Trends and distribution patterns of obstetricians, gynecologists, and pediatricians in Japan: a retrospective cohort study from 1974 to 2004

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Abstract
[Background] The shortage of obstetricians and gynecologists (OB/GYNs) and pediatricians (PEDs) is a serious social problem in Japan. However, little is known about the trends and distribution patterns of OB/GYNs and PEDs.
[Methods] Descriptive statistics were calculated for all physicians, OB/GYNs, and PEDs in 1974, 1984, 1994, and 2004. Multivariate logistic regression analysis was performed to identify factors associated with specialty change among OB/GYNs and PEDs who graduated in 1970, 1980, and 1990. OB/GYNs who left the specialty of obstetrics and gynecology, and PEDs who practiced in the specialty of pediatrics were followed up over their lifetimes.
[Results] The total number of physicians increased by over two-fold during the study period. The actual number of OB/GYNs has remained stable, but the number of OB/GYNs per 1,000 newborn babies has increased by 50%. The number of PEDs has increased almost three-fold, and the number of PEDs per 10,000 children has increased four-fold. The percentage of female OB/GYNs and PEDs has also increased. OB/GYNs who graduated in 1980 (Odds ratio [OR], 0.8) and in 1990 (OR, 0.3) were less likely to change specialty than internists, while PEDs who graduated in 1970 (OR, 1.8) and 1980 (OR, 2.1) were more likely to change specialty. Over the thirty-year time frame, 28% of OB/GYNs left the department of obstetrics and gynecology, and 18% of PEDs left the department of pediatrics.
[Conclusions] This study reveals the different dynamics that occur in these specialties, but the increase in number of female physicians is consistent in the both specialties. Future studies are needed to clarify the motives of physicians to better understand reasons for moving departments.
Introduction

The latest report from the Organization for Economic Cooperation and Development (OECD) indicated that the number of physicians per 1,000 of population was 2.1 in Japan, ranking twenty-seventh of the 30 OECD countries (OECD, 2007). This number is not low, but Japanese people think the shortage of physicians is a serious social problem. In particular, a shortage of obstetricians and gynecologists (OB/GYNs) and pediatricians (PEDs) has been identified (Anonymous, 2007a; Anonymous 2007b), and the government recently decided that the number of enrollees to medical schools should be increased. (Ministry of Health, Labour, and Welfare of Japan, 2008)

In August 2007, in Nara, a western prefecture in Japan, a 36-year-old pregnant woman miscarried in an ambulance after she was transferred from hospital to hospital. Reportedly, emergency centers were unable to accept her owing to physician absence or a lack of available beds. (Anonymous, 2007c) Experts also say that the pediatric medical system in Japan is in danger of collapse owing to overwork of PEDs, excessive requirements of patients and their families, and poor social support. (Otake, 2001)

The Ministry of Health, Labour and Welfare (MHLW) conducts a Survey of Physicians, Dentists and Pharmacists (SPDP) every 2 years, and provides descriptive statistics of the Survey. However, little is known about the trends and distribution patterns of OB/GYNs and PEDs. To confirm the reality of this shortage, it is necessary to clarify how long the current OB/GYNs and PEDs have been in practice. In the present study, using this retrospective data, I analyzed the dynamic changes in numbers and distributions of OB/GYNs and PEDs.

Methods

Data acquisition:

For this survey, the electronic files of all physicians during the period 1972 to 2004 were provided by the MHLW. All physicians are obligated to respond to the survey, and the submission rate was approximately 90%. (Shimada and Kondo, 2004) The survey items include the year their medical licenses were obtained, physician registration number, date of birth, sex, address of workplace, department, and occupation. The data did not include any personal information from which an individual could be identified. Data cleaning was performed to complete the data collection, and a total of 4,024,916 responses (374,804 physicians) were obtained.
Descriptive Statistics:

The total number of physicians, the number of physicians per 100,000 people (general population), percentage of female physicians, and mean age in 1974, 1984, 1994, and 2004 were determined. The total numbers of OB/GYNs, number of OB/GYNs who withdrew in the last 10 years, number of OB/GYNs registered in the last 10 years, number of OB/GYNs per 1,000 births, percentage of female OB/GYNs, and average age in 1974, 1984, 1994, and 2004 were calculated. The total number of PEDs, number of PEDs who withdrew in the last 10 years, number of PEDs registered in the last 10 years, number of PEDs per 10,000 children aged less than 15 years, percentage of female PEDs, and mean age of PEDs in 1974, 1984, 1994, and 2004 were also determined. The population and the number of births for each of the years were obtained from the Population Estimate and the Vital Statistics.

Evaluation of the factors of specialty changes:

For each Class of 1970, 1980, and 1990, multivariate logistic regression analysis was performed to identify factors associated with specialty change. The independent variables were sex, age at first registration, specialty at their fifth year of experience, working area at their fifth year of experience, and working facility at their fifth year of experience.

Follow-up investigation:

A group of physicians who graduated in 1970 and were registered after initial training was defined as the Class of 1970. In the same way, the groups of physicians who graduated every two years from 1972 and 1996 were defined as the Class of 1972 to the Class of 1996, respectively. For each group, OB/GYNs who left the specialty of obstetrics and gynecology, and PEDs who left the specialty of pediatrics were followed up during their lifetime.

Statistical analysis:

T-tests were used to compare the average values between two groups, and chi square tests were used to compare rates between two groups. The log rank test was used to compare the differences in withdrawal rates. All statistical analyses were performed using the statistical software package SPSS version 13.0 (SPSS, Chicago, USA). A P value less than 0.05 was considered statistically significant.
Results

The total number of physicians increased over two-fold during the study period. The number of OB/GYNs has been stable, but the number of OB/GYNs per 1,000 newborn babies increased by 50% (6.4 in 1974 to 10.9 in 2004). The number of PEDs increased almost three-fold and the number of PEDs per 10,000 children increased nearly four-fold (1.9 in 1974 to 7.4 in 2004). The number of OB/GYNs registered in the last ten years decreased continuously, and the number of OB/GYNs who withdrew in the last 10 years to those registered in the last 10 years reversed after 1994. On the other hand, even in 2004, the number of PEDs registered in the last 10 years had decreased from 1994, while the number of PEDs registered in the last 10 years exceeded the number of PEDs withdrew in the last 10 years in the whole study period. The average age of OB/GYNs was significantly higher than that for the total group of physicians (P<0.01). The percentages of female OB/GYNs and PEDs increased in the past 30 years, and were higher compared with that of all physicians in 2004 (P<0.01)(Table 1).

Multivariate logistic regression analysis showed that OB/GYNs in the Classes of 1980 (odds ratio [OR], 0.8) and 1990 (OR, 0.3) were less likely to change their specialty than internists, while PEDs in the Classes of 1970 (OR, 1.8) and 1980 (OR, 2.1) were more likely to change the specialty (Table 2).

With 30 years of experience since physicians had finished their initial training, 28% of OB/GYNs in the Class of 1970 moved the department of obstetrics and gynecology, and 18% of PEDs of the same Class left the department of pediatrics. Compared with the Class of 1980, the withdrawal rates were significantly different in the Class of 1990 for OB/GYNs, and in the Classes of 1990, 1992, and 1994 for PEDs (Table 3 and Figure 1 for OB/GYNs; Table 4 and Figure 2 for PEDs).

Discussion

In Japan, there is experiencing a severe shortage of both OB/GYNs and PEDs. This study revealed the different dynamics that have occurred in these specialties over the past 30 years. Nevertheless, an increase in proportion of female physicians was observed in both specialties.

Obstetricians and gynecologists:

This study highlighted the following regarding the dynamics of OB/GYNs over the
past 30 years: (i) the actual number of OB/GYNs remained almost unchanged, (ii) the number of newly registered OB/GYNs is declining, and the average age of OB/GYNs has increased; (iii) OB/GYNs were less likely to leave this specialty compared with internists.

Social conditions are thought to be reasons for the decreasing number of younger OB/GYNs. The working conditions of OB/GYNs involved in childbirth are thought to be harsher now than in years past. It has been shown that perinatal mortality and maternal mortality in Japan are among the lowest in the world. (World Health Organization, 2006) However, there has been a trend towards later marriage in Japan, which has resulted in increased childbearing at older ages and complicated pregnancies. Therefore, although the number of births is decreasing, the workload of OB/GYNs for each pregnancy and childbirth is increasing. There has been an increase in the number of OB/GYNs in private practice, who have withdrawn from child delivery, and have been exclusively involved in outpatient maternity treatment. (Ministry of Health, Labour, and Welfare, 2005)

According to a statistical report from the Supreme Court of Japan, the number of civil lawsuits regarding medical accidents continues to increase. In particular, the number of cases where OB/GYNs were sued for medical accidents is rising. [Supreme Court of Japan, 2006a; Supreme Court of Japan, 2006b] In addition, under Japanese law, these lawsuits are treated as criminal cases when serious medical malpractices are suspected.

Although these social conditions affect the trends in the practicing numbers of OB/GYNs, the withdrawal rates of OB/GYNs were stable across the different Classes. Presumably, their strong sense of mission and responsibility are driving forces for such hard work. In addition, their specialized skills, which take a long time to acquire, are another possible reason.

Pediatricians:

The results indicate the following: (i) the number of PEDs has gradually increased, (ii) PEDs were more likely to leave this specialty compared with internists, (ii) younger PEDs tend to leave pediatrics early, particularly in recent years.

The earlier leaving of younger PEDs may affect the working conditions of senior PEDs, who may then need to cover duties traditionally the responsibility of younger PEDs, including emergency services and night duties. As a result, senior PEDs may experience additional burdens by having to take on these routine duties.

The volume and content of pediatric care are continually increasing. Advances in medical technology have increased the number of diagnostic examinations and treatments available. Furthermore, the time spent obtaining informed consent has
increased. These circumstances place excess demand on pediatric care, and also contribute to increasing workload.

The Japanese Pediatric Society recently proposed centralizing pediatric hospitals. (Japan Pediatric Society, 2005) The number of PEDs per 10,000 children aged less than 15 years in Japan in 2004 was 1.8 times that in Britain in 2005. [Royal College of Pediatrics and Child Health, 2006] Thus, another problem in Japan is low efficiency related to the distribution of human resources. For the 130 million people in Japan, the number of hospitals with a pediatrics department is about 3,500 and the average number of pediatricians per hospital is 2.4. The percentage of hospitals with three pediatricians or less is about 63%. (Fujimura, 2007) If the distribution of human resources is changed, then the shortage of pediatricians will improve dramatically.

The roles of hospital and clinics should be well-defined. According to a survey conducted in 2005 by the Japanese Pediatric Association, 61% of a hospital pediatrician’s working time is devoted to primary care. (Fujimura, 2007) Moreover, the possibility that family physicians partly substitute for PEDs should be considered. In the United States, where family physicians are trained, family physicians account for 25% of primary care office visits for children younger than 15 years. (Goodman and the Committee on Pediatric Workforce, 2005) Internists receive pediatric training in primary care and can contribute towards the provision of pediatric care. (Lannon et al., 1999)

**Increase in female physicians:**

This study revealed an increasing number of female OB/GYNs and PED, which is favorable for patients. This is similar to findings in the United States, where the percentage of female pediatricians has increased by 9% between 1993 and 2000. (Cull et al., 2002)

However, this trend will affect the “actual” supply of workforce because many female physicians may have difficulty in continuing with and returning to work due to pregnancy, childcare problems or other reasons. In terms of increasing actual workforce supply, measures to improve the working conditions of female physicians are needed. For example, the opportunity to work part-time may be an effective option for female physicians on family leave. Of interest, in the United States, the percentage of part-time female pediatricians increased from 24% to 28% between 1993 and 2000. (Cull et al., 2002)
A need for further studies:

The present study does not clarify the reasons why younger PEDs decided to change their careers, and why OB/GYN remained in their positions. Future studies will need to evaluate the motives of physicians, which lead them to changing specialty. The biggest limitation of the SPDP is that it does not ask physicians to indicate why they change workplace, occupation, or specialty. In contrast, in the United States, the American Medical Association has the AMA Physician Master file. This registration system contains more detailed information than the SPDP. (American Medical Association) In addition to these tracking systems, policymakers need to know physicians’ motives and characteristics to better plan incentives. For instance, physicians origins (Matsumoto et al., 2008; Rabinowitz et al., 2000; Easterbrook et al., 1999), intentions (Rabinowitz et al. 2000), education (Rabinowitz et al. 2000; Easterbrook et al., 1999; Rabinowitz et al., 2001; Rabinowitz et al., 2005), and test scores (McManus et al., 2003) affect their career choices.

For OB/GYN, reports from the United States have revealed that OB/GYNs’ job satisfaction level was much lower than that of other specialists, (Leigh et al., 2002) and OB/GYNs who were not involved in childbirth had shorter working hours and greater job satisfaction. (Bettes et al., 2004) Improvements in working conditions and job satisfaction will affect not only current OB/GYNs, but also medical graduates and residents who may possibly specialize in OB/GYN.

Regarding the workforce of PEDs, a key problem in Japan is the low efficiency of the distribution of the workforce. Therefore, an estimate of the future workforce is required. Analyses of job satisfaction amongst PEDs is also necessary. (Shugerman et al., 2001; Shipman et al., 2004; Leigh et al., 2002)

Conclusions

Developments in human resources for health are critical to achieve the Millennium Development Goals. Over four million health workers are needed, and 57 countries have a severe shortage of health workers. (World Health Organization, 2006) In May 2008, the First Global Forum on Human Resources for Health was held in Kampala, Uganda. (The Global Health Workforce Alliance, 2008) The Global Health Workforce Alliance issued a strategic plan, and defined one of the core functions to be “mobilizing knowledge and learning”. (The Global Health Workforce Alliance, 2006) Therefore, researchers are expected to conduct more studies regarding this issue owing to a lack of reliable data. (Chopra et al., 2008) Although this study used data from Japan and focused on trends
of physicians in obstetrics and gynecology, and pediatrics from the view of the domestic requirement, similar concerns have been identified in many countries, and will likely affect other departments. I hope this study will contribute to improving health for all people.

Acknowledgment

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and average period of deliberation. www.courts.go.jp/saikosai/about/iinkai/izikankei/toukei_01.html (in Japanese)
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<td>Age (average±SD in years)</td>
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<td>42.2±13.6</td>
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*Aggregated number of newly registered physicians and physicians who moved from other specialties

NP, not provided
Table 2. Logistic regression analysis for specialty change in the Classes of 1970, 1980, and 1990

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<td>2.1 (2.0 – 2.2)*</td>
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Base category was internal medicine.

The regression analyses were adjusted for sex, age at first registration, specialty at their fifth year of experience, working area at their fifth year of experience, and working facility at their fifth year of experience.

R² for the analyses for the Classes of 1970, 1980, and 1990 were 0.24, 0.19, and 0.17, respectively.

*p<0.05
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*Significantly different compared with the Class of 1980 (p<0.05) based on the log rank test
### Table 4. Cumulative withdrawal rates of pediatricians every 5 years

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* Significantly different compared with the Class of 1980 (p<0.05) based on the log rank test
Figures

Figure 1. Cumulative withdrawal rates of obstetricians and gynecologists
Figure 2. Cumulative withdrawal rates of pediatricians