

Characteristics of Medical School Graduates who Underwent Problem-Based Learning

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Abstract

Introduction: In this study, we compared the choice of medical specialty and subspecialty interest among problem-based-learning (PBL) graduates and non-PBL graduates. **Materials and Methods:** Questionnaires were mailed to a total of 1398 female doctors who graduated from Tokyo Women's Medical University (TWMU) between 1989 and 2003. The response rate was over 30%, giving 248 respondents who had undergone a PBL curriculum (PBL+) and 220 subjects who had not (PBL-). Current specialty of the graduates were compared between the PBL+ and PBL-, and also compared with the general Japanese female doctors (Control 1 and 2) of similar age groups. Respondents were analysed in terms of their interests in subspecialty medical care or general medical practise, which includes comprehensive medical care, primary care and basic medicine. Internal medicine doctors working in the university hospitals were compared with those working outside the university hospitals. Internal medicine doctors were also compared with specialists in ophthalmology, otolaryngology, dermatology and psychiatry. Subjects were compared by odds ratio (OR) to examine group difference in the field of interest. OR >2.0 was considered statistically significant. **Results:** Most doctors in all groups chose internal medicine. More PBL+ internal medicine doctors showed interests in comprehensive medical care and primary care; more PBL+ internal medicine doctors working outside university hospitals showed interest in comprehensive medical care and primary care when compared with those who were working in the university hospitals. The PBL- graduates did not show such a characteristic. **Conclusions:** More PBL+ graduates who chose internal medicine showed interest in holistic medical practices such as primary care and community medicine and more PBL+ specialists showed sustained interest in their respective fields.

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Introduction

Problem-based learning (PBL) is one of the medical education strategies to promote continuous active and self-directed learning.^{1,2} Our medical school implemented PBL in 1990 and currently there are 800 PBL graduates who are practising physicians. Studies have shown that PBL can change learning attitudes among undergraduate students³⁻⁵ but there is not much information available about the outcome of PBL after graduation. In this retrospective study, we investigated whether the PBL programme affected specialty choice and practise interests among PBL graduates

(PBL+) and non-PBL graduates (PBL-) between the years 1989 and 2003.

Materials and Methods

A questionnaire survey was conducted among a total of 1398 females who had graduated from Tokyo Women's Medical University (TWMU) between 1989 and 2003. The study was conducted as part of a large-scale survey that evaluated the outcome of PBL. For the purpose of this study, 10 of the 85 questions from the questionnaire were used for the analysis. The questions used for analysis

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included asking the respondents about their demographic information, experience of PBL tutorial during medical school years, and their interests in specialised fields, comprehensive medical care, primary care or basic medicine. Response to the questions were either in a yes/no, fill in the blank or multiple choice format.

Current specialty of the graduates were compared between the PBL+ and the PBL-, and also compared with the general Japanese female doctors of similar age group (25 to 34 years and 35 to 39 years). The data were obtained from a recent gazette.⁶ Subspecialty interests were divided into specialised fields or general medical care which included comprehensive medical care, primary care and basic medicine. In this study, primary care was defined as medical practice for common diseases or the initial care or treatment provided before referring a patient to a subspecialist. Comprehensive medical care was defined as the holistic medical care based on caring for a patient physically, emotionally and mentally. The subspecialty interests of internal medicine doctors working outside the university hospital were compared with those working in the university hospitals. The subspecialty interests of internal medicine doctors were also compared with other specialists (in ophthalmology, otolaryngology, dermatology and psychiatry). In our study, odds ratio (OR) was used to compare between groups. Higher OR indicated that more physicians were interested in the investigated fields of interest. An OR >2.0 was defined as statistically significant.

A database was organised using Microsoft Office Access 2003[®] and used for subsequent analysis. Data were analysed using the JMP IN 5.0.1a (SAS Institute, North Carolina, USA).

Results

The respondents were grouped into PBL+ and PBL- subjects. The PBL+ subjects (248 of 783; response rate, 31.7%) were graduates between 1996 and 2003 who had experienced PBL tutorials and had undergone a full PBL curriculum during the first 4 years of the undergraduate programme. The PBL- subjects (220 of 615; response rate, 35.8%) were graduates between 1989 and 1994 who had not experienced the PBL curriculum but had undergone a traditional lecture and practical-based curriculum. Year 1995 graduates were excluded because PBL was still under trial then.

The percentage of each subject group in each field of specialty is shown in Table 1. Internal medicine was the most popular choice among all the subject groups (PBL+, PBL-, and the 2 age groups of general Japanese female doctors). However, more PBL+ subjects chose surgery as their specialty compared to the other subject groups. The number of subjects who chose internal medicine (over 30%

Table 1. Percentages (%) of Problem-based Learning (PBL) Graduates, Non-PBL Graduates, and Other Japanese Female Doctors in Each Specialty

Specialty	Subject group (age range in years)			
	PBL+* (25-47)	Control 1† (25-34)	PBL-‡ (33-53)	Control 2§ (35-39)
Internal medicine	33.5	32.4	41.0	35.0
Surgery	12.0	8.5	7.5	6.3
Paediatrics	10.7	9.6	7.0	8.4
Ophthalmology	9.5	9.1	16.0	12.0
Obstetrics and gynaecology	7.9	7.8	3.3	5.6
Psychiatry	3.7	5.0	2.3	6.7
Otolaryngology	3.3	3.2	10.3	3.8
Dermatology	7.0	6.3	5.7	6.8
Others	19.4	24.4	12.6	22.2

* PBL graduates who underwent a hybrid of lectures, practical and PBL tutorials for the first 4 years of a 6-year curriculum

† the general Japanese female doctors of similar age group as PBL graduates (age range, 25 to 34 years) (data obtained from the Ministry of Health, Labour and Welfare)⁶

‡ non-PBL graduates who underwent a traditional lecture and practical-based curriculum with no PBL in the 6-year curriculum

§ the general Japanese female doctors of similar age group as non-PBL graduates (age range, 35 to 39 years) (data obtained from the Ministry of Health, Labour and Welfare)⁶

in all groups) allowed us to compare characteristics within this group of subjects, while the number of subjects in other fields of specialty was too small for further analysis. Therefore, we re-grouped subjects into internal medicine specialist and non-internal medicine specialist to allow more detailed analyses.

Within internal medicine, the distribution of the 3 types of the practises (primary care and community care, specialised fields and “others”) was compared between the PBL+ and the PBL-. 23.7% of the PBL+ physicians were working in primary care and community care, whereas 31.4% of the PBL- group were working in these disciplines. Physicians who practised specialised fields comprised 61.6% of the PBL+ and 61.4% of the PBL- subjects. Physicians who practised other disciplines comprised 14.7% of the PBL+ and 7.1% of the PBL- subjects.

Table 2 shows the subspecialty interests of doctors in internal medicine and non-internal medicine in both the PBL+ and the PBL- groups. In the PBL+ group, more doctors in internal medicine were interested in comprehensive medical care (OR, 1.4) and primary care (OR, 1.8). In the PBL- group, more doctors in internal medicine were interested in comprehensive medical care only. These differences were not significant.

Table 2. Subspecialty Interests of Doctors in Internal Medicine versus Non-Internal Medicine in Both Problem-based Learning (PBL)+* and PBL-† Groups

	PBL+*					PBL-†				
	Internal medicine		Non-Internal medicine		OR	Internal medicine		Non-Internal medicine		OR
	n‡	%§	n‡	%§		n‡	%§	n‡	%§	
Interest in specialised fields	66	87.9	116	92.2	0.6	76	85.5	99	87.9	0.8
Interest in comprehensive medical care	66	83.3	116	77.6	1.4	76	88.2	101	84.2	1.4
Interest in primary care	66	89.4	114	82.5	1.8	76	85.5	101	86.1	1.0
Interest in basic medicine	67	40.3	116	47.4	0.7	74	40.5	101	42.6	0.9

OR: odds ratio

* PBL graduates who underwent a hybrid of lectures, practical and PBL tutorials for the first 4 years of a 6-year curriculum

† non-PBL graduates who underwent a traditional lecture and practical-based curriculum with no PBL in the 6-year curriculum

‡ number of respondents

§ percentage of respondents who answered that she had interest in the subject

Table 3a. Subspecialty Interests of Doctors in Internal Medicine versus Non-Internal Medicine in Both Problem-based Learning (PBL)+* and PBL-† Groups: Comparison Between Those who are Working Outside the University Hospitals

	PBL+*					PBL-†				
	Internal medicine		Non-Internal medicine		OR	Internal medicine		Non-Internal medicine		OR
	n‡	%§	n‡	%§		n‡	%§	n‡	%§	
Interest in specialised fields	31	93.6	57	93.0	1.1	57	80.7	71	90.1	0.5
Interest in comprehensive medical care	31	93.6	57	80.7	3.5	57	87.7	73	84.9	1.3
Interest in primary care	31	93.6	55	85.5	2.5	57	87.7	73	90.4	0.8
Interest in basic medicine	32	31.3	57	45.6	0.5	55	45.5	73	37.0	1.4

OR: odds ratio

* PBL graduates who underwent a hybrid of lectures, practical and PBL tutorials for the first 4 years of a 6-year curriculum

† non-PBL graduates who underwent a traditional lecture and practical-based curriculum with no PBL in the 6-year curriculum

‡ number of respondents

§ percentage of respondents who answered that she had interest in the subject

Table 3b. Subspecialty Interests of Doctors in Internal Medicine versus Non-Internal Medicine in Both Problem-based Learning (PBL)+* and PBL-† Groups: Comparison Between Those who are Working in the University Hospitals

	PBL+*					PBL-†				
	Internal medicine		Non-Internal medicine		OR	Internal medicine		Non-Internal medicine		OR
	n‡	%§	n‡	%§		n‡	%§	n‡	%§	
Interest in specialised fields	35	82.9	58	91.4	0.5	19	100.0	28	82.1	NA¶
Interest in comprehensive medical care	35	74.3	58	74.1	1.0	19	89.5	28	82.1	1.8
Interest in primary care	35	85.7	58	79.3	1.6	19	79.0	28	75.0	1.3
Interest in basic medicine	35	48.6	58	50.0	0.9	19	26.3	28	57.1	0.3

OR: odds ratio

* PBL graduates who underwent a hybrid of lectures, practical and PBL tutorials for the first 4 years of a 6-year curriculum

† non-PBL graduates who underwent a traditional lecture and practical-based curriculum with no PBL in the 6-year curriculum

‡ number of respondents

§ percentage of respondents who answered that she had interest in the subject

¶ not calculable because the denominator is zero

We further classified internal medicine doctors into those working in university hospitals and those working outside the university hospital because of subspecialty variations in the university hospitals. We found that more

PBL+ doctors in internal medicine compared to non-internal medicine who worked outside the university hospitals showed interests in comprehensive medical care (OR, 3.5) and primary care (OR, 2.5). This gave ORs of 2.7

Table 4. Subspecialty Interests of Other Specialists¶ versus Doctors of Internal Medicine in Both Problem-based Learning (PBL)+* and PBL-† Groups

	PBL+*					PBL-†				
	Other specialists¶		Internal medicine		OR	Other specialists¶		Internal medicine		OR
	n‡	%§	n‡	%§		n‡	%§	n‡	%§	
Interest in specialised fields	37	97.3	66	87.9	5.0	57	80.7	76	85.5	0.7
Interest in comprehensive medical care	37	73.0	66	83.3	0.5	57	80.7	76	88.2	0.6
Interest in primary care	36	77.8	66	89.4	0.4	57	85.5	76	84.2	0.9
Interest in basic medicine	37	40.5	67	40.3	1.0	57	38.6	74	40.5	0.9

OR: odds ratio

* PBL graduates who underwent a hybrid of lectures, practical and PBL tutorials for the first 4 years of a 6-year curriculum

† non-PBL graduates who underwent a traditional lecture and practical-based curriculum with no PBL in the 6-year curriculum

‡ number of respondents

§ percentage of respondents who answered that she had interest in the subject

¶ ophthalmology, otolaryngology, dermatology and psychiatry

times (3.5/1.3) higher for comprehensive medical care and 3.1 times (2.5/0.8) higher for primary care when compared with those in the PBL- group. There was no such difference when the same comparison was made among doctors working in the university hospitals (Table 3b).

When the subspecialty interests of doctors in internal medicine were compared with those of other specialists (in ophthalmology, otolaryngology, dermatology and psychiatry), more PBL+ of other specialists showed interest in their specialised fields (OR, 5.0). The same comparison did not show such a difference in the PBL- group (Table 4).

Discussion

PBL tutorial is one of the educational modalities used in medical education.⁷ Our medical school introduced PBL to develop self-directed learning and problem solving ability in undergraduates. Although some studies have evaluated long-term outcomes of PBL,^{8,9} it is not known if this educational modality affects the choice and development of the professional career after graduation. We studied the impact of PBL on the choice of medical subspecialty and whether there were differential characteristics, especially in terms of subspecialty interests, among those doctors who had undergone this educational modality in the medical school.

In our study, we found that more PBL+ graduates specialised in internal medicine who worked outside the university hospital showed interests in comprehensive medical care and primary care. The characteristics were not found in the PBL- group. In addition, more PBL+ of other specialists showed interests in their specialised field but the characteristics were not found in the PBL- group.

Like all other medical schools in Japan, TWUM offers a 6-year medical course. The first-year students are mostly high school graduates with no experience in PBL tutorials. The first 4 years of the curriculum are the preclinical years

and the last 2 years are the clinical years. Before the PBL programme was introduced, students underwent a traditional lecture and practical-based curriculum with no PBL tutorials. After the introduction of the PBL curriculum, the students began to undertake a hybrid of lectures, practicals and PBL tutorials during the first 4-year curriculum. PBL was implemented as an educational modality to link basic science and clinical medicine. A PBL tutorial group consists of 6 to 7 students with a trained tutor as the facilitator. There are two 105-min PBL group tutorials per week, each followed by a self-study period. Four group sessions are needed to complete a clinical case. A total of 49 cases are completed in the 4 preclinical years.

Our study aimed to examine the outcome of PBL curriculum by identifying the characteristics of medical graduates. In comparing the different medical specialty among the PBL+ graduates, PBL- graduates and the general Japanese female doctors, there were not many differences except that more PBL+ graduates chose surgical disciplines.

In our survey, the response rate of the PBL+ group was 31.7% and that of the PBL- group was 35.8%. One third of the total subjects responded and that could mean that we have a biased distribution. While this remains a limitation of our study, we assume that similar subpopulation of the PBL+ group and the PBL- group responded because the response rate of each group was similar.

Internal medicine was the most commonly chosen specialty in all 3 study groups (over 30% in all study groups). Our results indicated that PBL+ doctors in internal medicine tended to show an interest in primary care and comprehensive medical care. However, the actual type of practice within the internal medicine discipline showed that more PBL- doctors in the internal medicine were working as primary care or community care doctors. This result could be explained by the different age of the PBL+ and the PBL- groups. PBL+ doctors in the current study

were younger than the PBL- physicians and therefore were likely to be still under postgraduate training at university hospitals or teaching hospitals. Internal medicine in teaching hospitals is usually divided into subspecialties. This characteristic interest in comprehensive medical care or primary care was clearly observed when data from PBL+ physicians who were working outside the university hospitals were analysed (Table 3a). Some studies have shown that PBL is effective for the learning and application of holistic care,⁹⁻¹¹ where graduates of a PBL+ curriculum preferentially chose specialties related to holistic care such as family practice. In Japan, family practice is not legally a professional specialty, making it an unpopular specialty. Even so, PBL+ graduates demonstrate a strong interest in holistic care.

Comparing the subspecialty interest between doctors who were in internal medicine and those who chose specialties such as ophthalmology, otolaryngology, dermatology and psychiatry, the PBL+ group showed more interest in their specialties compared to the PBL- group. The increased interest in holistic care demonstrated by the internal medicine doctors and the greater sustained interest in their respective subspecialties demonstrated by these specialists showed the favourable characteristics of the PBL graduates. The PBL programme may have promoted a more proactive and reflective selection of the respective subspecialty by the graduates. The PBL programme may reinforce the characteristics necessary to build strong commitment to the chosen specialty.

In conclusion, more PBL+ graduates who chose internal medicine showed interest in holistic medical practices such as primary care and community medicine. Our results imply that the undergraduate PBL curriculum of our medical schools may affect specialty choice and current interests of female doctors who graduated from our university. More detailed studies are required to further elaborate on and

detail the nature and scope of PBL influence in order to support our speculations.

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