Table 1
Distribution of main areas of practice in the 1996 and 2006 surveys.

	2006 survey						1996 survey			
	Total			Female			Total		Female	
	Number	%	(1)	Number	%	(2)	Number	%	Number	%
Internal medicine specialties group										
Internal medicine	70,470	25.4	**	10,496	14.9	**	72,485	30.2	8968	12.4
Gastroenterology	10,762	3.9	**	1127	10.5	**	8274	3.4	684	8.3
Cardiology	9416	3.4	**	909	9.7	**	6705	2.8	538	8.0
Pulmonology	3966	1.4	**	620	15.6	**	2717	1.1	306	11.3
Neurology	3443	1.2	**	675	19.6	**	2648	1.1	422	15.9
Rheumatology	760	0.3	**	146	19.2	**	353	0.1	44	12.5
Psychosomatic internal medicine	841	0.3	**	160	19.0		279	0.1	46	16.5
Allergology	184	0.1	*	36	19.6		120	0.0	16	13.3
Surgical specialties group										
Surgery	21,574	7.8	**	974	4.5	**	24,855	10.3	591	2.4
Neurosurgery	6241	2.2	*	236	3.8	**	5629	2.3	148	2.6
Cardiovascular surgery	2585	0.9	**	104	4.0	**	2016	0.8	37	1.8
Plastic surgery	1909	0.7	**	421	22.1	**	1303	0.5	195	15.0
Chest surgery	1255	0.5	**	61	4.9	*	743	0.3	19	2.6
Pediatric surgery	661	0.2		108	16.3	**	553	0.2	58	10.5
Aesthetic plastic surgery	394	0.1	**	47	11.9	*	156	0.1	9	5.8
Others										
Orthopedics	18,870	6.8		672	3.6	**	16,391	6.8	425	2.6
Pediatrics	14,700	5.3	**	4576	31.1	**	7387	5.7	3870	28.2
Psychiatry	12,829	4.6	**	2391	18.6	**	10,666	4.4	1624	15.2
Ophthalmology	12,362	4.4	*	4556	36.9		10,957	4.6	3989	36.4
Obstetrics and gynecology	11,783	4.2	**	2761	23.4	**	12,389	5.2	1894	15.3
Otorhinolaryngology	8909	3.2	**	1666	18.7	**	8806	3.7	1459	16.6
Dermatology	7845	2.8		3071	39.1	**	6776	2.8	2137	31.5
Anesthesiology	6209	2.2	**	1834	29.5	**	5037	2.1	1203	23.9
Urology	6133	2.2		214	3.5	**	5161	2.1	98	1.9
Radiology	4883	1.8		938	19.2	**	4178	1.7	648	15.5
Residents	14,402	5.2		4739	32.9					
Other	8720	3.1	**	1411	16.2	**	5335	2.2	683	12.8
Unknown, not in clinical practice	15,821	5.7	**	2935	18.6	**	11,946	5.0	1853	15.5
Total	277,927	100.0		47,884	17.2	**	240,215	100.0	31,964	13.3

(1) 2 × 2 chi-square test for respective specialties/all other specialties × 1996/2006. (2) 2 × 2 chi-square test for male/female × 1996/2006.
* $p < 0.05$.
** $p < 0.01$.

these cohorts was investigated to determine when and how physicians in the internal medicine groups and surgical groups had migrated into different areas of practice over the course of their careers.

Chi-square tests were used to analyze whether the proportion of female or specialty distribution significantly changed between 1996 and 2006. For these analyses, we considered $p < 0.05$ to indicate statistically significant differences. SPSS 16.0J (SPSS Japan, Inc., Tokyo, Japan) was used for statistical analysis.

3. Results

3.1. Distribution of main area of practice in 1996 and 2006

The distributions of the main areas of practice in 1996 and 2006 are shown in Table 1. In the 2006 survey, the following main areas of practice were highly represented (shown as a percentage of the total number of physicians): general internal medicine (25.4%), surgery (7.8%), orthopedics (6.8%), pediatrics (5.3%), psychiatry (4.6%) and ophthalmology (4.4%). In the 1996 survey, internal medicine (30.2%), surgery (10.3%), orthopedics (8.6%), pediatrics (5.7%), obstetrics and gynecology (5.2%) and psychiatry (4.4%).

The areas of practice with over 30% of female physicians in 2006 were dermatology (39.1%), ophthalmology (36.9%), residents (32.9%) and pediatrics (31.1%). In 1996, they were ophthalmology (36.4%) and dermatology (31.5%). In terms of proportion of female in all physicians, we found significant increase over the study period (13.3–17.2% $p < 0.001$). Comparing the percentage of main area of practice in 1996 and 2006 revealed a significant decrease in the percentage in internal medicine (30.2–25.4%), surgery (10.3–7.8%), neurosurgery (2.3–2.2%), pediatrics (5.7–5.3%), ophthalmology (4.6–4.4%), obstetrics and gynecology (5.2–4.2%) and otorhinolaryngology (3.7–3.2%).

No data for "residents" in 1996 as it was only in 2004 that the 2-year postgraduate clinical training program became compulsory for all practicing physicians and so added resident as one of the area of practice in Physician Survey, in the 1996 survey data, medical residents indicated a department they were engaged in at the time of the survey.

Table 2
Distribution of main areas of practice as of 2006.

Years since registered as physician		Internal medicine	Internal subspecialties	Surgery	Surgical subspecialties	Orthopedics	Pediatrics	Psychiatry	Obstetrics and gynecology	Others	Residents	Unknown, not in clinical practice	Total
0–1 years	Number	193	31	44	14	12	22	24	10	169	13,851	81	14,451
	%	1.34	0.21	0.30	0.210	0.08	0.15	0.17	0.07	1.17	95.85	0.56	100.00
2–9 years	Number	9575	8747	4378	3662	4085	3335	3165	2229	13,637	543	1967	55,323
	%	17.3	15.8	7.9	6.6	7.4	61.0	5.7	4.0	24.6	1.0	3.6	100.0
10–19 years	Number	16,368	9499	6135	4342	5671	3344	3668	2763	16,858	6	3176	71,830
	%	22.8	13.2	8.5	6.0	7.9	4.7	5.1	3.8	23.5	0.0	4.4	100.0
20–29 years	Number	18,180	6647	4871	3281	4619	3857	2842	2623	12,925	1	3194	63,040
	%	28.8	10.5	7.7	5.2	7.3	6.1	4.5	4.2	20.5	0.0	5.1	100.0
30–39 years	Number	11,295	3020	3141	1365	2311	2311	1472	1868	5944	0	2305	35,182
	%	32.1	8.6	8.9	3.9	7.0	6.6	4.2	5.3	16.9	0.0	6.6	100.0
40–49 years	Number	7038	953	1770	304	1432	975	1040	1198	3214	0	2127	20,051
	%	35.1	4.8	8.8	1.5	7.1	4.9	5.2	6.0	16..0	0.0	10.6	100.0
Over 50 years	Number	7821	475	1235	77	590	856	618	1092	2314	1	2971	18,050
	%	43.3	2.6	6.8	0.4	3.3	4.7	3.4	6.0	12.8	0.0	16.5	100.0
Total	Number	70,470	29,372	21,574	13,045	18,870	14,700	12,829	11,783	55,061	14,402	15,821	277,927
	%	25.4	10.6	7.8	4.7	6.8	5.3	4.6	4.2	19.8	5.2	5.7	100.0

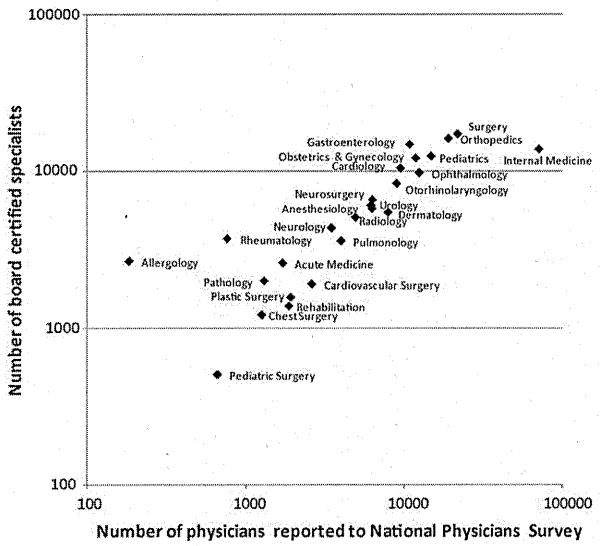


Fig. 1. Main areas of practice obtained from National Physician Survey and the number of board-certified specialists obtained from Japanese Board of Medical Specialties

3.2. Main area of practice and board-certified specialists

The scatter plot graphs revealed that data points for most of the specialized fields were located close to a 45-degree line. Exceptions were internal medicine, which fell below the 45-degree line, indicating that the number of physicians designating internal medicine as main area of practice exceeded the number of board-certified specialists, while allergology and rheumatology were located above the 45-degree line, indicating that the number of physicians designating "allergology" or "rheumatology" as their main area of practice were fewer than the number of board-certified specialists (Fig. 1).

3.3. Distribution of main area of practice by different year of experience groups in 2006

The main findings of the distribution of specialties is the younger generations engaging in internal medicine as their main area of practice gradually decreased, whereas the proportion engaged in internal medicine subspecialties and other specialties have steadily increased. This also indicates a general tendency for the younger generations of physicians to specialize, rather than working as generalists (Table 2).

3.4. Migration of main areas of practice in internal medicine and surgery groups at different career stages

Of the physicians who started their careers with internal medicine group as their main area of specialty in 1996 and registered as physician in the same year, 82.5% started their careers as physicians of internal medicine, gastroenterology; 5.4%, cardiology; 4.7%, neurology; 4.3%, pulmonology; 2.0%, other internal medicine; 0.6%. Some internal medicine physicians, however, differentiated to subspecialties of internal medicine subspecialties. A longitudinal analysis of the cohorts revealed that the 1996 registration cohort with between 0 and 10 years of experience since registration showed a decrease in the proportion of involvement in internal medicine to 43.6% in the first 4 years, and to 37.0% in 10 years. The proportions of those involved in all other internal subspecialties except neurology, however, were found to significantly increase over that period. We found that in 10 years of experience, a proportion of physicians migrated to other specialties than internal medicine group (1996 registration cohort; 13.5%, 1986 registration cohort; 5.4%, 1976 registration cohort; 4.3%, 1966 registration cohort; 5.2%, 1956 registration cohort; 4.9%) or no report (18.3%, 10.4%, 10.3%, 20.0%, 43.4%, respectively). Neurology is a main area of practice with stable proportion, whereas other internal medicine group steadily decreases their proportion in 10 years (Table 3)

In the cohort of physicians who started their career in surgical specialty groups in 1996 and registered in 1996, 67.9% of them started their careers in surgery, which was significantly decrease in 10 years to 37.6%. The proportion of physicians involved in cardiovascular surgery (4.5–6.6%) and chest surgery (1.7–4.4%) and aesthetic plastic surgery (0.1–0.7%) increased for those with 10 years of experience, indicating that they increasingly specialized within the field of surgery. In physicians with between 10 and 20 years of experience and those with between 20 and 30 years of experience (1986 cohort and 1976 cohort, respectively), the proportion involved in subspecialties, except for neurosurgery, was quite stable. Among physicians engaged in surgical specialties, we found that over 10 years 9.1–16.8% of surgeons moved away from surgery to internal medicine (Table 4).

4. Discussion

4.1. Physicians' tendency to shift toward specialization, and the role of general practice

Our results indicated that the proportion of physicians involved in internal medicine decreased from 30.2% in 1996 to 25.4% in 2006, and those younger physicians were less likely to choose internal medicine, choosing internal medicine subspecialties and other specialties instead. These findings indicate an increasing tendency toward specialization of Japanese physicians overall, with fewer physicians joining primary care-oriented specialties.

In Japan, neither "general practice", nor "family physician" is listed as areas of practice in the Government Order under Medical Law. So, the National Physicians Survey questionnaire did not list "general practice" or "family practice" as choices for the main area of practice. However, it is considered that a certain proportion of internal medicine physicians function as general practice and family medicine physicians. In Japan, especially in clinics, physicians provide medical services for which they have not received specific training [15]. By doing so, they effectively function as primary care physicians. In many countries, the right balance between specialist and generalist medical practitioners has been under discussion, and necessary measures have been undertaken [16]. This trend is contrary to the situation in the United States and

Table 3
Shift of main area of practice in 1996 after 10 years of practice (internal medicine group).

	Survey year						
	1996	1998	2000	2002	2004	2006	
1996 registration cohort (n = 2736) (0–10 years of experience during survey periods below)							
Internal medicine	82.5	55.1	43.6	40.8	38.8	37.0	**
Gastroenterology	5.4	8.2	9.6	9.6	10.0	10.3	**
Cardiology	4.7	10.3	11.9	11.1	10.8	11.1	**
Neurology	4.3	4.2	4.4	4.1	3.9	3.8	
Pulmonology	2.0	3.6	4.3	3.4	3.4	3.3	**
Other internal medicine	0.6	0.7	1.1	1.2	1.4	1.4	**
Surgeries	–	2.8	3.2	3.2	3.3	2.8	**
Others	–	8.3	8.9	9.6	9.2	10.7	**
No report	–	6.1	12.0	15.9	17.8	18.3	**
1986 registration cohort (n = 2499) (10–20 years of experience during survey periods below)							
Internal medicine	65.7	58.2	57.6	57.0	57.3	57.1	**
Gastroenterology	11.2	10.2	9.2	9.0	8.9	8.7	**
Cardiology	11.1	10.1	9.7	9.7	9.2	8.9	**
Neurology	4.0	3.6	3.3	3.6	3.4	3.0	
Pulmonology	5.3	4.2	3.8	3.4	3.7	4.0	*
Other internal medicine	1.4	1.2	1.3	1.1	1.5	1.3	
Surgeries	–	1.6	1.9	1.8	1.4	1.4	**
Others	–	2.6	3.4	3.6	4.0	4.0	**
No report	–	7.1	8.6	9.7	9.2	10.4	**
1976 registration cohort (n = 1625) (20–30 years of experience during survey periods below)							
Internal medicine	72.1	67.7	68.5	65.2	66.8	66.0	**
Gastroenterology	10.5	8.7	7.9	7.6	7.0	6.4	**
Cardiology	8.7	7.6	6.5	6.2	6.3	6.2	**
Neurology	2.8	2.5	2.0	2.4	2.7	2.6	
Pulmonology	3.7	3.3	2.8	3.0	3.0	2.6	
Other internal medicine	1.1	1.1	1.0	1.0	0.7	0.9	
Surgeries	–	1.8	1.8	1.7	1.3	1.8	**
Others	–	1.9	2.1	3.3	2.5	2.5	**
No report	–	4.4	6.3	8.7	9.1	10.3	**
1966 registration cohort (n = 1009) (30–40 years of experience during survey periods below)							
Internal medicine	81.8	74.7	72.4	69.9	66.9	65.7	**
Gastroenterology	9.5	7.5	7.1	6.3	6.3	4.6	**
Cardiology	4.2	3.3	3.3	2.5	2.3	2.3	*
Neurology	2.2	2.3	1.8	1.7	1.5	1.1	
Pulmonology	1.6	1.2	0.8	0.6	0.9	0.8	
Other internal medicine	0.4	0.3	0.3	0.5	0.4	0.2	
Surgeries	–	2.7	2.0	1.6	2.2	1.7	**
Others	–	2.2	3.4	3.6	3.6	3.5	**
No report	–	5.6	8.7	12.9	15.6	20.0	
1956 registration cohort (n = 1063) (40–50 years of experience during survey periods below)							
Internal medicine	87.9	74.9	69.9	60.4	53.2	46.4	**
Gastroenterology	6.5	5.0	4.0	3.4	3.2	2.8	**
Cardiology	2.8	2.3	1.6	1.6	1.3	1.1	**
Neurology	0.6	0.5	0.3	0.2	0.3	0.3	
Pulmonology	0.6	0.6	0.4	0.5	0.4	0.6	
Other internal medicine	0.8	0.9	0.8	0.8	0.7	0.3	
Surgeries	–	1.8	1.6	2.2	2.2	2.0	**
Others	–	2.9	3.5	2.3	3.5	2.9	**
No report	–	10.2	17.1	27.8	34.7	43.4	**

Other internal medicine includes: psychosomatic internal medicine, allergology, rheumatology.
* $p < .05$, 2 × 2 chi-square test respective specialties/other specialties × 1996/2006.
** $p < .01$, 2 × 2 chi-square test respective specialties/other specialties × 1996/2006.

Canada. One study indicated that the proportion of physicians involved in internal medicine in the United States increased from 16.0% in 1995 to 16.8% in 2007, the proportion engaged in family medicine increased from 8.2% to 8.9%, and the proportion involved in general practice decreased from 2.3% to 1.1%, [17]. In Canada, the proportion of physicians engaged in general internal medicine fell from 4.3% in 1996 to 3.9% in 2006, with a slight decrease in the proportion of family physicians (general practice and family medicine) from 52.0% to 51.2% [18].

The Japanese postgraduate medical education program has significantly changed over the last few years [19–21]. Under the old program, physicians received postgraduate medical training in a single department from the begin-

Table 4
Shift of main area of practice in 1996 after 10 years of practice (surgical group).

	Survey year						
	1996	1998	2000	2002	2004	2006	
1996 registration cohort (n = 1142) (0–10 years of experience as physician during survey period)							
Surgery	67.9	54.4	46.2	39.5	39.8	37.6	**
Neurosurgery	17.5	14.6	13.2	12.9	11.7	11.4	**
Plastic surgery	6.0	3.2	3.5	2.9	2.8	2.5	**
Cardiovascular surgery	4.5	5.4	6.7	6.8	6.8	6.6	*
Pediatric surgery	2.4	0.7	1.1	1.4	1.4	1.4	
Chest surgery	1.7	1.9	2.7	2.6	3.5	4.4	**
Aesthetic plastic surgery	0.1	0.0	0.1	0.4	0.4	0.7	*
Internal medicine	–	5.7	6.3	8.1	8.2	9.1	**
Others	–	8.3	9.1	9.2	10.2	12.4	**
No report	–	5.7	10.9	16.3	15.1	14.0	**
1986 registration cohort (n = 1175) (10–20 years of experience as physician during survey period)							
Surgery	63.2	53.2	50.3	47.1	43.6	40.0	**
Neurosurgery	19.4	17.4	17.2	15.7	15.5	15.1	**
Plastic surgery	4.9	3.7	3.7	3.7	3.5	3.6	
Cardiovascular surgery	7.7	7.1	6.0	6.6	6.2	6.0	
Pediatric surgery	1.3	1.2	0.9	1.2	1.4	1.1	
Chest surgery	3.1	3.2	3.2	3.3	3.6	3.3	
Aesthetic plastic surgery	0.3	0.4	0.3	0.3	0.6	0.4	
Internal medicine	–	4.2	8.2	10.9	13.7	16.3	**
Others	–	3.1	4.9	4.7	6.0	7.5	**
No report	–	6.5	5.2	6.6	6.0	6.6	**
1976 registration cohort (n = 655) (20–30 years of experience as physician during survey period)							
Surgery	69.8	60.9	57.1	54.4	52.7	49.0	**
Neurosurgery	16.8	16.3	15.3	14.2	13.9	12.8	*
Plastic surgery	3.7	3.4	3.7	3.4	3.7	3.4	
Cardiovascular surgery	5.2	4.7	4.6	4.1	3.7	3.5	
Pediatric surgery	1.1	1.2	0.9	0.8	1.1	0.6	
Chest surgery	2.9	1.8	2.3	1.8	2.0	1.8	
Aesthetic plastic surgery	0.6	0.8	0.3	0.3	0.2	0.0	**
Internal medicine	–	5.2	6.7	10.2	11.6	14.2	**
Others	–	2.7	3.1	3.8	3.8	6.3	**
No report	–	2.9	6.1	7.0	7.5	8.4	**
1966 registration cohort (n = 393) (30–40 years of experience as physician during survey period)							
Surgery	74.3	63.9	57.8	47.6	44.0	36.9	**
Neurosurgery	14.2	13.7	14.0	12.7	12.7	9.2	*
Plastic surgery	3.1	2.8	2.8	2.8	2.3	1.5	
Cardiovascular surgery	4.6	3.8	3.8	3.3	3.3	1.5	*
Pediatric surgery	1.8	1.8	2.0	1.5	1.3	0.8	
Chest surgery	1.5	1.3	1.0	0.8	0.5	0.0	**
Aesthetic plastic surgery	0.5	0.0	0.0	0.0	0.3	0.0	**
Internal medicine		7.4	10.4	14.2	14.5	16.8	**
Others		2.0	3.1	3.8	4.3	6.1	**
No report		3.3	5.1	13.2	16.8	27.2	**
1956 registration cohort (n = 324) (40–50 years of experience as physician during survey period)							
Surgery	89.5	72.8	65.7	52.8	48.5	40.1	**
Neurosurgery	5.9	4.6	4.0	3.4	3.4	3.4	
Plastic surgery	1.9	0.3	0.3	0.0	0.0	0.0	**
Cardiovascular surgery	1.9	0.9	0.6	0.0	0.0	0.0	**
Pediatric surgery	0.0	0.3	0.0	0.0	0.0	0.0	**
Chest surgery	0.6	0.3	0.0	0.0	0.0	0.0	**
Aesthetic plastic surgery	0.3	0.3	0.3	0.3	0.0	0.0	**
Internal medicine	–	7.1	8.3	10.2	12.3	14.2	**
Others	–	2.8	4.3	5.9	5.6	4.3	**
No report	–	10.5	16.4	27.5	30.2	38.0	**

* $p < .05$, 2 × 2 chi-square test respective specialties/other specialties × 1996/2006.
** $p < .01$, 2 × 2 chi-square test respective specialties/other specialties × 1996/2006.

ning of the training program. Under the new program, during the first 2 years after graduation, they experience a rotation through multiple different departments. This change was implemented to enable physicians to provide a comprehensive range of medical services. Under the new program, residents are intended to become more experienced and confident with basic skills and general knowledge, as a result of introducing new postgraduate medical education [22]. From an international perspective, the provision of primary health care is of great importance [23], and it is appropriate to secure a sufficient number of physicians that can provide primary

health care to efficiently provide medical services overall.

4.2. Relationship between main area of practice and board-certified specialty

From our study, we found that the number of board-certified specialist and the number of those placed in the "main area of practice" categories were in general agreement, with some exceptions. Therefore, "main area of practice" can serve as effective lead indicators to help us better understand the career orientations of Japanese physicians.

Some specialties exhibited a difference between main area of practice and board-certified specialization. The difference in internal medicine (i.e. the number of "board-certified specialists" was less than that of physicians whose main area of practice was internal medicine) can be explained by the fact that the specialist system of general internal medicine is in the process of changing the definition of "specialist" to encompass the changes in the term made in 2008. A difference was also observed in allergology—the number of physicians whose main area of practice is allergology is more than that of "board-certified specialists". This observation may be due to the fact that the number of allergology specialists includes otorhinolaryngologists (allergic rhinitis), dermatologist (atopic dermatitis), and respiratory medicine specialists (asthma). A similar difference was seen in rheumatology and may be because rheumatology specialists include many of the orthopedic specialists.

This discrepancy has arisen as a result of the certification system of specialists. With regard to allergology, to become a board-certified allergologist, it is prerequisite to first be board certified in an area of medicine such as an internist, otorhinolaryngologist, dermatologist, or ophthalmologist. Therefore, those who are certified as allergologists are board certified in at least two areas, whereas, they can designate only one "primary main area of practice" in the survey. It is inferred that most board-certified physicians were likely to designate specialties other than allergology. In the Physician Survey data collected in 2006 on multiple practicing areas [24], on average, physicians responded that they were engaged in 1.64 areas of practice (those working at hospital 1.26, those working for clinics 2.32). These data indicate that many physicians, especially those who work for clinics, were involved in multiple practice areas, or even had multiple board certifications.

4.3. Japanese physicians career path and specialty certification

Our results showed that in Japan, younger physicians demonstrated an increased tendency toward specialization. Furthermore, physicians involved in internal medicine slowly tended to become specialized in particular subspecialties, typically taking about 4 years, and remained in those specialties subsequently. Surgeons, in general, tended to identify themselves from a very early stage of their career path as specialists in certain field. Some of surgeons switch their area of practice from surgery to internal medicine.

A variety of studies have been conducted on when and how physicians decide on their specializations. In a study in 1989 of Canadian medical school graduates, 12.5% were found to have changed their specialty choice after starting training [25]. Research conducted in Australia revealed that 50% of physicians decided their career path after the pre-registration year. A study in the United States found that, contrary to the earlier belief that changes between departments rarely take place [26], physicians did not necessarily stay in their initially chosen departments. This study showed that 9% of board-certified internal medicine physicians in the United States left internal medicine after 14–16 years of practice (4% for specialized internal medicine physicians and 21% for general internal medicine physicians) [27].

In terms of the quality of medical services provided by specialists, one study supported an association between board certification status and positive clinical outcomes [28], while another revealed mixed clinical outcome [29]. Continuous and further development of the specialist system is expected. In the United States, the duration of certification was changed from lifetime (indefinite) certification to time-limited certification, with the advent of the Maintenance of Certification process [30]. Time-limited certification was first adopted by the American Board of Family Practice in 1970.

Findings from other countries have indicated that it may also be necessary to expand the role of the Japanese Board of Medical Specialties, focusing on issues of coordination and standardization of the certification of qualifications, including the duration of the certification period and the conditions for renewal for specialist physicians, as well as the maintenance of medical service quality provided by specialist physicians. It will be difficult to drastically change the Japanese specialist system, as existing individual academic societies have been gradually developed over a long period of time, and Medical Law allows physicians to practice in any area regardless of their board certification. Steps are therefore required to ensure the consistency of certification standards among all participating academic societies, and to define layers of specialty categories (general specialties and subspecialties). These steps constitute a practical approach, and may be effective in consolidating already established specialist systems in an environment where the discretionary specialist system is already functioning. Thus, lessons from the case in Japanese could be applied in other countries in the future.

4.4. Limitations

Several limitations of our study should be considered in the interpretation of the current findings. First, although the National Physicians Survey was designed as a census survey, some physicians remain unreported. If such data are unevenly distributed, they may constitute unpredicted confounding factors. Second, because the single main area of practice data was only available after the 1994 survey, our study period for follow-up observations was relatively short. This approach would be sound if the career pattern

of physicians was quite stable. However, the increase in the proportion of female physicians, changes in medical school enrollment capacity, and recent changes to the postgraduate clinical training system might affect the career path patterns of physicians in Japan. As such, it remains unclear whether the women in the study sample were disproportionately over-represented in the younger generations of physicians, and, if so, whether the observed generational differences might have reflected, to some extent, gender differences rather than age differences alone. Third, the main area of practice and the board-certified specialization data were collected at different times, and are not identical indices. As these data do not have a one-to-one correspondence, this issue remains a potentially valuable area for future studies, including additional research combining data from individual physicians' main area of practice and board certification status.

However, despite these limitations, the National Physicians Survey is an extremely rich data source, so analyses of this database constitute the best available basis for discussing physicians' career paths in terms of specialization.

5. Conclusions

We analyzed the status of specialization and career paths, focusing primarily on physicians' main areas of specialization, using data collected between 1996 and 2006 in the National Survey of Physicians.

We found that in Japan, younger physicians showed a stronger tendency to become specialists. Among the physicians involved in internal medicine, the number continuing their engagement in internal medicine fell from 82.5% to 43.6% in their first 4 years of practice, then to 37.0% after 10 years, gradually becoming more specialized. Furthermore, surgeons, excluding chest surgeons and cardiovascular surgeons, typically chose their subspecialties in early stages of their careers, with only 9.1–16.8% of surgeons switching from surgery to internal medicine over 10 years.

We observed a trend toward medical specialization. However, to strengthen our medical system, we propose that increasing the number of physicians specializing in general practice and strengthening the certification system for (and maintaining the quality of) specialist physicians are important policy issues.

Acknowledgment

This study was conducted with support from the Health and Labour Sciences Research Grants (Research on Region Medical).

References

[1] Newton D, Grayson. Trends in career choice by US medical school graduates. The Journal of the American Medical Association 2003;290:1179–82.
[2] McGlynn E, Ash S, Adams J, Kessey J, Hicks J, DeCristofaro A, et al. The quality of health care delivered to adults in the United States. The New England Journal of Medicine 2003;348:2635–45.
[3] Lambert T, Goldacre M, Edwards C, Parkhouse J. Career preference of doctors who qualified in the United Kingdom in 1993 compared with those doctors qualifying in 1974, 1977, 1980, and 1983. British Medical Journal 1996;313:19–24.
[4] Goldacre M, Davidson J, Lambert. Career choices at the end of the preregistration year of doctors who qualified in the United Kingdom in 1996. Medical Education 1999;33:882–9.
[5] Joyce C, McNeil J. Fewer medical graduates are choosing general practice: a comparison of four cohorts, 1980–1995. The Medical Journal of Australia 2006;185:102–4.
[6] Council on Graduate Medical Education. Summary of eighth report: patient care physician supply and requirement: testing COGME recommendation. Washington, DC: Council on Graduate Medical Education, 1996. Available from: http://www.cogme.gov/rpt8_3.htm.
[7] Shadbolt N. Choosing general practice: a review of career choice determinants. Australian Family Physician 2009;38:53–5.
[8] Bland C, Neurer L, Maldonado G. Determinants of primary care specialty choice: a non-statistical meta-analysis of the literature. Academic Medicine 1995;70:620–41.
[9] Borges N, Stratton T, Wagner P, Clam C. Emotional intelligence and medical specialty choice: findings from three empirical studies. Medical Education 2009;43:565–72.
[10] Kassebaum D, Szenas P, Shuchert M. Determinants of generalist career intentions of 1995 graduating medical students. Academic Medicine 1996;71:198–209.
[11] Otaki J. Considering primary care in Japan. Academic Medicine 1998;73:662–8.
[12] Otaki J, Fujisaki K, Terasaki H, Fukui T, Okamoto Y, Iwasaki S, et al. Specialty choice and understanding of primary care among Japanese medical students. Medical Education 1996;30:378–84.
[13] Saigal P, Takamura Y, Nishiue T, Fetters M. Factors considered by medical students when formulating their specialty preference in Japan: findings from a qualitative study. BMC Medical Education 2007;7:31, doi:10.1186/1472-6920/7/31.
[14] Japanese Board of Medical Specialties. List of the number of certified specialists in member academic societies as of March; 2008 [in Japanese, accessed 21.06.09] http://www.japan-senmon-i.jp/number/index.html.
[15] Starfield B, Shi L. Policy relevant determinants of health: an international perspective. Health Policy 2002;60:201–18.
[16] Kindig D, Cultice J, Mullan F. The elusive generalist physician: can we reach a 50% goal? The Journal of the American Medical Association 1993;270:1069–73.
[17] American Medical Association. Physicians Characteristics and Distribution in the US 2009 Edition. American Medical Association; 2009.
[18] The Canadian Medical Association. Statistical information on Canadian physicians, 2009. Available from: http://www.cma.ca/index.cfm/ci_id/16959/la_id/1.htm#1.
[19] Onishi H, Yoshida I. Rapid change in Japanese medical education. Medical Teacher 2004;26:403–8.
[20] Kozu T. Medical education in Japan. Academic Medicine 2006;81:1069–75.
[21] Inoue K, Matsumoto M. Japan's new postgraduate medical training system. The Clinical Teacher 2004;1:38–40.
[22] Nomura K, Yano E, Aoki M, Kawaminami K, Endo H, Fukui T. Improvement of residents' clinical competency after new postgraduate medical education program in Japan. Medical Teacher 2008;30:e161–9.
[23] World Health Organization. The world health report 2008. Primary health care. Now more than ever. Geneva: World Health Organization; 2008.
[24] Ministry of Health, Labour and Welfare. National survey on physician, dentist and pharmacist; 2006.
[25] Ryten E, Thurber A, Buske L. The class of 1989 and post-MD training. Canadian Medical Association Journal 1998;158:731–7.
[26] Isobel A. Career preferences of doctors: medicine is no longer staffed by men working full time in one specialty for 40 years. British Medical Journal 1996;313:2.
[27] Lipner R, Bylsma W, Arnold G, Fortna G, Tooker J, Cassel C. Who is maintaining certification in internal medicine—and why? A national survey 10 years after initial certification. Annals of Internal Medicine 2006;144:29–36.
[28] Sharp L, Bashook P, Lipsky M, Horowitz S, Miller S. Specialty board certification and clinical outcomes: the missing link. Academic Medicine 2002;77:534–42.
[29] Brennan T, Horwitz R, Duffy F, Cassel C, Goode L, Lipner R. The role of physician specialty board certification status in the quality movement. The Journal of the American Medical Association 2004;292:1038–43.
[30] Rhodes R, Biester T. Certification and maintenance of certification in surgery. Neurosurgery Clinics of North America 2007;87:825–36.

投稿

女性医師割合の高い診療科（眼科・皮膚科・麻酔科）におけるキャリアパスについて

児玉 知子*1　小池 創一*2　松本 伸哉*3
井出 博生*4　康永 秀生*5　今村 知明*6

目的　本研究では，医師・歯科医師・薬剤師調査（以下，三師調査）コホートデータを用いて比較的女性医師割合の高い眼科，皮膚科，麻酔科における女性医師のキャリアパスを検討し，医籍登録後（以下，登録後）の就業における動態を把握する。

方法　1984年，1994年，2004年の三師調査において診療科の女性医師割合を年齢階級別に比較した。さらに，医籍登録番号で統合されたコホートデータを作成し，女性医師割合の高い眼科，皮膚科，麻酔科について，1984年医籍登録者と1994年医籍登録者における女性医師の就労継続，復職，休職，診療科の届け出変更について分析した。

結果　2004年調査における女性医師割合は，眼科36.8%，皮膚科38.0%，麻酔科29.1%と高率であった。1984，1994，2004年時の女性医師割合を年齢階級別に比較したところ，すべての年齢階級において眼科には有意差がなく，皮膚科，麻酔科では有意な女性医師割合の増加がみられた。特に29歳以下の若年齢層においては眼科51.5%，皮膚科68.4%，麻酔科46.8%と高率であった。1984年医籍登録者と1994年医籍登録者の登録後10年時における在職率の比較では，眼科において1994年登録者で有意に高かった。1984年登録者の20年後の在職率は，眼科で95%，皮膚科で107%（中途参入含む），麻酔科で55%であった。麻酔科では登録後4～6年時で診療科の変更が多く，眼科から他科への変更は1%未満と低率であった。隔年調査での平均復職率は，眼科12%，皮膚科18%，麻酔科10%であり，麻酔科で休職率が復職率を上回っていた。

結論　眼科，皮膚科，麻酔科においては女性医師の割合が高く，特に眼科，皮膚科では登録後20年時の在職率が非常に高いことが明らかとなった。離職のピークは眼科，皮膚科においては登録後8～10年であり，麻酔科においては明らかなピークは認めなかった。女性医師の継続就労，休職，復職パターンは診療科によって異なる可能性があることが示唆された。

キーワード　女性医師，キャリアパス，医師・歯科医師・薬剤師調査，眼科，皮膚科，麻酔科

I はじめに

昨今の医師の活動状況を検討するにあたっては，医師のキャリアパスに影響を与える種々の要因を踏まえた動態の把握が必要である。中でも，昨今の女性医師の増加は，医師全体の需給バランスを考えるうえでも重要な因子となっている。OECD加盟諸国において女性医師の割合が高いのは，フィンランド54.6%を筆頭に，EU諸国では40%前後，米国においては30.1%であるが，日本は17.4%と最も低い割合にある[1]。しかしながら，近年の医師・歯科医師・

*1 国立保健医療科学院人材育成部国際保健人材室長　*2 東京大学医学部附属病院企画情報運営部准教授
*3 同客員研究員　*4 東京大学医学部附属病院パブリックリレーションセンター助教
*5 東京大学大学院医学系研究科医療経営政策学講座特任准教授　*6 奈良県立医科大学健康政策医学講座教授

薬剤師調査（以下，三師調査）における若年医師の女性割合は確実に増加していることから，今後は医師全体に占める女性の割合も諸外国並みに増加すると予測される。これまでに女性医師の離職ピークは登録後約8～10年であり，一度離職した医師も年数をかけて復職している現状が報告されている[2)3)]。本研究では，診療科の中でも，比較的女性医師割合の高い眼科，皮膚科，麻酔科について，コホートデータを用いて医籍登録後の女性医師の就労状況について検討する。

Ⅱ 研究方法

1984年，1994年，2004年の三師調査において届け出のあった診療科の女性医師割合を年齢階級別に比較した。この際，分析対象とした診療科は，三師調査に「従事する診療科」（1994年以降は「主たる診療科」）として眼科，皮膚科，麻酔科の届け出があったものとし，比較対照のために内科，内科サブスペシャルティ，外科，外科サブスペシャルティを加えた。内科サブスペシャルティは，心療内科，呼吸器科，消化器科，循環器科，神経内科，アレルギー科，リウマチ科とし，外科サブスペシャリティは整形外科，形成外科，美容外科，脳神経外科，呼吸器外科，心臓血管外科，小児外科を集計した。従事する診療科で内科，外科においてサブスペシャルティと同時に複数診療科を届け出ていた場合，サブスペシャルティを優先し，重複のないものとした。眼科，皮膚科，麻酔科においては診療科の重複はない。

さらに，医籍登録番号で統合されたコホートデータから，1984年登録者と1994年登録者における眼科，皮膚科，麻酔科の届け出があった女性医師の在職率，就労継続，復職，休職，診療科の届出変更について分析した。在職率は，医籍登録後初めての調査時（登録後2年目）において，それぞれ眼科，皮膚科，麻酔科の診療科を届け出た女性医師数を分母とし，分子は登録後の三師調査において同診療科を届け出た女性医師数とした。就労については，各年の三師調査の診療科の届け出において，同じ診療科で連続する三師調査に就労を届け出たものを「継続」，他科に変更のあったものを「転出」，他科からの変更を「転入」，無職の届け出もしくは未届けのものを「休職」，前回の三師調査で無職の届け出もしくは未届けであったものが，次回に就労の届け出をしたものを「復職」とした。この際，復職時に診療科の変更があったものも，一律に「復職」として扱った。

なお，年齢階級別の女性医師割合の比較にはchi-square testを用い，有意水準は5％（両側）とした。統計ソフトはSTATA10.0を使用した。

三師調査データは厚生労働統計の目的外利用として電子個票データを申請し許可を得た。データには個人が識別されるデータは含まれていない。また，本研究実施に際しては，国立保健医療科学院疫学研究倫理審査委員会の承認を得た。

Ⅲ 研究結果

（1） 眼科，皮膚科，麻酔科における女性医師割合の経年変化

2004年調査における女性医師割合は，眼科36.8％，皮膚科38.0％，麻酔科29.1％であった（表1）。医師全体における女性の割合は，1984年から2004年に全体で約1.6倍となっているが，診療科レベルでは外科で1.1％から4.6％へ4.2倍と最も高い

表1 1984，1994，2004年三師調査における女性医師の割合

（単位．人，（ ）内％）

	1984年 (n＝170,469)[1)]	1994 (n＝218,215)[1)]	2004 (n＝256,656)[1)]
女性医師総数	17 216(10.1)	27 208(12.5)	42 035(16.4)
内科	6 516(8.9)	8 305(11.8)	10 919(14.8)***
内科サブスペシャリティ	352(7.6)	1 680(9.1)	3 519(12.5)***
外科	189(1.1)	479(2.0)	1 079(4.6)***
外科サブスペシャリティ	297(2.2)	740(3.0)	1 579(5.0)*
眼科	2 516(34.5)	3 618(36.0)	4 585(36.8)
皮膚科	908(27.0)	1 901(29.6)	2 956(38.0)***
麻酔科	478(18.8)	1 047(22.6)	1 859(29.1)***

注 1) nは医師数総数である。
2) *p＜0.05，***p＜0.001（Chi-square test）

増加を認めており，外科サブスペシャリティ，内科，内科サブスペシャリティにおいて約2倍の増加を認めた。1984年時点ですでに女性医師割合が比較的高かった眼科においては，34.5%から36.8%とほぼ変化なく，皮膚科では27.0%から38.0%へ1.4倍，麻酔科で18.8%から29.1%へ1.6倍の増加がみられた。眼科，皮膚科，麻酔科のいずれの科においても，内科および内科サブスペシャリティの2倍以上の女性医師割合となっている。1984年，1994年，2004年調査における女性医師割合の変化を年齢階級別（29歳以下，30～39，40～49，50～59歳）に比較した結果では，ほぼすべての診療科において各年齢階級で有意な女性医師割合の増加を認めたが，眼科においては有意差がみられなかった（表2）。一方で，29歳以下における1984年調査と2004年調査の比較では，眼科で38.6%から51.5%へ，皮膚科で41.5%から68.4%へ，麻酔科で24.8%から46.8%へと，これら3つの各診療科医師の半数程度を女性が占めており，他の年齢階級と比較して最も高い女性医師割合であった。また，内科や内科サブスペシャリティ，外科においても各年齢階級で有意な女性医師割合の増加を認めているが，眼科，皮膚科，麻酔科と比較して女性医師割合は15～30%前後少ない。

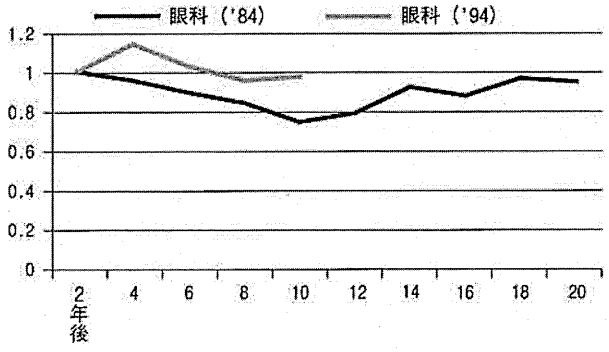
表2　1984，1994，2004年三師調査における年齢階級別女性医師の割合

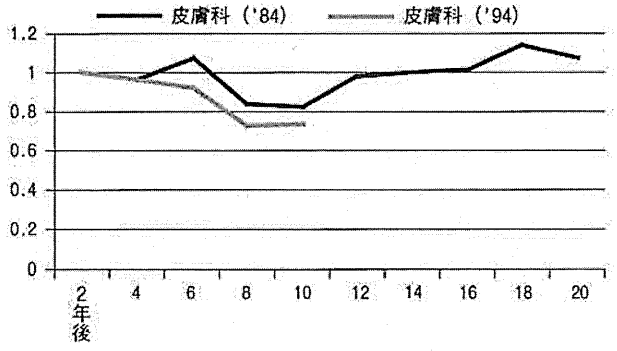
（単位　人，（　）内%）

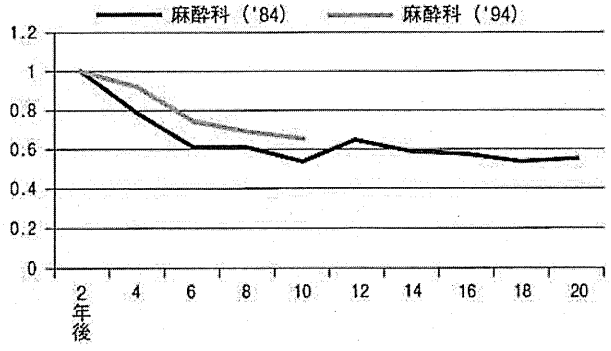
	1984年	1994	2004
内科			
29歳以下	1 109(14.7)	1 878(26.9)	1 889(35.6)***
30～39歳	1 285(8.6)	2 488(15.3)	3 324(26.3)***
40～49	735(6.7)	1 315(9.1)	2 604(14.2)***
50～59	1 382(7.5)	584(7.1)	1 343(8.6)***
内科サブスペシャリティ			
29歳以下	127(11.7)	544(23.0)	823(30.6)***
30～39歳	164(7.4)	748(9.9)	1 692(17.3)***
40～49	35(4.8)	273(5.7)	687(8.2)***
50～59	22(5.2)	61(3.0)	243(5.3)***
外科			
29歳以下	64(1.9)	206(6.5)	455(20.8)***
30～39歳	57(1.0)	192(2.5)	447(7.4)***
40～49	11(0.4)	28(0.6)	141(2.3)***
50～59	30(1.0)	10(0.3)	20(0.5)***
外科サブスペシャリティ			
29歳以下	114(3.8)	278(8.2)	428(15.9)*
30～39歳	83(1.6)	287(2.9)	772(8.1)*
40～49	32(1.1)	92(1.6)	246(2.5)*
50～59	35(1.8)	27(0.8)	73(1.4)*
眼科			
29歳以下	386(38.6)	692(47.5)	491(51.5)
30～39歳	558(31.2)	981(32.6)	1 440(38.5)
40～49	342(32.8)	649(32.0)	1 113(33.0)
50～59	599(37.6)	334(33.1)	673(33.0)
皮膚科			
29歳以下	250(41.5)	410(53.2)	497(68.4)***
30～39歳	357(30.0)	674(36.6)	913(45.9)***
40～49	191(26.5)	472(31.2)	788(38.0)***
50～59	65(13.0)	200(24.6)	486(32.1)***
麻酔科			
29歳以下	236(24.8)	373(32.4)	519(46.8)***
30～39歳	188(16.4)	455(21.6)	752(33.9)***
40～49	47(17.8)	172(17.3)	410(21.2)***
50～59	4(2.6)	42(16.5)	153(17.1)***

注　*p＜0.05，***p＜0.001（Chi-square test）

図1　1984年および1994年医籍登録の女性医師における医籍登録後の在職率







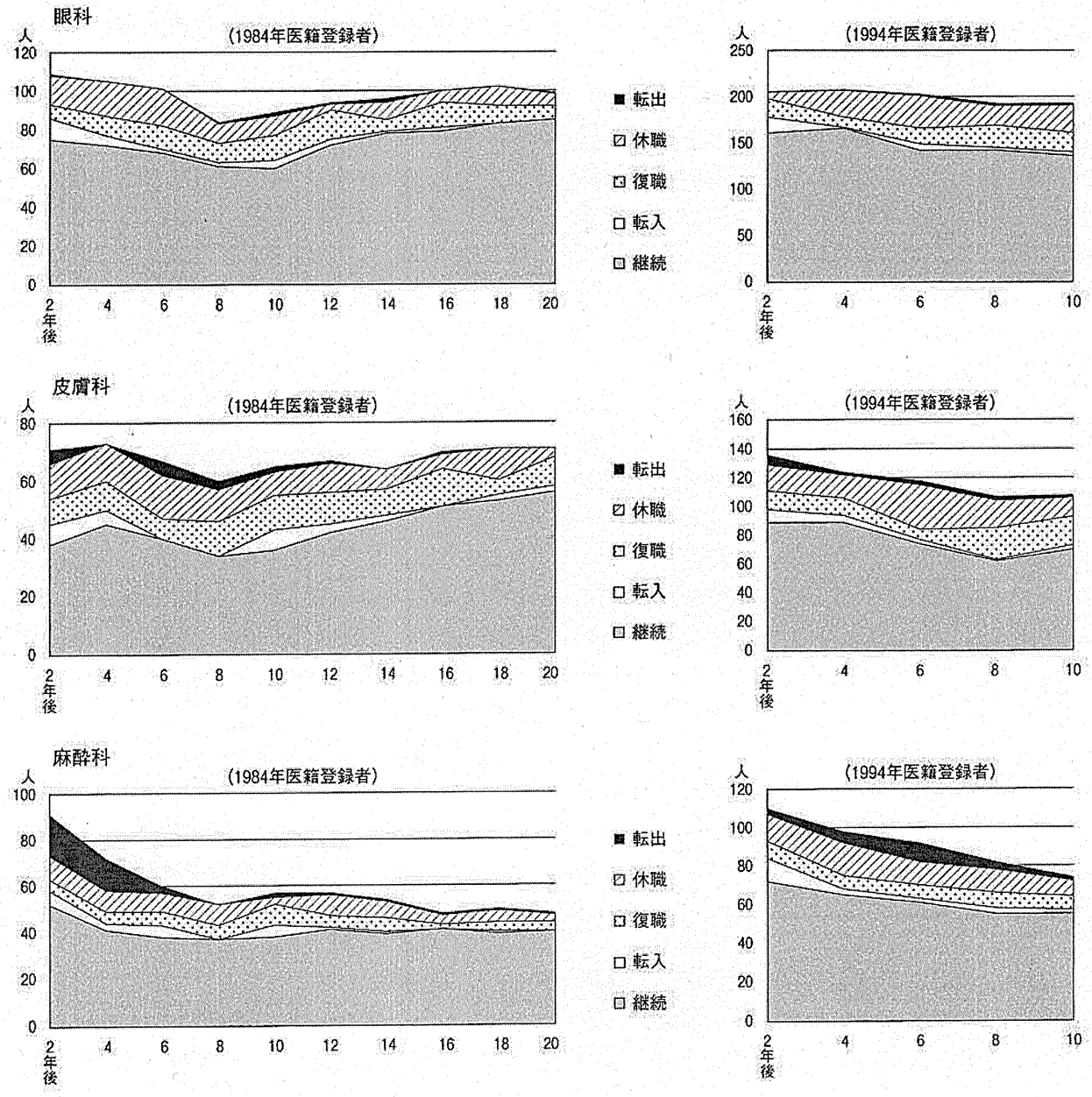
（2） 1984年医籍登録者と1994年医籍登録者における登録後在職率の比較

次に，眼科，皮膚科，麻酔科の1984年医籍登録者（以下，登録者）と1994年登録者の登録後10年時における在職率の比較では，眼科においては1994年登録者98%，1984年登録者75%であり，1994年登録者の在職率が有意に高かった（図1）。さらに1984年登録者の20年後の在職率は，眼科で95%，皮膚科で107%（中途参入含む），麻酔科で55%であった。眼科，皮膚科における離職のピークは登録後8～10年時と考えられ，皮膚科では1984年登録者の方が1994年登録者よりも高い在職率にある傾向がみられた。麻酔科では1984年，1994年登録者ともに登録後間もなく在職率が低下しはじめ，登録後6～8年時にはほぼ横ばいとなり，その後は登録後当初の約50～60%程度の在職率となっていた。

（3） 1984年と1994年登録者における就労継続，休職，復職，診療科の変更（図2）

眼科，皮膚科，麻酔科における1984年登録者の母集団はいずれも100人前後であったが，登

図2 眼科・皮膚科・麻酔科における女性医師の就労継続・休職・復職・診療科の変更（転入・転出）



録後20年目では麻酔科で母集団の約50～60％となっていた。診療科の変更について，1984年登録者では，麻酔科で登録後2～4年時における診療科の変更（転出）が多く，眼科から他科への変更（転出）は平均で1％未満と低率であった。また皮膚科では登録後2年と6～8年時に2回の転出ピークがみられており，転入は登録後2～4年，10年以降においても確認された。各診療科の平均復職率は，眼科12％，皮膚科18％，麻酔科10％であり，麻酔科で休職者数が復職者数を上回っていた。母集団の中で，継続就労，休職，復職，変更（転出，転入）のいずれのカテゴリにも入っていない登録者は，2回の連続する三師調査に未届けであった医師である。例をあげると，眼科，皮膚科では登録後8年時に母集団のディップ（溝）がみられているが，これは登録後6年時，8年時のいずれの三師調査にも未届けであった医師である。しかしながら，登録後20年時には医籍登録時点の母集団とほぼ同等の母集団が把握できており，登録後20年時の在職率は，眼科で95％，皮膚科で107％（中途参入含む），麻酔科で55％であった。

1994年登録者は，眼科，皮膚科においては1984年登録者の約2倍の母集団であった。眼科における休職のピークは登録後6年時頃であるが，1984年と比較して明らかなピークはみられず，登録後8～10年では休職者と復職者がほぼ同数のコンスタントな需給状況がみられる。一方，皮膚科では登録後6年時の休職者数が最も多いが，登録後8年時からの復職者数は休職者数を上回っている。麻酔科においては，1984年と比較すると診療科の変更（転出）のピークが登録後6年時となっており，転出者も1984年と比較して少ない。しかし，休職者数が復職者数を上回っている状況は1984年より顕著である。

Ⅳ 考　　察

（1） 診療科による女性医師の就労状況

今回の分析では，女性医師の就労継続や復職，診療科の変更が診療科別に異なる可能性が示唆された。これまでの女性医師の登録後の就労状況についての研究において，登録後10年程度をピークに休職率が高くなることが明らかになっていることはすでに述べたが[2)3)]，眼科においては，このピークがさほど顕著でなかった。他の診療科と比較すると，登録後10年までの休職率が高く，その後はコンスタントに復職が続いている。つまり，眼科においては，他の診療科における医師よりも登録後早い時期に休職している可能性がある。一方，継続率，復職率も高いため20年後の在職割合は95％と高くなっていた。1984年，1994年，2004年調査における女性医師割合を年齢階級別（29歳以下，30～39，40～49，50～59歳）に比較した結果では，ほぼすべての診療科において有意な女性医師の割合の増加を認めているが，眼科のみ有意差がみられておらず，1984年当初より高い女性医師割合の傾向が続いていることが示唆された。このことは，眼科における診療形態が女性医師にとって継続して働きやすい傾向にあることが予想される。また眼科以外の診療科に変更する割合も低いのは，眼科における専門性が高いことが示唆される。眼科の学会アンケート調査では，約80％の大学附属病院で，妊娠・育児中の女性医師に対して勤務時間・当直免除などの何らかの配慮がなされていると報告されている[4)]。一方，同調査において大学における女性医師のキャリアパスとして，女性医師の割合が，助手・助教授（25％），講師（15％），教授（6％）と昇進に伴って比率が低下していることを報告しており，女性にとって働きやすい職場であることと，継続したキャリアを積んで社会的地位を獲得することには何らかの社会的ギャップがあることが示唆される。仕事と家庭のバランスの置き方にはいうまでもなく個人差があるが，オーストラリア・ニュージーランドの調査では，女性眼科医は男性眼科医に比べて仕事の満足度に差はみられないものの，労働時間および賃金が少なく，結婚して子どもをもつ割合が男性より低いと報告しており[5)]，ワークライフバランスの問題は各国を問わず存在していることが明らかである。

一方，皮膚科においては，眼科と同様に登録

後10年までの休職者が比較的多く，同時に復職者も多かった。皮膚科の学会アンケート調査でも，女性医師の約半数が離職の経験を持ち，その80％が最初の10年間に離職していると報告されており，本研究結果を裏付けるものである[6]。また，20年後の在職率は，転入者を含めると当初の母集団を越える結果となった。登録後10年以降も就労が可能であるということは，皮膚科の診療形態も眼科と同様に女性医師にとって継続して働きやすく，かつ専門性が高いということが考えられる。海外の医学生対象調査でも，ライフスタイルと調和する専門領域(specialty)として皮膚科，一般医療（general practice)，公衆衛生があげられている[7]。

麻酔科では，登録後4年までは平均20％の転出がみられた。これには，もともと卒業時に外科系や産婦人科等の診療科選択希望があり，その前の研修の一部として麻酔科を選択していた可能性がある。また，20年後の在職割合が55％程度と，眼科や皮膚科と比して半分の割合であり，若年女性医師に麻酔科選択者が多かったとしても，10～20年後の麻酔科全体の労働力推計には換算できない可能性が高い。麻酔医に対するアンケート調査では，幼少時期の育児を母親の役割とする社会的性別意識の問題点と女性医師に対する育児支援体制の不備が指摘されている[8]。さらに，麻酔科の診療領域には，集中治療，ペインクリニック，救急医療，緩和医療など手術麻酔以外の多様な業務のほか，24時間フルタイムで働ける医師だけが必要といったスタンスの勤務環境の問題点が指摘されており，女性医師の再教育や復帰支援を進めていくなかでは，男女を問わず，すべてのスタッフの労働環境や労働時間に対する配慮を行うことが重要である[9]。

上記については，ある程度専門とする診療科が決まった後の女性医師の継続した働き方について述べてきた。しかしながら，今回の結果でも明らかなように，近年は若年医師における女性の割合が増加傾向にあるため，今後は臨床研修をはじめ，各診療科における専門分野別のトレーニング体制をどのように整えるかが大きな課題となるであろう。女性医師が妊娠，出産，育児に伴う離職を必要とされた際に，ライフスタイルに合わせた自由なスケジュールを組むことが可能な研修やトレーニング体制のあり方についても検討される必要がある。

（2） 女性医師コホート分析の問題点

通常のコホート分析では，母集団のある一定の観察期間中の転帰を分析するが，今回のような隔年実施の統計調査データを用いることには限界がある。一つには，調査が隔年12月に実施されることから，医師の就労届出状態が，あくまでも調査時点の就労状況に基づくということである。従って，今回の研究で継続就労とした定義が，必ずしも2年間継続して就労していたということではなく，あくまでも2回の調査時に就労していたということで，実際には次回の三師調査までの2年間の期間中に，休職，復職がなされていた可能性がある。さらに，女性医師の場合，個人によって，登録後20年間の間に1回だけ休職をする者，数回の休職を繰り返す者，全く休職しないものを含め，休職のパターンに大きなばらつきがあった。今回の分析では，このように2回の連続する三師調査時点における就労状況の変化を分析したことから，2回の三師調査に連続して届け出がなかった者については，休職の定義に含まれていない。このため，図2において観察者の合計数がディップ（溝）となっている。本稿では，継続就労者に関する詳細な分析は対象としなかったが，1984年登録女性医師全体においては，20年間継続して診療に従事していた医師は約3割程度であった。つまり，7割近くの女性医師は何らかのパターンで休職，復職を繰り返していることが容易に想像される。診療現場における医師の需要と供給のバランスは絶えず変動しており，医師の人材や労働力把握を適切に行うためには，医師の就労動向をリアルタイムで把握する必要がある。リアルタイムでの適切な人材供給がなされるシステムが構築されていれば，医療現場における人材不足の問題を解決する一助となるであろうし，女性医師自身にとっても，比較的柔軟に休

職や復職を繰り返しながら，継続して医師の業務に携わることが可能となるであろう。

本研究では，比較的女性医師割合の高い眼科，麻酔科，皮膚科において，女性医師の登録後の就労状況に関して，統計調査データを基に分析を試みた。今後は，これらの診療科，さらには女性医師割合が低い診療科においても，女性医師が就労継続可能な具体的な条件や環境整備についての詳細な検討が期待される。

V 結　論

眼科，皮膚科，麻酔科においては女性医師の割合が高く，特に眼科，皮膚科では登録後20年時の在職率が非常に高いことが明らかとなった。離職のピークは眼科，皮膚科においては登録後8～10年であり，麻酔科においては明らかなピークは認めなかった。女性医師の継続就労，休職，復職パターンは診療科によって異なる可能性があることが示唆された。

謝辞

本研究は平成23年度厚生労働科学研究費補助金地域医療基盤開発推進研究事業「専門医制度に関する研究」（研究代表者：小池創一）の分担研究として実施された。

文　献

1）OECD Health Data 2010.
2）Kaneto C, Toyokawa S, Inoue K, et al. Gender difference in physician workforce participation in Japan. Health Policy 2009；89(1)：115-23.
3）女性医師の卒後就労分析．平成19年度厚生労働科学研究費補助金政策科学総合研究事業（政策科学推進研究事業）医師のキャリアパスを踏まえた動態把握のあり方及びその有効活用に関する研究．総括・分担研究報告書．15-20.
4）眼科女性医師活性化委員会．眼科女性医師に関するアンケート調査の報告．日本の眼科　2008；79(3)：311-5.
5）Danesh-Meyer HV, Deva NC, Ku JY, et al. Differences in practice and personal profiles between male and female ophthalmologists. Clin Experiment Ophthalmol. 2007 May-Jun；35(4)：318-23.
6）檜垣祐子，泉美貴．女性医師のキャリア支援．臨床皮膚科　2010；64(5)：180-2.
7）Creed PA, Searle J, Rogers ME. Medical specialty prestige and lifestyle preferences for medical students. Soc Sci Med. 2010 Sep；71(6)：1084-8. Epub 2010 Jul 13.
8）上田聡子，中村真之，野上裕子．女性麻酔科医の現況に関する調査研究（続報）－社会的性別意識と育児負担－．日本臨床麻酔学会誌　2006；26(4)：418-28.
9）澄川耕二．女性医師復帰支援プログラム（Vol. 2）長崎大学病院の女性医師麻酔科復帰支援プロジェクト．医学のあゆみ　2010；233(7)：570-3.

Health Policy xxx (2011) xxx–xxx

Contents lists available at ScienceDirect

Health Policy

journal homepage: www.elsevier.com/locate/healthpol

The working status of Japanese female physicians by area of practice: Cohort analysis of taking leave, returning to work, and changing specialties from 1984 to 2004

Tomoko Kodama[a,*], Soichi Koike[b], Shinya Matsumoto[b], Hiroo Ide[b], Hideo Yasunaga[c], Tomoaki Imamura[d]

[a] Department of Human Resources Development, National Institute of Public Health, 2-3-6 Minami, Wako, Saitama 351-0197, Japan
[b] Department of Planning, Information and Management, The University of Tokyo Hospital, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan
[c] Department of Health Management and Policy, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan
[d] Department of Public Health, Health Management and Policy, Nara Medical University, 840 Shijo-cho, Kashihara, Nara 634-8521, Japan

ARTICLE INFO

Keywords:
Female physicians
Physician workforce
Career
Area of practice
Japan

ABSTRACT

Background: The percentage of females in the physician workforce is increasing in Japan, as in other countries; however, the working status of female physicians has not been sufficiently investigated.
Methods: Original data were obtained from the National Survey of Physicians (NSP) conducted by the Ministry of Health, Labour and Welfare, Japan, from 1984 to 2004. We examined the trend of female physicians' areas of practice and analyzed their leave, return to work, and change in areas of practice using cohort data.
Results: The percentage of female physicians has increased significantly in recent generations, especially in surgery, surgical subareas of practice, and obstetrics and gynecology. A remarkable increase was found in obstetrics and gynecology among women under 29 years old from 15.4 to 66.2%. The total number of female physicians on leave has been higher than the number of female physicians returning since 1998. The average percentage of those who changed their area of practice was high in surgery (20.7%) and low in pediatrics (5.0%) and obstetrics and gynecology (1.7%).
Conclusions: A strategic plan is needed for future health policy to plan for the physician workforce, especially for the areas of practice with increasing proportions of young female physicians.

1. Background

An increase in the number of women in medicine has been reported in Australia, Canada, the Netherlands, Norway, Sweden, the United Kingdom and the USA [1–7]. Although these countries have different healthcare systems and social circumstances, a higher percentage of women in medicine has significant implications for workforce planning because of their career breaks or part-time work status [8–10]. Internationally, the proportion of females in the physician workforce increased by around 30% – from 28.7% in 1990 to 38.3% in 2005 in OECD countries and flexibility in working time and career development is emphasized for policy makers because that female physicians work fewer weekly hours than male physicians in many OECD countries [11].

In Japan, the percentage of females among all physicians (approximately 250,000) was 16.4% in 2004. However,

* Corresponding author. Tel.: +81 484586111; fax: +81 484586132.
E-mail addresses: tkodama@niph.go.jp (T. Kodama), koikes@adm.h.u-tokyo.ac.jp (S. Koike), shinyamatsumoto-tky@umin.ac.jp (S. Matsumoto), idea-tky@umin.ac.jp (H. Ide), yasunagah@adm.h.u-tokyo.ac.jp (H. Yasunaga), imamurat@naramed-u.ac.jp (T. Imamura).

0168-8510/$ – see front matter © 2011 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.healthpol.2011.07.012

Please cite this article in press as: Kodama T, et al. The working status of Japanese female physicians by area of practice: Cohort analysis of taking leave, returning to work, and changing specialties from 1984 to 2004. Health Policy (2011), doi:10.1016/j.healthpol.2011.07.012

during the last decade, the percentage of female students enrolled at medical schools has increased to approximately 30% [12], indicating that the proportion of female physicians is likely to increase in the future.

In recent years, physician shortages and an imbalance in the numbers of physicians in different areas of practice have occurred in Japan, as in Western societies, not only in specific specialties, such as pediatrics and obstetrics, but also in internal medicine and surgery [13–17]. The increasing proportion of female physicians is considered to be one of the reasons that has exacerbated physician shortage, with the hypothesis that female physicians leave work completely after marriage or go on leave for a long period of time to raise their children. However, there is little concrete evidence about the actual working status of female physicians nationally. Therefore, we aimed to determine the percentages of female physicians by area of practice over two decades and the patterns of taking leave from and returning to work in four areas of practice: internal medicine, surgery, obstetrics and gynecology, and pediatrics. This information can be used for future health policy planning relevant to the physician workforce.

2. Materials and methods

2.1. Data acquisition

Data were obtained from the National Survey of Physicians (NSP) from 1984 to 2004, with official permission from the Ministry of Health, Labour and Welfare (MHLW) of Japan. The NSP was conducted every year from 1972 to 1982 and has been conducted every other year since 1984. The survey was designed as a form of census and the response rate was considered to be quite high; therefore, it was used to try and understand Japanese physicians' career choices or distribution in previous studies [13–15,18–20]. The survey questionnaires are distributed to physicians' workplaces. It is mandatory for physicians to report their working status and information on medical areas of practice by filling in the questionnaire, which is sent back to the MHLW by the local health centers. Although the NSP is still conducted at present, we used the data collected before 2004 to avoid inconsistency in the analysis of specialty changes, which might have resulted from the use of later data because the ministry began requiring clinical training for newly registered physicians after 2004.

The data allowed to be used in this study were electronic data with no personally identifiable information except for each physician's registration (license) number, which was not disclosed to the public and could not be linked to the physicians' private information, such as name and address. This study was approved by the Research Ethics Committee of the National Institution of Public Health in July 2009.

2.2. Data analysis

2.2.1. Trends in the proportion of female physicians by area of practice

The percentages of female physicians by area of practice were obtained from cross-sectional data in 1984, 1994 and 2004. The area of practice preferred among female physicians under 29 years old was recorded. For the area of practice categories, the "main area of practice" coding in the NSP was employed; these categories included internal medicine, surgery, pediatrics, psychiatry and neurology, obstetrics and gynecology, ophthalmology, otolaryngology, dermatology, rehabilitation medicine, radiology, anesthesiology, general medicine (rotation), and other. In compiling the data, psychosomatic internal medicine, respiratory medicine, gastroenterology, cardiology, neurology, allergy and immunology, and rheumatology were considered to be subareas within internal medicine; orthopedic surgery, plastic surgery, cosmetic surgery, neurosurgery, respiratory surgery, cardiovascular surgery and pediatric surgery were considered to be subareas within surgery. The coding of 'obstetrics and gynecology' was unified in the NSP questionnaire. Coding of "main area of practice" in the survey questionnaire was officially introduced in 1994. Therefore, we recoded the "main area of practice" from the multiple "areas of practice" reported in the surveys from 1984 to 1994. In the recoding, if internal medicine and one internal medicine subarea of practice were chosen for "areas of practice", the subarea of practice was employed as the "main area of practice". If internal medicine and more than two internal medicine subareas of practice were chosen, then internal medicine was employed as the "main area of practice". The recoding of surgery and surgical subareas of practice also followed this rule. Rehabilitation medicine was officially added to the coding scheme in the 1994 NSP. The statistical significance of the differences in the proportion of female physicians in each area of practice between 1984, 1994 and 2004 were examined using the Chi-squared test. Statistical differences were assessed with two-sided tests, with an alpha level of 0.05.

2.2.2. Female physicians' leave and return to work by area of practice from 1984 to 2004

The cohort data were taken from the original data of the NSP from 1984 to 2004 using the registration numbers of the physicians. To examine the trends leave taken by female physicians after registration (licensing), the average percentages of female physicians on leave by years after registration were obtained by categorizing their year of registration (1981–1985, 1986–1990, 1991–1995, and 1996–1999).

Further, the numbers of female physicians who were newly registered returned to work or went on leave for consecutive biennial NSPs were obtained between 1984 and 2004. To observe the changes in the numbers of working female physicians, we selected internal medicine, surgery, pediatrics, and obstetrics and gynecology, which have had a relatively large increase in the proportion of female physicians since 1984. The analysis was conducted only on those with a minimum of 4 years' experience after registration, reflecting the fact that some physicians undertake 2 years of general rotation as initial clinical training after obtaining their licenses. The analysis period was set to the period after 1984, when the survey frequency was changed from annual to biennial.

The average percentages of those continuing work, on leave, returning to work and changing their area of practice

Please cite this article in press as: Kodama T, et al. The working status of Japanese female physicians by area of practice: Cohort analysis of taking leave, returning to work, and changing specialties from 1984 to 2004. Health Policy (2011), doi:10.1016/j.healthpol.2011.07.012

(in and out) were calculated for 1984–1994 and 1994–2004 using cohort data from 1984 to 2004. Those registered in an area of practice in Year N and still registered in the same area of practice in the next survey in Year $N+2$ were classified in the "continue" work category; those registered in an area of practice in Year N and not registered in any area of practice or registered as "a physician not in practice" in the next survey in Year $N+2$ were classified in the "on leave" category; those not registered in any area of practice or registered as "a physician not in practice" in Year N and registered in an area of practice in Year $N+2$ were counted, regardless of the previous area of practice, in the "return" category; those registered in one area of practice in Year N and registered in the relevant area of practice in Year $N+2$ were, regardless of the previous area of practice, classified in the "change in" category; and those registered in the relevant area of practice in Year N and registered in a different area of practice in Year $N+2$ were, regardless of the next area of practice, classified in the "change out" category. To calculate the percentages of female physicians in the "continue", "on leave", "return", "change in" and "change out" categories in each area of practice, the total number of female physicians registered in the relevant area of practice either in Year N or in Year $N+2$ was used as a denominator. Because most female physicians go on leave for different durations, we averaged the percentages of every two consecutive NSPs during 1984–1994 and 1994–2004.

For data management and analysis, STATA 10 (StataCorp LP, 2007, TX, USA) and SPSS16.0J (SPSS Japan Inc., Tokyo, Japan) statistical software were used for this study.

3. Results

3.1. Increasing percentage of female physicians and their choice in the area of practice

The numbers and percentages of female physicians by area of practice in 1984, 1994 and 2004 are shown in Table 1. The proportion of female physicians increased from 10.1% in 1984 to 16.4% in 2004. In the 2004 survey, the specialties with a high percentage of females were dermatology (38.0%), ophthalmology (36.8%) and pediatrics (31.2%). The proportion of female physicians remained high in ophthalmology, and this was the only area of practice for which there was no significant increase or decrease in the percentage of female physicians between 1984 and 2004 other than rehabilitation medicine.

The proportion of female physicians under 29 years old increased dramatically, from 14.6% in 1984 to 35.3% in 2004, as shown in Table 2. The 2004 survey shows that female physicians accounted for almost half or more of all physicians in dermatology (68.4%), obstetrics and gynecology (66.2%), ophthalmology (51.5%), pediatrics (49.2%) and anesthesiology (46.8%). The greatest increases from 1984 to 2004 in the percentage of female physicians under 29 years old were observed in the areas of surgery (10.8 times), surgical subareas of practice (4.2 times), obstetrics and gynecology (4.3 times), and internal medicine (2.4 times).

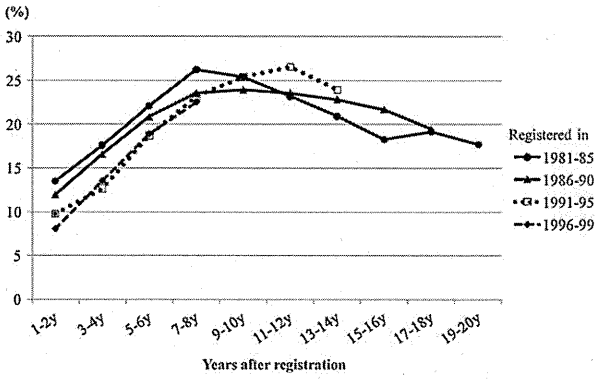


Fig. 1. The trend for the number of female physicians on leave who registered from 1981 to 1999, by years after registration.

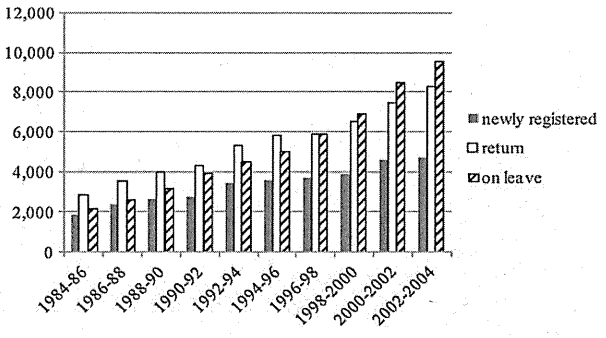


Fig. 2. Number of female physicians who were newly registered, returned to work or went on leave for consecutive biennial National Surveys of Physicians in Japan between 1984 and 2004.

3.2. Pattern of female physicians' leave from their work

In the cohort data, 46,561 female physicians were identified. The peak of the average percentage of female physicians on leave was between 7–8 years and 11–12 years after registration according to the categorized registered year, as shown in Fig. 1. The slope and peak of the average percentages of female physicians on leave did not differ by registered year, but the peak year after registration was delayed among those female physicians registered in 1990s. The mean age of female physicians at registration was 26.0 ± 3.5 SD (standard deviation) and was not significantly different between the 1980s and the 1990s. The average rate of return to work after 20 years after registration was 82.5%, and 35.2% worked continuously without leaving.

3.3. Flux and continuity of female physicians in internal medicine, surgery, pediatrics, and obstetrics and gynecology

The number of female physicians who were classified as "newly registered", "on leave (not registered in any area of practice or registered as 'a physician not in practice')" and "return" in the biennial surveys is shown in Fig. 2. Since 1998, the number of female physicians in the "on leave" category has been greater than the number of female physicians in the "return" category. Of those in the "on leave"

Please cite this article in press as: Kodama T, et al. The working status of Japanese female physicians by area of practice: Cohort analysis of taking leave, returning to work, and changing specialties from 1984 to 2004. Health Policy (2011), doi:10.1016/j.healthpol.2011.07.012

Table 1
The number and percentage of female physicians by area of practice in 1984, 1994 and 2004.

Year of the survey	1984		1994		2004	
Number of whole physicians (male & female)	n=170,469		n=218,215		n=256,656	
(Number of female physicians, % female)	n	%	n	%	n	%
Internal medicine***	6516	8.9	8305	11.8	10,919	14.8
Internal medicine subareas***	352	7.6	1680	9.1	3519	12.5
Pediatrics***	2164	24.3	3608	27.4	4572	31.2
Psychiatry and neurology***	816	11.3	1404	14.2	2315	18.4
Surgery***	189	1.1	479	2.0	1079	4.6
Surgical subareas*	297	2.2	740	3.0	1579	5.0
Obsterics and gynecology***	1396	10.1	1704	13.9	2695	22.2
Ophthalmology	2516	34.5	3618	36.0	4585	36.8
Otolaryngology*	992	14.6	1362	16.3	1667	18.4
Dermatology*	908	27.0	1901	29.6	2956	38.0
Rehabilitation medicine§	–	–	101	13.3	294	17.3
Radiology**	195	9.1	553	14.6	881	18.4
Anesthesiology***	478	18.8	1047	22.6	1859	29.1
General (rotation)***	70	5.7	60	8.4	1275	32.8
Other***	152	2.9	620	12.5	67	25.4
Unknown***	175	5.1	26	12.0	4729	21.4
Total, % female	17,216	10.1	27,208	12.5	42,035	16.4

Note: Chi-squared test examined the data between 1984 and 2004.
* $p<0.05$
** $p<0.01$.
*** $p<0.001$.
§ Chi-squared test examined the data between 1994 and 2004.

Table 2
The area of practice and percentage of female physicians among young physicians under 29 years old.

Years of the survey	1984		1994		2004	
Number of whole physicians (male & female)	n=23,791	%	n=25,886	%	n=25,956	%
Number of female physicians, % female	n=3474	14.6	n=6351	24.5	n=9152	35.3
Area of practice, % female						
Dermatology		41.5	Dermatology	53.2	Dermatology	68.4
Ophthalmology		38.6	Ophthalmology	47.5	Obsterics and gynecology	66.2
Pediatrics		30.0	Pediatrics	44.1	Ophthalmology	51.5
Anesthesiology		24.8	Obsterics and gynecology	37.3	Pediatrics	49.2
Otolaryngology		21.5	Anesthesiology	32.4	Anesthesiology	46.8
Psychiatry and neurology		18.5	Psychiatry and neurology	29.9	Rehabilitation medicine	44.2
Radiology		17.0	Radiology	28.3	Psychiatry and neurology	38.7
Obsterics and gynecology		15.4	Rehabilitation medicine	28.0	Radiology	38.3
Internal medicine		14.7	Internal medicine	26.9	Internal medicine	35.6
Internal medicine subareas		11.7	Otolaryngology	26.6	Otolaryngology	35.6
General (rotation)		9.3	Internal medicine subareas	23.0	General (rotation)	34.8
Surgical subareas		3.8	General (rotation)	17.6	Internal medicine subareas	30.6
Surgery		1.9	Surgical subareas	8.2	Surgery	20.8
Rehabilitation medicine		–	Surgery	6.5	Surgical subareas	15.9

category, the percentage of those who were reported as "a physician not in practice" was 2–3%, whereas the vast majority did not report their working state in any area of practice.

Fig. 3 shows the average flux (change in, return, on leave and change out) and continuity of female physicians using two consecutive NSPs from cohort data of 1984–1994 and 1994–2004 in internal medicine, surgery, pediatrics, and obstetrics and gynecology. The percentage of female physicians continuing in their area of practice has been consistently higher for obstetrics and gynecology (75.7% on average) than for surgery (48.4% on average; minimum 28.4%, maximum 61.7%).

The "change out" percentage was observed to be higher for surgery, while the percentage of "change out" from obstetrics and gynecology to the other areas of practice remained constant at low levels of less than 2%. The percentages of flow-in (change in and return) and flow-out (on leave and change out) were relatively stable for internal medicine even though the number of female physicians increased between 1984 and 2004.

In the comparisons between the percentages of female physicians in the "on leave" and "return" groups for the four areas of practice, there was no remarkable difference between the four areas of practice. The overall average percentage of female physicians "on leave" was approximately 10% (internal medicine, 10.6%; surgery, 9.8%; pediatrics, 11.2%; and obstetrics and gynecology 10.8%). The average percentages of female physicians in the "return" group (internal medicine, 9.4%; surgery, 7.1%; pediatrics, 9.2%; obstetrics and gynecology, 8.5%) were approximately 1% lower than those of female physicians "on leave" in all four areas of practice. For pediatrics and obstetrics and gynecology, the percentages of both "change out" and "change

Please cite this article in press as: Kodama T, et al. The working status of Japanese female physicians by area of practice: Cohort analysis of taking leave, returning to work, and changing specialties from 1984 to 2004. Health Policy (2011), doi:10.1016/j.healthpol.2011.07.012

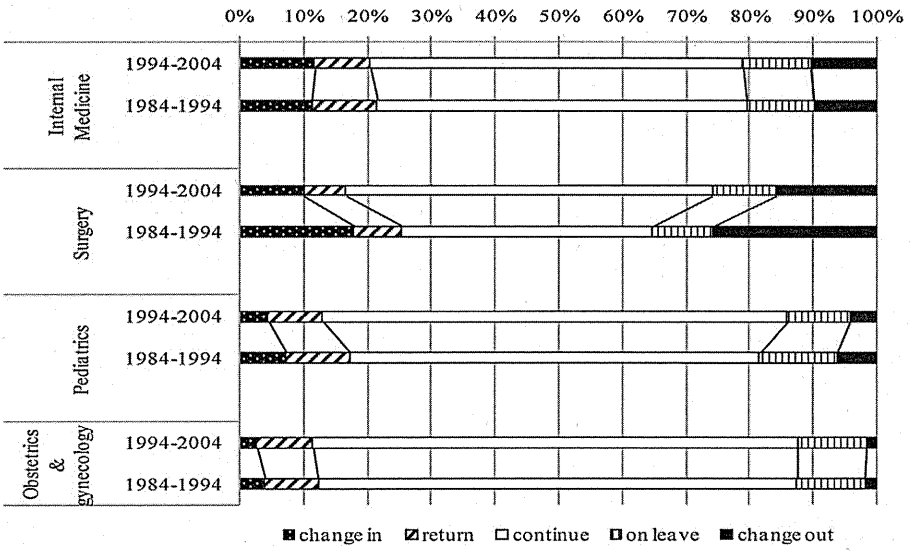


Fig. 3. Average percentage of female physician flux (leave, return, and change in area of practice) and continuity of work from 1984 to 2004. *Note*: The data were obtained from consecutive National Surveys of Physicians between 1984 and 1994 (average of 1984–1986, 1986–1988, 1988–1990, 1990–1992, 1992–1994) and between 1994 and 2004 (average of 1994–1996, 1996–1998, 1998–2000, 2000–2002, 2002–2004) for internal medicine, surgery, pediatrics, and obstetrics and gynecology. Only data for those female physicians with more than 4 years' post-registration experience were used.

in" were less than 5%, values that are lower than those for internal medicine and surgery. Overall, the percentages of female physicians who changed their area of practice ("change in") were, on average, 11.6% for internal medicine; 14.0% for surgery, 6.6% for pediatrics and 3.4% for obstetrics and gynecology. The percentages of those who changed their areas of practice ("change out") were, on average, 10.1% for internal medicine, 20.7% for surgery, 5.0% for pediatrics, and 1.7% for obstetrics and gynecology.

4. Discussion

4.1. Increase in the proportion of female physicians

In 1970, the Japanese government set a target of "securing at least 150 physicians per population of 100,000 by 1985". Since 1973, new medical schools have been established, sharply increasing the number of physicians. The number of medical schools increased to 80 and the number of students to 8360 in 1995, compared with 50 schools and 4380 students in 1970 [21]. The results of this study show that the proportion of female physicians among all newly registered physicians is increasing every year. It was reported that the workforce participation rates of female physicians in their late 20s and 30s have shown a marked decline in Japan, compared to those of male physicians, which have remained at a high level until the age of 65 years [19]. Our study also showed that up to 25% of female physicians leave work after registration. This means that, if the proportion of young female physicians increases in the future, leave-taking by female physicians could seriously affect the total physician workforce. In addition, it was also found in this study that the number of female physicians in the "on leave" category has been greater than the number of female physicians in the "return" category since 1998. Levinson predicted that feminization of the profession would result in changes in the local and social delivery of care but also stated that the overall size of the effect on the workforce was not yet clear [8]. Koike et al. also hypothesized that the increase in the number of female physicians could impact certain specialties for which the percentage of female physicians was originally small and which both male and female new physicians tend to refrain from choosing [20].

Another Japanese study reported that, of female physicians who were qualified for more than 5 years, 6.5% were on leave and 78.0% had taken a part-time position during child-rearing [22]. These data reflect the fact that many female physicians in Japan do not continue their career full-time. The regulation of working hours and a better understanding of maternity and parental leave by colleagues were reported to be important factors enabling female physicians to continue their careers [9,10]. In addition, with respect to specific support for female physicians' child-rearing, Oki et al. indicated a demand for better access to day care facilities and greater flexibility in caring for their sick children in Japan [23]. Therefore, policymakers should carefully monitor the dynamics of the physician workforce to avoid physician shortages in certain areas of practice and should also consider promoting a supportive working environment for physicians to continue their careers.

4.2. Preference of area of practice by female physicians

In this study, we found that dermatology, ophthalmology, and pediatrics retained high proportions of female physicians, whereas the percentages of female physicians increased for obstetrics and gynecology, anesthesiology, surgery and surgical subareas of practice in Japan. The proportion of female physicians under 29 years old in surgery was 20.8%, which might increase, as in other countries; for example, 32% of surgical in the USA are female [24].

Please cite this article in press as: Kodama T, et al. The working status of Japanese female physicians by area of practice: Cohort analysis of taking leave, returning to work, and changing specialties from 1984 to 2004. Health Policy (2011), doi:10.1016/j.healthpol.2011.07.012

Troppmann et al. emphasized the necessity for strategies to include serious consideration of alternative work schedules and optimization of maternity leave and child care opportunities to maximize the recruitment and retention of female surgeons, even though the survey showed that most female surgeons would choose their profession again [25]. In this study, although there was no information about working hours or the work environment of surgeons, the detailed analysis of the data on changing out in this study suggested that the female surgeons who changed their area of practice to internal medicine (24%) might have worked in an insufficiently supportive environment for them to continue their careers in surgery. Other areas of practice into which surgeons changed were gastroenterology (11.3%), anesthesiology (7.3%), pediatric surgery (7.1%), plastic surgery (6.3%), and cardiovascular surgery (5.5%), in descending order of frequency. Female surgeons continuing to work in a subarea of surgery accounted for approximately one third of surgeons in the "change out" group in this study. Even after subtracting these surgeons, the percentage of "change-out" was higher for surgery than for internal medicine, pediatrics, and obstetrics and gynecology.

4.3. Status of "on leave", "return" and area of practice "change"

In Japan, it has been pointed out that physicians become exhausted because of the overwhelming workloads. There was a report in Japan blowing a whistle concerning the overworking of obstetricians who were employed by hospitals. These obstetricians frequently worked more than 60 h per week, particularly those physicians who worked in obstetrics and gynecology [26] However, we observed that the percentages for "change out" and "change in" in obstetrics and gynecology, as well as in pediatrics, were low among female physicians. In addition, the percentage of female physicians in obstetrics and gynecology on leave was not different from that of other areas of practice. This result might indicate that female physicians who prefer to work in the area of obstetrics and gynecology tend to continue their careers. In addition, this study indicated that more young female physicians tend to choose obstetrics and gynecology. Therefore, the necessity of a fundamental review of the working conditions for physicians working in obstetrics and gynecology should be emphasized because both male and female physicians in this area of practice have been required to perform long hours of service.

Recently, in Japan, initiatives such as hiring female physicians part-time or for treating only outpatients have been undertaken to create a better working environment for female physicians with children. Another ongoing countermeasure is the recruitment of female physicians on leave and the creation of a female physician human resource bank by the Japan Medical Association. Certainly, it seems difficult to change the existing working system, which has been built up over a long period of time by huge efforts and personal sacrifices made by physicians, who were almost all male in the past. However, improving working conditions is not only for the benefit of female physicians but for the benefit of male physicians so that all physicians can continue their careers in balance with their personal lives. In the end, it is necessary to improve the entire working system for physicians, particularly for obstetricians, by introducing a rotation system for night-call in local areas in collaboration with physicians at private clinics, managing several part-time working physicians for the treatment of outpatients, and so forth to reduce the burden of physicians working in hospitals. These steps are applicable for all areas of practice experiencing severe shortages of physicians; another study pointed out that the healthcare organizations should develop new practices for attracting new personnel, including talented management [27].

In recent years, the proportion of female physicians "on leave" remained greater than that of female physicians in the "return" group. This difference could be explained by the fact that the percentage of female physicians of reproductive age increased as the result of the recent increase in the number of newly registered female physicians. Japanese healthcare policymakers should understand the patterns of leave-taking by female physicians and should monitor the active workforce of female physicians, which is always influenced by a variety of factors after qualification, especially personal life events, such as marriage and childbearing. Another study indicated that the ratio of female-to-male practice productivity of obstetrician–gynecologists in 10-year age increments from 30- to 60-year-old individuals revealed lower productivity in many variables for the women in the 40–49 age group [28]. Therefore, a more detailed study including an analysis of working hours and conditions is needed to make the future plan suitable for working female physicians in Japan. Finally, retention after 20 years was approximately 80% among Japanese female physicians; thus, there are still huge human resources available if policymakers wisely plan or promote the careers of female physicians and create appropriate working environments in which female physicians can remain in or return to their careers.

4.4. Limitations of the National Survey of Physicians and future implications

It is mandatory for physicians to submit their form to the NSP, and the overall return rate, considering the survival rate, was estimated to be 90.3% [29]. The approach of using only the NSP data has a limitation in accurately determining the percentages of "on leave" physicians because the surveys are conducted only biennially, and therefore it is impossible to determine the number of short-term leaves, including pregnancy and maternity leaves. Furthermore, as the questionnaire forms are sent to the physicians' workplaces, it is also difficult to determine the status of those working at multiple facilities as part-time employees. To accurately determine the dynamic state of a physicians' work status, the questionnaire forms should be sent to and collected from individuals. Another possible approach would be utilizing the Health Insurance Doctor Registry. In Japan, the Public Health Insurance System is well developed; in this system, all physicians who provide medical services to publically insured individuals are required to register with the administrative office of the Social Insurance Agency. If mandatory and periodic collections of the

Please cite this article in press as: Kodama T, et al. The working status of Japanese female physicians by area of practice: Cohort analysis of taking leave, returning to work, and changing specialties from 1984 to 2004. Health Policy (2011), doi:10.1016/j.healthpol.2011.07.012