choose their own physicians, and referral is not mandated within the NHI system. As a result, otolaryngologists and pediatricians have equal opportunities to provide primary care for preschool children. However, reimbursement for services is not the same because otolaryngologists can receive extra payment by providing local treatment, especially for children with the common cold. Thus, NHI involves many otolaryngologists who take care of preschool children mutually with pediatricians. Furthermore, to receive greater reimbursement from NHI, some otolaryngologists compete with pediatricians in providing primary care for preschool children,

e.g. mainly in private clinics. Pediatricians are well trained to treat common childhood diseases and to administer pediatric dosages of medication. They can provide comprehensive care of preschool children, such as performing a general physical checkup, evaluating growth and developmental milestones, and providing well-baby care and breastfeeding education. Nevertheless, otolaryngologists receive higher reimbursement from the NHI than do pediatricians, by providing local treatment. We have done another analysis to determine if the pediatricians' visit rate were affected by an increase in the density of otolaryngologists. As the number of otolaryngologists increased, the visits made to pediatricians also increased. The main reason was that the densities of otolaryngologists and pediatricians were highly correlated with each other ($r=0.90$, $p<0.001$). Both of the specialist groups like to practice in crowded urban areas, and this reflects very strong competition between them. Figure 3 shows that outpatient visits made to pediatricians increased as the density of pediatricians increased. This can have policy implications. If policy makers want to increase the visits made to pediatricians, they should encourage more pediatricians to practice in areas in which they are relatively lacking in number.

In Taiwan, most parents prefer to have pediatricians treat their young children and infants. However, as their children grow older, many parents seek the advice of otolaryngologists. The decline in the proportion of visits to pediatric specialists was caused mainly by the significant increase in visits to otolaryngologists. The reason might be that children acquire upper respiratory infections more frequently when they begin to attend kindergarten. Parents in Taiwan often ask doctors to perform local treatment for children with upper respiratory infection, and prefer to have physicians other than pediatricians treat their children. To the best of our knowledge, this phenomenon only occurs in Taiwan. The trend among different age groups is illustrated in Figure 1. In rural counties, because of the shortage of qualified medical professionals, the proportion

of visits to pediatric specialists was low in comparison with that in urban counties.

In 1994, the Institute of Medicine⁹ defined the attributes of primary care as “the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and the community”.¹⁰ Primary care is usually considered as providing first contact care, continuity, longitudinality, coordination, and comprehensiveness.⁷ On the basis of these provisions, pediatric specialists are the most qualified medical professionals to provide primary care for preschool children. In this study, we attempted to analyze the accessible first contact care within the NHI system of Taiwan. In the primary care setting, there is an approximately 2:1 ratio of pediatricians to otolaryngologists in providing primary care for preschool children (Table 2). Such a high referral rate would be impossible. In fact, patient referrals between private clinics are very rare in Taiwan, and there were a disproportionate number of visits made to otolaryngologists. Although the optimal visit rate for specialists still needs further investigation, we believe the pediatric specialists’ visit rate for preschool children is less than optimal. The NHI reimbursement system determines the provision of medical service in Taiwan.¹¹ Therefore, we suggest that the BNHI modify this system to help increase the pediatric specialists’ visit rate.

There are some limitations to our study. First, Taiwan is a relatively small island, and therefore, patients can go conveniently to neighboring counties to seek medical services. This is a study limitation when using the NHI database as a resource to analyze regional data. Nevertheless, we believe parents usually seek primary care in the areas in which they live and that the analysis of primary care was reliable. Second, this was a quantitative study. We could not obtain individual data because of the confidentiality policy of the BNHI. Therefore, there was a possibility of ecological fallacy. Further studies using an individual

approach might be needed. Third, this was a cross-sectional study from a systemic sampling file. The sampling rate was 0.2%. An outpatient visit was a record. The sampling was not done by patients’ identification numbers. Therefore, it was not possible to analyze crossover visits using this dataset. Fourth, upper respiratory tract infection is the most common diagnosis in the primary care setting among visits made to preschool children. It would have been more accurate to investigate whether there were differences between different diagnoses. However, we do not think the coding of ICD-9 (International Statistical Classification of Diseases and Related Health Problems) is sufficiently reliable to make such an analysis. Many doctors use other diagnostic codes such as sinusitis, tonsillitis, and acute otitis media to avoid auditing by the BNHI for overuse of antibiotics. We would like to present a whole picture of preschool children’s outpatient visits instead of those for individual diseases. Fifth, a physician can have several specialties in the DOC file. However, according to the rules of the BNHI, physicians can choose only one specialty to claim reimbursement. Therefore, change of specialty is rare in the DOC file. In fact, 3676 of 28,947 registered physicians changed specialty in 2004. Only 898 physicians that belonged to the four specialties in which we were interested changed their registration during 2004. For our analysis, we adopted the first column in the DOC file as the physicians’ specialty. We do not believe that this has distorted our analysis.

In summary, otolaryngologists compete with pediatricians in the primary care of young children in Taiwan. All children should be cared for by well-trained medical professionals. The proportion of visits made to pediatric specialists is correlated significantly with the accessibility of pediatricians in different counties. We suggest that the NHI modify its policy to help increase the visit rate to pediatric specialists and thus help ensure a more equitable system. The Taiwan Pediatric Association should also encourage young physicians to practice in areas with limited access to pediatricians.

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