Environ Health Prev Med (2014) 19:414–421
DOI 10.1007/s12199-014-0408-4

REGULAR ARTICLE

Patient's recognition level of medical terms as estimated by pharmacists

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Received: 9 May 2014 / Accepted: 22 August 2014 / Published online: 3 September 2014

Abstract
Objectives The role of pharmacists in the healthcare settings is expanding and pharmacists are expected to counsel patients and/or caregivers regarding the appropriate use of a drug. However, we believe that communication between healthcare providers and patients may be limited by overestimation of patients' recognition level of medical terms by providers. The purpose of this study was to clarify patients' recognition level of medical terms, mainly related to drugs, as estimated by pharmacists to contribute to improving risk communication in the medical care field.
Methods A total of 211 medical doctors and 212 pharmacists were surveyed. Differences between patients' recognition level of medical terms as estimated by medical doctors and pharmacists were assessed. In total, 90 medical terms were evaluated, including 57 medical terms from the National Institute for Japanese Language and an additional 33 medical terms.
Results Patient's recognition level of the selected medical terms as estimated by pharmacists was higher than that estimated by medical doctors.
Conclusions Compared with medical doctors, pharmacists tend to overestimate patients' recognition level of medical terms. Therefore, pharmacists need to take greater care to ensure that their patients fully understand the risks and benefits of the drugs.

Keywords Risk communication · Perception gap · Shared decision-making · Medical term · Regulatory science

Introduction

In the medical care field, pharmaceutical products have a huge benefit that illness is treated through their bioactivity, but they also have risks, i.e., drug adverse effects. Concern over the drug adverse effects of new medicines is an important topic to address.

Furthermore, the concept of the shared decision-making has been evaluated for medical treatments [1], and recently the active participation of the patient in his or her treatment is also positively demanded in Japan [2].

Under such situations, we face perception gaps in pharmaceutical terms and related issues between patients and medical practitioners, which is one of the obstacles in practicing risk communication between them. To tackle this issue, Koch-Weser [3] examined medical word use in clinical encounters. The medical terms were checked to confirm their specific meaning in the healthcare field [4]. Chapman et al. [5] suggested that a substantial proportion of the laypeople do not understand phrases often used in cancer consultations. Chapple et al. [6] also suggested that the language used in the medical care field was often confusing and misunderstood by the families involved. Bass et al. [7] showed that the resident physicians overestimated the literacy abilities of their patients. There is a report on qualitative research from the viewpoint of risk

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evaluation in intensive care medicine [8]. In addition, the study says that the emphasis on appropriate medication counseling should not be limited to medications available only by prescription [9]. In Japan, we think there is still the specificity of "difference in recognition" and "difference in information" between patients and medical practitioners.

With regard to the information on adverse effects of medicine, a study was conducted in Japan by the National Institute for Japanese Language on the underlying recognition of medical terms by laypeople [10], but clinical trial terms and adverse effect terms were not examined at all in this research. Recently, clinical trials have been conducted vigorously and rigorously not only in Japan but also in China and other Asian countries [11, 12]. Therefore, in our previous study, we have conducted to elucidate the gaps in basic recognition of technical medical terms including clinical trial terms, adverse effect terms as well as the terms that the National Institute for Japanese Language examined between laypeople and medical doctors [13].

It has been introduced that the 6 years school period system of School of Pharmacy in Japan since 2006. In addition, according to Item 2 of Article 25 of the revision of the Pharmacist Law of 1996, pharmacists are required to counsel patients and/or caregivers regarding the appropriate use and potential side effects of the drugs [14]. Therefore, it is critical that pharmacists be able to accurately assess the health literacy of their patients to effectively communicate the necessary information. However, in our previous study, pharmacists were not surveyed as the subjects. Therefore, this time the patient's recognition level of medical terms estimated by pharmacists was surveyed.

In addition, Incorporated Administrative Agency Pharmaceuticals and Medical Devices Agency (PMDA) performs its three important services such as reviewing the application of new drugs, pharmaceutical products safety measures and the pharmaceutical products adverse effect damage relief based on the law of PMDA [15]. Given its increasing role in the pharmaceutical setting, it is extremely important that pharmacists recognize PMDA. Therefore, the recognition of this agency was also investigated.

Methods

The study protocol was approved by the Ethics Committee of the Graduate School of Medicine, Nagoya University prior to data collection.

Subject

Medical doctors and pharmacists were collected as the subject. The collection of the answer was performed under contract with NTT Rezonanto Co., Ltd. using an Internet survey monitored by Goo Research contractors. A two-step method was adopted for the selection of pharmacists, similar to the selection of medical doctors in our previous study [13]. First, a subgroup of healthcare workers was examined. Then, the respondents who answered that they were pharmacists were directed to subsequent questions.

The research was performed on the basis of the rules of NTT Rezonanto Co., Ltd. Samples representing 110 % of the target number were collected and submitted to us after removing inappropriate samples. A total of 212 pharmacists were selected between Jan 18, 2012, and Jan 23, 2012, and a total of 211 medical doctors were selected between Feb 9, 2011, and Feb 11, 2011 [13].

Demographic data regarding pharmacists, such as their age, gender, location and scale of work place, experience of communicating directly with patients, and experience of participation in clinical trials, were collected in this study. Data regarding medical doctors, such as their age, gender, medical treatment department, scale of the medical institution, number of patients examined per day, and experience of participation in clinical trials, were collected in our previous study [13].

Medical terms

Differences between patients' recognition level of 90 medical terms as estimated by medical doctors and pharmacists were examined. The 90 medical terms consisted of 57 medical terms from the National Institute for Japanese Language [10] and an additional 33 medical terms [13].

The medical terms of the National Institute for Japanese Language were classified into 3 groups (A–C). Group A was "expressed in other words of vernacular speech" and included 13 medical terms such as ileus, evidence, and remission. Group B was "explained definitely" and was subdivided into 3 groups: Group B1 was "had to explain the correct meaning to the patients" and included 15 medical terms such as insulin, virus, and inflammation; Group B2 was "understood roughly but required more explanation to provide a reliable meaning" and included 17 medical terms such as malignant tumor, congestion, and depression; and Group B3 was "understood well, but the meanings that are used in the hospital are a little different from the meanings in vernacular speech. Therefore, avoiding confusion is important." and included the terms complications, shock, and anemia. Group C was categorized into 3 subgroups according to the study of the National Institute for Japanese Language [10]. Four medical care terms, i.e., informed consent, second opinion, guidelines, and clinical pass, were needed to explain important, new concepts. Three medical care terms, i.e., QOL, palliative care, and primary care, were needed to describe a new concept concerned with medical care and

valuing everyday life. Two medical care terms for new medical instruments, MRI and PET were included to verify if laypeople knew whether they were receiving appropriate medical care. In total, 9 medical terms were listed. In this study, we combined all 3 subgroups of group C because they can all be categorized as terms needed to explain important, new concepts.

Furthermore, we targeted 7 medical terms that are primarily used in clinical trials, such as clinical investigation, GCP, and phase one clinical trial stage in group D. In addition, 26 medical terms related to adverse effects, such as anaphylaxis, Stevens–Johnson syndrome, and toxic necrolysis, were included in group E. In total, 90 medical terms were adopted as the target words. Perception of PMDA was also evaluated.

Analysis

Medical doctors and pharmacists evaluated each medical term using a scale of 1–5: (1) "I do not think that patients know," (3) "I cannot tell clearly whether patients know or not," and (5) "I think that patients know." This recognition was termed "patients' recognition level estimated by the medical doctors or pharmacists." In analyzing, (4) and (5) out of (1) to (5) were used as "I think that patients know".

Medical doctors and pharmacists also evaluated their recognition of PMDA using a scale of 1–3: (1) "I do not know PMDA," (2) "I have an experience to hear the PMDA," and (3) "I know PMDA." This recognition was termed "recognition level of the PMDA by the medical doctors or pharmacists." In analyzing, 3 was used as "I know the PMDA".

The Chi-square test was applied to analyze the differences between patient's recognition level of medical terms as estimated by medical doctors and by pharmacists. The Chi-square test was also applied to analyze the difference in the recognition level of PMDA by medical doctors and by pharmacists.

Results

Demographics

Table 1 shows the demographic characteristics of the survey respondents. In the present study, we obtained responses from 212 pharmacists (97 men and 115 women). For medical doctors, we used data from our previous study [13] in which responses were obtained from 211 medical doctors (194 men and 17 women). A statistically significant difference was observed in the age of medical doctors by gender. The majority of male medical doctors (43.3 %) were aged 40–49 years, whereas the majority of female doctors (58.8 %) were aged 30–39 years. On the other hand, though a statistically significant difference was also observed in the age of pharmacists by gender, the majority of male pharmacists (34.0 %) were 30–39 and also the majority of female pharmacists (35.7 %) were aged 30–39 years. A significant difference was also observed in the clinical trial experience of pharmacists by gender; 35.1 and 21.7 % male and female pharmacists, respectively, had clinical trial experience.

Difference between medical doctors and pharmacists with respect to patients' recognition level of the 90 medical terms

Table 2 shows patients' recognition level of the 90 medical terms as estimated by medical doctors and pharmacists.

Compared with medical doctors, pharmacists showed higher estimates of patients' recognition level for all 13 terms in group A, with 30.8 % (4 out of 13) terms being estimated significantly higher. Furthermore, pharmacists showed higher estimates of patients' recognition level for all terms in group B, with the estimates being significantly higher for 40.0 % (6 out of 15) terms in group B1, 52.9 % (9 out of 17) terms in group B2, and 66.7 % (2 out of 3) terms in group B3.

Among all 9 medical terms in group C, pharmacists' estimates of patients' recognition level of 8 medical terms excluding one term such as "MRI" were higher. The difference was statistically significant for only 1 of the 8 terms(12.5 %).

In group D, pharmacists showed higher estimates than medical doctors for all terms, and the difference was significant for 57.1 % (4 out of 7) terms.

Lastly, in group E, pharmacists' estimates were higher for all terms except 2, "ventricular tachycardia" and "alveolar hemorrhage", and 50.0 % (12 out of 24) terms were estimated significantly higher.

Difference between pharmacists with and without clinical trial experience with respect to patients' recognition level of 90 medical terms

Pharmacists with clinical trial experience ranked patients' recognition level at 70 out of 90 medical terms higher than pharmacists without experience. As shown in Table 3, the difference was statistically significant for 10 of these 70 terms. These 10 terms included 1 term from group C, 4 from group D, and 5 from group E. On the other hand, there was no statistically significant difference for the 20 medical terms that were estimated higher by pharmacists without clinical trial experience.

Table 1 Demographic characteristics of respondents

	Medical doctors				Pharmacists		
	Sex				Sex		
	Male ($n = 194$)	Female ($n = 17$)			Male ($n = 97$)	Female ($n = 115$)	
Age				Age			
20–29	5 (2.6 %)	2 (11.8 %)	**	20–29	13 (13.4 %)	24 (20.9 %)	**
30–39	39 (20.1 %)	10 (58.8 %)		30–39	33 (34.0 %)	41 (35.7 %)	
40–49	84 (43.3 %)	4 (23.5 %)		40–49	32 (33.0 %)	26 (22.6 %)	
50–59	56 (28.9 %)	1 (5.9 %)		50–59	16 (16.5 %)	21 (18.3 %)	
60–69	3 (1.5 %)	0 (0.0 %)		60–69	1 (1.0 %)	3 (2.6 %)	
70 or more	7 (3.6 %)	0 (0.0 %)		70 or more	2 (2.1 %)	0 (0.0 %)	
Institute				Institute			
Clinic (no beds)	60 (30.9 %)	4 (23.5 %)	n.s.	Own the pharmacy	5 (5.2 %)	0 (0 %)	n.s.
Clinic (1–19 beds)	12 (6.2 %)	0 (0.0 %)		Working at pharmacy	52 (53.6 %)	86 (74.8 %)	
Hospital (20–99 beds)	15 (7.7 %)	0 (0.0 %)		Clinic pharmacy	1 (1.0 %)	0 (0.0 %)	
Hospital (100–199 beds)	32 (16.5 %)	3 (17.6 %)		Hospital pharmacy (20–99 beds)	3 (3.1 %)	7 (6.1 %)	
Hospital (200 beds or more)	75 (38.7 %)	10 (58.8 %)		Hospital pharmacy (100 beds or more)	33 (34.0 %)	19 (16.5 %)	
				The others	3 (3.1 %)	3 (2.6 %)	
Department				Deliver the drug information			
Internal medicine	83 (42.8 %)	9 (52.9 %)	n.s.	Yes	95 (97.9 %)	115 (100. %)	n.s
Surgery	78 (40.2 %)	6 (35.3 %)		No	2 (2.1 %)	0 (0.0 %)	
The others	33 (17.0 %)	2 (11.8 %)					
No of outpatients/day				Participation in clinical trials			
9 or less	23 (11.9 %)	3 (17.6 %)	n.s.	Yes	34 (35.1 %)	25 (21.7 %)	*
10–19 Person	33 (17.0 %)	4 (23.5 %)		No	63 (64.9 %)	90 (78.3 %)	
20–29 Person	37 (19.0 %)	3 (17.6 %)					
30–39 Person	19 (9.8 %)	4 (23.5 %)		Type of participation in clinical trials[a] ($n = 59$)			
				Management of drugs	32 (94.1 %)	19 (76.0 %)	
40 Person or more	82 (42.3 %)	n (17.6 %)		Clinical	5 (14.7 %)	2 (8.0 %)	
Participation in clinical trials				Examinee	2 (5.9 %)	0 (0.0 %)	
Yes	116 (59.8 %)	11 (64.7 %)	n.s.				
No	78 (40.2 %)	6 (35.3 %)		The others	3 (8.8 %)	5 (20.0 %)	

[a] multiple answers were welcomed

n.s. not significant

χ^2 test: ** $p < 0.01$,* $p < 0.05$

Difference between medical doctors and pharmacists with respect to recognition level of PMDA

There was a statistically significant difference between medical doctors and pharmacists with respect to recognition of PMDA: 27.0 and 65.1 % (χ^2 test: $p < 0.01$), respectively. When evaluating in terms of demographic characteristics, there were statistically significant differences in recognition of PMDA between male (74.2 %) and female (57.4 %) pharmacists, between age groups of <40 years (73.0 %) and ≥40 years (56.4 %), and between pharmacists with clinical trial experience (83.1 %) and those without it (58.2 %). On the other hand, we could not find any significant difference among medical doctors in terms of demographic characteristics.

Discussion

Recently, Internet surveys have become widely used and accepted in the medical sociology field in Japan [16]. Internet surveys are useful because answers can be obtained in a rather short period of time by evaluating parameters previously registered with an Internet research company.

Table 2 Difference between medical doctors and pharmacists with respect to patients' recognition level of the 90 medical terms

Group	Medical term	Estimated by the medical doctors ($n = 211$) Know[a] (%)	Estimated by the pharmacists ($n = 212$) Know[a] (%)	test
A	Critical condition	65.9	77.8	**
	Prognosis	54.5	71.7	**
	Tolerance	49.3	65.1	**
	Aspiration	45.5	53.8	n.s.
	MRSA	44.1	50.5	n.s.
	Biopsy	37.9	42.5	n.s.
	Infiltration	33.2	39.6	n.s.
	Evidence	30.3	39.6	n.s.
	Remission	30.3	39.2	n.s.
	Deliria	30.3	37.7	n.s.
	Ileus	29.4	32.5	n.s.
	ADL	28.9	29.7	n.s.
	COPD	24.6	40.6	**
B1	Virus	78.2	89.2	**
	Metabolic syndrome	74.9	83.0	*
	Tumor	71.1	77.4	n.s.
	Insulin	70.6	82.5	**
	Ulcer	68.7	73.6	n.s.
	Inflammation	66.4	89.2	**
	Be taken as needed	62.1	70.3	n.s.
	Renal insufficiency	59.2	68.4	n.s.
	Geriatric health services facilities	55.0	59.9	n.s.
	Steroid	52.1	70.8	**
	Tumor marker	46.9	54.7	n.s.
	Group home	44.1	50.5	n.s.
	Symptomatic treatment	42.7	56.6	**
	Sepsis	35.5	38.2	n.s.
	Connective tissue disease	33.2	42.0	n.s.
B2	Diabetes	85.3	92.9	*
	Adverse drug effect	82.5	89.2	n.s.
	Malignant tumor	81.5	87.7	n.s.
	Asthma	80.6	87.3	n.s.
	Arteriosclerosis	80.1	86.3	n.s.
	Depression	75.8	84.9	*
	Heat stroke	72.0	87.3	**
	Polyp	60.7	71.7	*
	Brain death	59.7	78.3	**
	Cirrhosis	58.8	70.3	*
	Death with dignity	51.2	58.5	n.s.
	Chemotherapy	48.3	53.3	n.s.
	Jaundice	47.9	59.9	*
	Anamnesis	42.7	50.5	n.s.
	Antibody	40.8	49.1	n.s.
	Clinical trial	34.6	49.1	**
	Congestion	32.2	45.8	**
B3	Anemia	72.5	91.0	**
	Complication	65.4	69.3	n.s.
	Shock	43.6	59.0	**

Table 2 continued

Group	Medical term	Estimated by the medical doctors ($n = 211$) Know[a] (%)	Estimated by the pharmacists ($n = 212$) Know[a] (%)	test
C	MRI	51.7	50.9	n.s.
	Informed consent	44.5	46.7	n.s.
	Second opinion	44.1	54.2	*
	Palliative care	35.1	40.1	n.s.
	Guidelines	34.6	39.2	n.s.
	PET	32.7	34.0	n.s.
	QOL	28.9	36.3	n.s.
	Primary care	25.1	26.9	n.s.
	Clinical pass	20.4	21.7	n.s.
D	Clinical investigation	29.9	39.2	n.s.
	Placebo	25.6	36.8	*
	Double blind trial	22.7	33.0	*
	Phase three clinical trial	15.2	20.3	n.s.
	Phase one clinical trial	14.7	23.1	*
	Phase two clinical trial	13.3	20.3	n.s.
	GCP	8.5	18.4	**
E	Anuresis/difficulty of urination	38.9	51.9	**
	Bleeding tendency	37.9	53.8	**
	Hypothyroidism	33.6	41.0	n.s.
	Thrombosis	32.2	40.1	n.s.
	Medicamentosus stomatitis	28.4	41.0	**
	Anaphylaxis	26.1	38.7	**
	Peripheral neuropathy	24.2	32.5	n.s.
	Nephrotic syndrome	24.2	31.6	n.s.
	Aplastic anemia	21.8	34.9	**
	Ataxia	20.9	28.8	n.s.
	Edema of lung	20.4	24.5	n.s.
	Interstitial pneumonia	19.9	31.1	*
	Rhabdomyolysis	19.9	31.1	*
	Ventricular tachycardia	19.9	19.8	n.s.
	Stevens-Johnson syndrome	19.4	29.7	*
	Agranulocytosis	19.4	26.4	n.s.
	Guillain–Barre syndrome	19.4	21.7	n.s.
	Angioedema	19.0	25.5	n.s.
	Drug-related parkinsonism	18.5	26.9	*
	Malignant syndrome	17.5	28.3	*
	Alveolar hemorrhage	17.1	17.0	n.s.
	Pseudohyperaldosteronism	16.1	25.5	*
	Dyskinesia	16.1	20.3	n.s.
	Toxic necrolysis	15.6	23.1	n.s.
	Akathisia	12.3	17.0	n.s.
	Hand-and-feet syndrome	11.8	21.2	*

[a] 1 means "I do not think that patients know". 3 means "I cannot tell clearly whether the patient knows or not", 5 means "I think that patients know." In analyzing, 4 and 5 out of 1–5 were used as "I think that patients know"

n.s. not significant

χ^2 test: ** $p < 0.01$,* $p < 0.05$

On the other hand, a face-to-face interview usually yields more detailed information such as the degree of the recognition level of medical terms. We believe that one of the limitations of this study is that responses were obtained using Internet surveys and may thus be superficial to some extent.

Table 3 Difference between pharmacists with and without clinical trial experience with respect to patients' recognition level of the 90 medical terms

Group	Medical term	Estimated by the pharmacists[a] (%)		
		Experience of clinical trials		
		Yes ($n = 59$) Know	No ($n = 153$) Know	Test
C	Clinical pass	33.9	17.0	*
D	Phase one clinical trial	35.6	18.3	*
D	Phase two clinical trial	32.2	15.7	**
D	Phase three clinical trial	32.2	15.7	**
D	GCP	27.1	15.0	*
E	Ataxia	39.0	24.8	*
E	Malignant syndrome	39.0	24.2	*
E	Drug-related parkinsonism	37.3	22.9	*
E	Ventricular tachycardia	32.2	15.0	**
E	Alveolar hemorrhage	27.1	13.1	*

[a] 1 means "I do not think that patients know". 3 means "I cannot tell clearly whether the patient knows or not", 5 means "I think that patients know." In analyzing, 4 and 5 out of 1–5 were used as "I think that patients know"

n.s. not significant

χ^2 test: ** $p < 0.01$,* $p < 0.05$

Our previous study showed that the eldest citizen group had the highest understanding of the 90 medical terms selected [13], indicating that the elderly persons who are computer literate enough to participate in the Internet survey are also the most healthcare literate. It is possible that this trend also applies to medical doctors and pharmacists. Therefore, this can be considered another limitation of this study.

Our previous study indicated that there was a huge gap in laypeople's recognition level of medical terms and the recognition level as estimated by medical doctors, particularly with respect to more difficult medical terms [13].

This study showed that pharmacists tend to estimate patients' recognition level of medical terms higher than medical doctors. More than 50 % of medical terms which has been observed the statistically significant differences between medical doctors and pharmacists were group B2, B3 and D. Group B2 was defined as "understood roughly but required more explanation to provide a reliable meaning" and Group B3 was defined as "understood well, but the meanings that are used in the hospital are a little different from the meanings in vernacular speech". We think recently pharmacists are requested to explain the information of drug to a patient rigorously and vigorously but even now they do not have an enough chance to check whether patient's recognition is appropriate or not. Therefore, pharmacists need to consider that even when they explain the easier medical to patients, they need to explain them with the viewpoint of avoiding confusion. Given that one of the most important duties of a pharmacist is to provide information and counseling on the drug when it is dispensed [14], pharmacists need to be aware that patients' recognition level is likely to be much lower than what they perceive.

Group D was defined as "medical terms that are primarily used in clinical trials". Our previous study showed that this group was the most difficult group for patients. In addition, in this study, pharmacists with clinical trial experience tended to estimate patients' recognition level of medical terms higher than pharmacists without clinical trial experience. In addition, the 10 medical terms with statistically significant difference consisted of 1 medical term in group C of new concepts, 4 medical terms in group D of the clinical trial-related terms, and 5 medical terms in group E of the medical care terms related to adverse effects. We think that pharmacists deliver the drug information to patients who have already seen their medical doctors and have been familiar with the medical words. This fact influences the patients' recognition level which pharmacists estimated, especially for the pharmacists with clinical trial experience because they have a chance to talk about the patients who were taken of informed consent by medical doctors to be involved in the clinical trials. The main role of pharmacists in clinical trials is to manage the drugs that are used to evaluate the efficacy and safety. Thus, it is possible that these pharmacists had so many opportunities to hear or see the clinical trial-related terms and adverse effect terms during the clinical trials that they estimated patients' recognition level to be higher.

Conversely, our previous study showed that patients' recognition level as estimated by medical doctors with clinical trial experience was lower than that by medical doctors without clinical trial experience [13]. Based on these results, we believe that clinical trials foster better communication between medical doctors and patients.

Furthermore, pharmacists need to convey not only the information on the safety and efficacy of drugs but also, if necessary, information regarding the role of PMDA to a patient so that they can be prepared to deal with potential adverse effects.

With the development of more targeted pharmaceutical therapeutics, the role of pharmacists in the healthcare settings is expanding. Pharmacists are now expected to act as clinical research coordinators in medical institutes such as Incorporated Administrative Agency National Hospital Organization of Japan [17]. Moreover, pharmacists work

more closely than ever with other healthcare providers, including medical doctors and nurses, in hospital environments in Japan [18].

With the increasing recognition of the value of shared decision-making in the medical field [1] and the consequent increasing solicitation of active patient involvement in his/her treatment in Japan [2], pharmacists as well as medical doctors need to be aware of the limitations of patients' recognition level of medical terms. Patients and/or caregivers are unlikely to fully comprehend pharmaceutical terms and the related issues. Therefore, pharmacists as well as medical doctors must take great care to do the risk communications of pharmaceutical therapies vigorously and rigorously.

This is particularly true for pharmacists who tend to overestimate the understanding of their patients. Therefore, we believe that training on effective communication with patients should be added to the educational curriculum of pharmacists that has been reformed as the 6-year education period system in Japan since 2006 with viewpoint of regulatory sciences.

Acknowledgments This study was partially supported by JSPS KAKENHI Grant Number 22590584 from the Japan Society for the Promotion of Science.

Conflict of interest The authors declare that they have no conflicts of interests.

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