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Japanese Community Pharmacists' Practice Research Literacy

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Abstract

Objectives: Lack of basic practice research literacy could be considered a barrier to conducting or participating in practice research. Therefore, we examined pharmacy practice research literacy in Japanese community pharmacists. Methods: Community pharmacists (n = 478) who delivered presentations at three major pharmacy-related conferences in 2012 and 2013 completed the survey. We selected 10 key terms related to practice research and asked participants whether they knew the meaning of. Questionnaires were sent to and returned by pharmacists via mail. Results: Of the 478 pharmacists who received questionnaires, 230 (47.9%) completed the survey. The response rates indicating that participants were familiar with the 10 key terms were approximately 50% or lower. The highest response rate was 67.0% for "bias", and the lowest was 17.0% for "PICO/PECO: Patient-Intervention-Comparison-Outcome/Patient-Exposure-Comparison-Outcome". Younger pharmacists tended to know several key terms, such as "p values", "bias", and "outcome". Conclusion: Japanese community pharmacists were not knowledgeable with respect to conducting and participating in pharmacy practice research. Practice research knowledge was superior in younger pharmacists. Education in pharmacy schools and continuing professional development programs is important for community pharmacists' practice research development.

Keywords

Pharmacy Practice Research, Research Literacy, Japanese Community Pharmacists

1. Introduction

The community pharmacy profession, which was previously product focused, now involves patient-focused practice. There is a need to establish evidence-based practice to expand the field, as it is the only practice accepted

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by other healthcare practitioners. In addition, consumers and patients have become more informed and demanding with respect to the services offered by pharmacists [1].

Pharmacy practice research topics, such as service provision, delivery, and development; pharmacists' professional activities; and service quality and safety, are widespread in the field of pharmaceutical service [2]. However, pharmacists are sometimes reluctant to conduct or participate in practice research [3].

There are some reviews of pharmacy practice research that intervention of community pharmacists can improve patient outcome research in blood pressure management, smoking cessation and chronic pain [4]-[6]. These researches became good evidence that community pharmacists can contribute to manage disease and promote healthcare system. However, the pharmacy practice research by Japanese community pharmacists has yet to be active [7].

We previously identified a number of barriers to conducting or participating in practice research and reported that Japanese community pharmacists were inactive in terms of practice research. The greatest barrier was a lack of time [7]. Other studies have also identified lack of time as pharmacists' main barrier to conducting or participating in practice research [1] [8] [9].

Armour *et al*. categorized barriers to participating in research as follows: mindset, communication, infrastructure (time, money, and staff), and skills and knowledge [1]. They also suggested that most Australian pharmacists lacked some of the skills and/or knowledge required to conduct research [1]. In addition, a shortage of knowledge related to practice research was found to be a hidden barrier to conducting or participating in practice research in Japanese community pharmacists.

We conducted a survey to determine whether Japanese community pharmacists were familiar with essential key terms related to practice research. We also explored the relationship between practice research activities and pharmacy education.

2. Method

This survey was carried out a part of "Japanese Community Pharmacists' Barriers to Conducting or Participating in Practice Research" [7]. Community pharmacists who had delivered presentations at three major pharmacy-related conferences (annual meetings of The Pharmaceutical Society of Japan [10], Japanese Society of Pharmaceutical Health Care and Sciences [11], and Japan Pharmaceutical Association [12]) in 2012 and 2013 were selected using the annual meetings' abstracts. Their addresses were identified according to the author's occupation, and community pharmacists (n = 478) were selected to participate in the study.

We selected 10 key terms commonly used to structure clinical questions, establish study designs, and evaluate results in practice research. These key terms are fundamental terms to do practice research. It would be acceptable that without of knowledge of these terms, pharmacists would not conduct or participating in practice research. All participants provided informed consent to participate in the study; they were then asked whether they were familiar with each key term. Questionnaires were sent to and returned by pharmacists via mail.

The questionnaire included items concerning participants' age and sex, years of experience in their current employment, the type of research described in their presentations, and their familiarity with 10 key terms.

Statistical analysis was performed using JMP Version 11.0 (SAS Institute Japan). Chi-square was used to analysis whether proportions of "know" responses in each key term differ from one another variable. Cochran-Armitage test was used to assess a trend of proportions of "know" responses in each key term on age. The McNemar's test was used to assess the significance of the difference between two correlated proportions for dependent (paired) categorical data. The test can assess whether a proportion of "know" responses in one key term differ from a proportion of "know" responses in another key term. The significance level was set at 0.05 for all tests.

3. Results

Of the 478 pharmacists who received the questionnaire, 230 (47.9%) completed the survey. **Table 1** summarizes the community pharmacists' characteristics. Large proportions of pharmacists were in their 30s or 40s and had 5 - 20 years of practice experience. The majority of participants who conducted practice research had at least five years of practical experience. More than one third of participants' presentations introduced their daily practice, and many provided little evidence of their pharmacy practice research. Intervention studies, involving a higher

Table 1. Community pharmacists' characteristics.

Characteristics	Total N = 230
Sex n (%), missing: 3	
Male	152 (67.0)
Female	75 (33.0)
Age n (%), missing: 1	
20s	27 (11.8)
30s	93 (40.6)
40s	54 (23.6)
50s	39 (17.0)
>60s	16 (7.0)
Years of practical experience n (%), missing: 4	
<2 years	7 (3.1)
2 - 5 years	33 (14.6)
5 - 10 years	74 (32.7)
10 - 20 years	70 (31.0)
>20 years	42 (18.6)
Type of research n (%), missing: 7	
Introduction of practice	94 (42.1)
Observation study	68 (30.5)
Intervention study	18 (8.1)
Other	43 (19.3)

evidence level, comprised only 8% of all presentations. Approximately 60% of presentations were presented using a poster.

Table 2 shows the numbers and proportions of pharmacists who recorded "know" responses for the key terms. Although all key terms were common in practice research, "know" response rates for the 10 key terms were approximately 50% or lower. The highest was 67.0% for "bias" and the lowest was 17.0% for "PICO/PECO: patient-Intervention-Comparison-Outcome/Patient-Exposure-Comparison-Outcome". These results suggest that Japanese community pharmacists were not knowledgeable regarding practice research. However, terms used in statistics, such as "p value" and "95% confidence interval" were well known, and those related to structuring clinical questions, such as "clinical question", "research question", and "PICO/PECO" were less well known by Japanese community pharmacists.

Table 3 shows the effect of age on "know" response rates forthe10 key terms. Results of the Cochran-Armitage test showed that a higher number of younger pharmacists were familiar with "p value" ($p = 0.021$) relative to that of senior pharmacists. In addition, although the differences were nonsignificant, a higher number of younger pharmacists were familiar with several key terms, such as "bias" ($p = 0.071$) and "outcome" ($p = 0.115$), relative to that of senior pharmacists.

Table 4 shows the McNemar test p values for correlations between paired proportions of participants who were familiar with key terms. In these cases, if p values were greater than 0.05, the two proportions involved were considered dependent, suggesting that participants who were familiar with one term were also familiar with another. Pharmacists who were familiar with "clinical question" were also familiar with "research question" and "confounding". Pharmacists who were familiar with "reliability and validity" were also familiar with "observational and intervention study". In addition, pharmacists who were familiar with "p value" were also familiar with "95% confidence interval". These results indicate that some pharmacists were knowledgeable about statistics and study design in practice research, while others were not.

Table 2. Numbers and proportions of pharmacists who provided "know" responses.

Key terms	Number (%)
Clinical question	59 (25.7)
Research question	56 (24.3)
PICO/PECO	39 (17.0)
Outcome	77 (33.5)
Bias	154 (67.0)
Confounding	54 (23.5)
Reliability and validity	94 (40.9)
Observational study and intervention Study	102 (44.3)
p value	127 (55.2)
95% confidence interval	128 (55.6)

Numbers (%) out of 230 responses. PICO/PECO: patient-Intervention-Comparison-Outcome/Patient-Exposure-Comparison-Outcome).

Table 3. Change in pharmacists' "know" response rates for the 10 key terms according to age.

Key terms	20s (n = 27)	30s (n = 93)	40s (n = 54)	50s (n = 39)	>60s (n = 16)	p value[1)]	p value[2)]
Clinical question	10 (37.0)	27 (29.0)	6 (11.1)	12 (30.8)	4 (25.0)	0.064	0.310
Research question	10 (37.0)	22 (23.7)	10 (18.5)	10 (25.6)	4 (25.0)	0.492	0.451
PICO/PECO	5 (18.5)	16 (17.2)	7 (13.0)	5 (12.8)	5 (31.3)	0.479	0.795
Outcome	45 (44.4)	36 (38.7)	13 (24.1)	10 (25.6)	6 (37.5)	0.205	0.115
Bias	22 (81.5)	65 (70.0)	33 (61.1)	22 (56.4)	11 (68.8)	0.219	0.071
Confounding	5 (18.5)	22 (23.7)	12 (22.2)	8 (20.5)	6 (37.5)	0.668	0.427
Reliability and validity	15 (55.6)	39 (41.9)	16 (29.6)	14 (35.9)	9 (56.3)	0.123	0.454
Observational study and Intervention Study	18 (66.7)	40 (43.0)	19 (35.2)	16 (41.0)	8 (50.0)	0.102	0.206
p value	17 (63.0)	57 (61.3)	30 (55.6)	14 (35.9)	8 (50.0)	0.088	0.021
95% Confidence interval	14 (51.9)	55 (59.1)	31 (57.4)	19 (48.7)	8 (50.0)	0.801	0.481

Numbers of "know" responses with rates in parentheses. [1)]Chi-square test; [2)]Cochran-Armitage test. PICO/PECO: Patient-Intervention-Comparison-Outcome/Patient-Exposure-Comparison-Outcome.

Table 4. McNemartest p values for correlations between paired proportions of participants familiar with key terms.

Key Terms	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
(1) Clinical question	1.000	0.439	0.032	0.181	<0.001	0.508	<0.001	<0.001	<0.001	<0.001
(2) Research question		1.000	0.010	0.004	<0.001	0.793	<0.001	<0.001	<0.001	<0.001
(3) PICO/PECO			1.000	<0.001	<0.001	0.025	<0.001	<0.001	<0.001	<0.001
(4) Outcome				1.000	<0.001	0.002	0.024	0.003	<0.001	<0.001
(5) Bias					1.000	<0.001	<0.001	<0.001	0.001	0.001
(6) Confounding						1.000	<0.001	<0.001	<0.001	<0.001
(7) Reliability and validity							1.000	0.317	<0.001	<0.001
(8) Observational study and intervention study								1.000	0.002	0.001
(9) p value									1.000	0.858
(10) 95% Confidence interval										1.000

The numbers in parentheses in the column headings represent the key terms in the far-left column. PICO/PECO: Patient-Intervention-Comparison-Outcome/Patient-Exposure-Comparison-Outcome.

4. Discussion

With the change in community pharmacy from a product-focused to a patient-focused profession, Japanese community pharmacists should ensure that their professional roles improve patients' outcomes via practice research. In our previous study, we identified Japanese community pharmacists' barriers to conducting or participating in practice research. The greatest barrier was lack of time to conduct research presumably due to the amount of time spent dispensing medication and counseling patients [7].

We also sought to determine whether education was a hidden barrier to conducting or participating in practice research in Japanese community pharmacists. If pharmacists are knowledgeable about practice research, they should be familiar with as know the meanings of essential key terms used in pharmacy practice research. We asked pharmacists whether they were familiar with10 key terms, to explore their practice research literacy.

The "know" response rates for key terms used to identify practice-related problems, such as "clinical question", "research question", and "PICO/PECO" were low at <30%. As the ability to identify clinical and research questions is essential in establishing practice research, Japanese community pharmacists would not have sufficient knowledge to conduct intervention studies. Therefore, intervention studies, which require a higher level of evidence, constituted only 8% of all presentations. This suggests that Japanese community pharmacists would find intervention studies difficult to conduct.

Many pharmacists were unfamiliar with other key terms relating study design and the evaluation of data, suggesting that they would not be knowledgeable about practice research. Some of the pharmacists in this survey exhibited a stronger interest in research relative to that shown by others, who also appeared to be less knowledgeable about practice research.

When we analyzed the relationship between a proportion of "know" responses for each key term and characteristics of pharmacists, there were statistically no significant relations except for age. Younger pharmacists tended to know that "p value" was related to statistics. In addition, pharmacists in their 20s appeared to have superior knowledge of several key terms relative to that of pharmacists of other ages (statistically nonsignificant). These findings could result in a change in Japanese pharmacy education. In Japan, 6-year pharmacy education programs were introduced in 2006 to improve pharmacy students' clinical skills [13]. The introduction of subject-related research in many pharmacy schools has provided young pharmacists with the opportunity to learn about practice and basic research. The difference of educational level of pharmacists would be other cause of the result. However we did not have the data to assess educational level of pharmacist in this survey.

In recent research, research experience prior to residency training strongly predicted subsequent practice research publication [14]. This report indicated that practice research training for entry-level pharmacists would be important for them to conduct and participating in practice research. Many Japanese community pharmacists did not receive practice research training when they were in pharmacy school. These results suggest that the development of educational programs concerning pharmacy practice research is important in both pharmacy schools and continuing professional development, to develop practice research for community pharmacists. Experienced pharmacists and faculty members should support less experienced pharmacists in conducting their practice research.

In Japan, if they learned how to conduct or participating in pharmacy practice research in pharmacy school, practice research by community pharmacists would give evidence that pharmacists can improve patient outcome.

5. Limitations

"Know" responses, which offered an indication as to whether participants were familiar with the key terms, were provided via self-evaluation. The questionnaire may not have accounted for potential differences in levels of understanding and familiarity with key terms between pharmacists. Therefore, the results of the survey represent pharmacists' literacy on a superficial level. In addition, pharmacists who participated in the survey demonstrated a strong interest in research. Therefore, the results of the survey could have overestimated Japanese community pharmacists' knowledge of practice research.

6. Conclusion

Japanese community pharmacists were not knowledgeable about conducting or participating in pharmacy practice research. Younger pharmacists demonstrated superior knowledge of practice research. Education in phar-

macy schools and continuing professional development programs is important in community pharmacists' development of practice research. Support by university stuffs to develop practice research in Japan would be necessary.

Conflict of Interest

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