
Original Article

The development of a public health nurses precepting experiential learning scale

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Objectives The Japanese government has supported public health nurses' systematic career development and preceptors' learning. Previous studies on precepting public health nurses indicated the value of precepting for career development. However, assessment scales for preceptor learning were not found. The purpose of this study was to develop the "PHN Precepting Experiential Learning Scale" (PHN-PELS) based on Kolb's experiential learning theory.

Methods This study included three phases of questionnaire development. First, the preliminary qualitative pilot study resulted in the PHN-PELS. The second pilot study was a questionnaire survey, returned by 52 (54.2%) public health nurses (PHNs) who had examined the validity and modified the items. Finally, a nation-wide questionnaire survey was conducted for PHNs who precepted novice PHNs in public health units from 2012 to 2016.

Results Of the 868 questionnaires mailed to 86 public health units, 438 (59.4%) were returned with 378 (43.5%) valid responses. PHN-PELS has 20 items forming four sub-scales, with confirmed content validity, construct validity, and reliability ($\alpha > .7$). Sub-scales were: "Role Performance of Fostering Novice PHN," "Self-development as a PHN," "Sharing to Foster Novice PHN," and "Improving Career Development Environment."

Conclusion Scale development of the PHN-PELS resulted in four sub-scales with 20 items; its validity and reliability were supported. The PHN-PELS measures experiential learning in precepting novice PHNs, therefore, its usability is recommended for preceptors to evaluate their experiential learning and for preceptor training program in selecting sub-scales as appropriate.

Key words : public health nurse, preceptorship, novice public health nurse, scale development, experiential learning

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I. INTRODUCTION

Public health nurses (PHNs) employed by the Japanese government are expected to develop effective and efficient policies based on valid evidence, and to comprehensively coordinate the healthcare of their clients. In addition to these expectations, responsibilities assigned to PHNs have increased to allow them to deal with the growing diversity and complexity of health problems in society. In this context, PHNs recognize their lack of competence¹⁾ and inadequate experience in policy-making²⁾. It is for this reason that the Japanese government has issued statements over the past decade regarding the need for systematic career development for PHNs^{3~6)}. One strategy suggested by the government is strengthening the "preceptorship for novice PHN training"⁵⁾. However, researchers found that preceptors viewed this as

burdensome⁷⁾. Even so, precepting contributes to professional development in terms of learning as identity, competency, and self-development, not only for novice PHNs, but also for the preceptors^{4,5)}. Being a preceptor provides a career development learning opportunity for PHNs.

Both qualitative and quantitative studies on the experiences and advantages of precepting and preceptor development have revealed useful information and insights regarding career development; the role of supporting novice PHNs; the importance of sharing thoughts through reflective dialog with novice PHNs⁸⁾; the ability of mid-level PHNs to support other nurses and recognition of their "habits of mind" to foster novice PHNs after the continuing education program⁹⁾; understanding their role and tasks as preceptors after a preceptor continuing education program¹⁰⁾; and a desire by mental health nurses, following their precepting experience, to implement organizational change¹¹⁾. PHNs have agency to improve their practice as professionals: precepting education¹²⁾ and experiences provide a stimulus for PHNs to

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reflect, recognize change, improve their practice, and acquire additional knowledge of their practice.

Dewey¹³⁾, in developing the groundwork for experiential learning, stated that a higher creative perspective would be derived through the integration of reflective thinking on experiences. PHNs need to become competent in “reflection-in-action and doing” because of the need to assess and act in complex, novel community situations. Taking action, even when limited information is available, requires resourcefulness and experimentation. In order to enact the professional role, it is important that PHNs move from their experience with reflection and conceptualization to experimentation. Kolb¹⁴⁾, extending Dewey’s work, describes an Experiential Learning Model as a process that moves the learner through concrete experience, reflective observation and abstract conceptualization to active experimentation. Implementing this experiential learning model during the precepting of novice PHNs could contribute to the career development of PHN preceptors. A measurement tool for evaluating this process is required, given that no existing studies have developed such a tool.

This study therefore aims to develop a PHN Precepting Experiential Learning Scale (PHN-PELS). The author’s goal was to evaluate the learning of PHNs during their experience as preceptors and during the preceptor education program, the relationships with their support structures, career development systems, and the PHN environment.

Definition

In this study, PHN Precepting Experiential Learning (PHN-PEL) is defined as the PHN’s abstract conceptualization and active experimentation as a preceptor, which is based on the preceptor’s reflective observations of his/her interactions with the novice PHN and organizational members.

II. METHODS

Scale Development and Pilot Study

Development of a PHN precepting experiential learning scale.

The theoretical principle guiding the development of the scale content was experiential learning^{13,14)}. The reanalyzed preliminary qualitative study¹⁵⁾ referred to experiential learning among experts with two interaction domains: interaction with the novice PHN and interaction with organizational members. Furthermore, each interaction domain has two objectives: 1) interaction with the novice PHN including fostering the novice PHN and self-development as a PHN, and 2) interaction with organizational members including sharing in order to foster novice PHNs and improve the environment to facilitate career development.

The reanalyzed preliminary qualitative study¹⁵⁾ (54 items) and findings from the literature review (four items) yielded a PHN-PELS with 58 items forming

four sub-scales. The item response range was from 1 (*not at all*) to 5 (*absolutely*). Each item included “intend” to denote active experimentation (not just recognition) to seek a normal distribution response.

Two sub-scales described interactions with the novice PHN: Role Performance Fostering Novice PHN and Self-development as a PHN. Interactions with organizational members also yielded two sub-scales: Sharing to Foster Novice PHN and Improving Career Development Environment. Each sub-scale consists of one factor.

Eight public health nursing researchers provided face and content validity and identified items that were unclear or inappropriate. The author extracted the 18 unclear items and turned them into more distinct statements and deleted one inappropriate item.

Next, the PHN-PELS was sent to a convenience sample of 58 PHNs working in administration for a second round of content validation. The response rate was 90.2% with 52 PHNs returning the survey. Respondents were asked to rate each item as either 0 (*not clear*) or 1 (*clear*). Respondent ratios were over 80% for each item, and the ratio of opinions that an item was unclear was under 20%, so no items were deleted. No ceiling or floor effects were found. However, 16 items were rated over 4 on a 5-point Likert scale; therefore, the author refined the descriptions of these items to achieve a more normal distribution based on respondents’ comments on face validity.

Quantitative Study

Sample and data collection procedure.

This quantitative descriptive study comprised a nationwide cross-sectional survey for PHNs who had any precepting experience during the years 2012–2015. Japan is divided into 47 prefectures with a total of 1,719 municipalities. The sample frame was 43 of the 47 prefectures (omitted: four disaster-stricken prefectures) and included 126 municipalities, most with larger cities including 68 designated cities (omitted: four disaster-stricken cities), all 23 special wards including six cities with populations over 300,000, because new PHNs are mainly hired in prefectures and large cities but not in small municipalities¹⁶⁾. Additionally, the author chose 29 smaller municipalities to avoid regional bias. Thus, there were a total of 163 public health units within the sample frame.

Invitations were sent to 163 department heads of public health units seeking their participation in the survey. The invitation included information about the research and consent and a query about the number of PHNs willing to participate. Head PHNs agreeing to the research were sent questionnaires, which they distributed to PH nursing staff with preceptor experience. Returns of the questionnaire were regarded as consents.

A total of 101 public health units (59.8%) agreed to participate: 21 of the 43 (48.8%) prefectures, 43 of

the 68 (63.2%) designated cities, six from the 23 special wards (26.1%), and 31 of the 35 (88.6%) cities from the municipalities. Thus, 868 questionnaires were mailed and 438 returned (50.5%) with 378 (43.5%) usable responses. The data collection was conducted from November 30, 2015, to February 27, 2016.

Data analysis

Item analysis.

First, the descriptive statistics were analyzed. Subsequently, after checking the response bias of items for ceiling and floor effects, Pearson's correlation coefficient between items and a good-poor analysis were conducted.

Examination of PHN-PELS validity and reliability.

An acceptable case-to-item ratio is between 5 and 20. A single-factor structure using confirmatory factor analysis (CFA) was used to test the hypothesis that a relationship between the observed variables and their underlying latent constructs existed. The goodness of fit indicator, goodness of fit index, and standard regression coefficient beta (beta) were analyzed to improve the model fit. The inclusion criterion for the Comparative Fit Index (CFI) was more than 0.9, and the Root Mean Square Error of Approximation (RMSEA) was less than 0.06. If the beta was less than 0.5, the item was deleted after consideration of the meaning. According to the fit index between items and errors, either the item was defined or a path was added.

In addition, the scale score correlation coefficients were examined using the raw variable of "frequency of meeting to discuss PHN career development" as an external criterion, which was expected to have a correlation to confirm construct validity. This was based on the assumption that if meetings to discuss PHN career development were held frequently, then PHN preceptor learning would improve. At the same time, construct validity was examined using correlation coefficients between "the numbers of PHNs in the organization," which was expected to have no correlation.

For internal consistency reliability, Cronbach's alpha was calculated for each sub-scale. SPSS Statistics version 23.0 and Amos 23.0 were used to calculate descriptive statistics and to conduct CFA.

Ethical considerations

The purpose of the study was explained in writing, participation was voluntary, and consent could be retracted at any time. The anonymously returned questionnaires implied consent. St. Luke's International University research ethics committee approved this study (Pilot study approval No. 15-029, 2015/7/27; Main Study approval No. 15-070, 2015/11/30).

III. RESULTS

Respondent characteristics

Preceptors as respondents in this study were mainly from the larger municipalities and were women (97.6%). Their average age was approximately 39 years (Table 1). The mean duration of work ex-

Table 1 Demographics of public health nurse participants ($N=378$)

Characteristics		<i>n</i>	(%)	<i>M</i> ± <i>SD</i> (range)
Gender	Male	9	2.4	
	Female	369	97.6	
Age				38.58 ± 7.95 (24-58)
	20~29	57	15.0	
	30~39	158	41.7	
	40~49	118	31.1	
	50~	45	11.9	
Type of nursing school from which public health nurse education was obtained	Technical nursing school	167	44.2	
	Junior college	47	12.4	
	University or college	159	42.1	
	Others	5	1.3	
Years of experience as a public health nurse				14.41 ± 7.89 (2-37)
	~5 years	50	13.2	
	6~10 years	92	24.3	
	11~20 years	143	37.7	
	20 years~	93	24.5	
Type of local government	Prefecture	166	43.9	
	Designated cities	158	41.8	
	Special wards	10	2.6	
	Other municipalities	44	11.6	

perience as a PHN was 14.41 ± 7.89 (2–37). A large minority worked at the prefectural government level (43.9%), and at designated cities (41.8%) (see Table 1).

Development of the PHN-PELS

Item analysis.

The Kaiser-Meyer-Olkin Measure of Sampling Adequacy was 0.893 ($P < .001$) indicating that the data was suitable for factor analysis. Seventy-six items from the preliminary PHN-PELS were checked first by response distribution of items (mean, standard deviation, range, ceiling effects, floor effects): no ceiling or floor effects were found. There were nine sets of correlation coefficients of 0.7 or more in the item correlation matrix. From good-poor analysis, two reversed items were inadequate for measurement because they did not achieve a significant difference between good-poor groups. The 378 responses were sufficient for an adequate CFA. The usable data for the initial factor analysis was a 5:1 participant-to-item ratio for the initial 76 items. These results were used with the fit index and the beta for refining the items in the CFA.

Sub-scale I “Role Performance Fostering Novice PHN.”

A ratio of 10:1 was adequate for 26 items in the largest sub-scale I. One item with one set of correlations between items of 0.7 or more was deleted after considering the meaning. Next, CFA was conducted using the one-factor model with 25 items. Ten items, with a non-significant beta of less than 0.5, were deleted. Nine items were refined according to the fit index between items or errors with consideration of the meaning of the item contents. The beta of item A10 was less than 0.5 ($\beta = .48$, $P < .001$), but considering the item meaning and factor contents, A10 was retained.

The one-factor model with six items using CFA had goodness of fit indicators as follows: GFI = .984, AGFI = .962, CFI = .977, RMSEA = .054. These findings confirmed the goodness of fit for this model (Table 2).

Sub-scale II “Self-development as a PHN.”

One item with one set of correlations between items of 0.7 or more was deleted after consideration of the meaning; therefore, the CFA was conducted using a one-factor model with 21 items. Six items, with betas less than 0.5 were deleted. Seven items were refined according to the fit index between items or errors, considering the item contents. After that, two items each with a beta less than 0.5 were deleted and even though the beta of item A32 was slightly less than 0.5 ($\beta = .49$, $P < .001$), after considering item's importance, it was retained.

Finally, the one-factor model with six items using CFA had goodness of fit indicators as follows: GFI = .986, AGFI = .968, CFI = .989, RMSEA = .046. These findings confirmed the goodness of fit for this

model (Table 2).

Sub-scale III “Sharing to Foster Novice PHN.”

There were no sets of correlations between items of 0.7 or more in this sub-scale. The CFA was conducted using a one-factor model with 12 items. There were two items with betas less than 0.5, which were deleted. Six items were refined according to the fit index either between items or errors considering the item contents. The beta of item A60 was less than 0.5 ($\beta = .49$, $P < .001$), but considering the item meaning and factor contents, A60 was not deleted.

A one-factor model with four items using CFA had goodness of fit indicators as follows: GFI = .995, AGFI = .976, CFI = .994, RMSEA = .047. These findings confirmed the goodness of fit for this model (Table 2).

Sub-scale IV “Improving Career Development Environment.”

For this sub-scale, five items with eight sets of correlations between items of 0.7 or more, were refined after considering the meaning. The CFA was conducted using the one-factor model with 11 items. Four items with betas less than 0.5 were deleted. In addition, three items were deleted according to the fit index between items and errors considering the meaning of item contents. The beta of item A76 was less than 0.5 ($\beta = .45$, $P < .001$), but considering the item meaning and factor contents, A76 was retained.

A one-factor model with the remaining four items using CFA, had goodness of fit indicators as follows: GFI = .997, AGFI = .985, CFI = .999, RMSEA = .021. These findings confirmed the goodness of fit for this model (Table 2).

Reliability and validity of PHN-PELS with four sub-scales

After revision, the PHN-PELS has 20 items organized into four one-factor sub-scales: sub-scale I (six items), sub-scale II (six items), sub-scale III (four items), and sub-scale IV (four items).

Examination of construct validity using correlations.

The item “frequency of meetings to discuss PHN career development,” which predicted the correlation with PHN-PELS, was used to examine construct validity, and was confirmed as follows: PHN-PELS ($r = .232$, $P < .001$), sub-scale I ($r = .163$, $P < .001$), sub-scale II ($r = .130$, $P < .001$), III ($r = .206$, $P < .001$), IV ($r = .229$, $P < .001$).

Construct validity was confirmed using “amount of PHNs in organization,” which did not predict the correlation with scales (PHN-PELS: $r = -.017$, $P = .744$, sub-scale I: $r = .014$, $P = .786$, II: $r = -.000$, $P = .997$, III: $r = -.023$, $P = .668$, IV: $r = -.048$, $P = .360$).

Distribution of PHN-PELS score, scale reliability, and correlations between the sub-scales.

PHN-PELS and sub-scale scores show normal dis-

Table 2 Result of CFA for PHN-PELS (Standardized regression coefficients: β)

Item	I	II	III	IV	Cronbach's α
Sub-scale I 'Role Performance of Fostering Novice PHN'					.758
A10 I foster the critical thinking of PHNs when they had problems.	.48				
A12 I foster PHN grasping what they learned in novice PHN training.	.54				
A17 I express the purpose of the PHN practice.	.65				
A19 I express the evidence from clients' opinions and statistical data.	.62				
A22 I express the worth of PHN practice though role-modeling with clients.	.65				
A24 I discuss the skills of how to use various information from related organizations.	.59				
Sub-scale II 'Self-development as a PHN'					.800
A32 I relate the meaning of the novice PHN's work to the essence of PHN.		.49			
A39 I consider the purpose of the PHN's practice.		.64			
A42 I grasp the evidence of the PHN's practice from literature and advanced cases.		.83			
A43 I recognize the importance to act for community empowerment at clients.		.50			
A45 I recognize the importance of finding clients who need support even at the application procedure.		.76			
A47 I recognize the importance of regarding client's values and of thinking together.		.67			
Sub-scale III 'Sharing to Foster Novice PHN'					.708
A50 I frequently ask staff to support novice PHN fostering.			.69		
A52 I ask PHNs in various positions to advise novice PHN.			.65		
A55 I ask staff to discuss about advice needed by novice PHN.			.66		
A60 I hear manager's thoughts about PHN practices.			.49		
Sub-scale IV 'Improving Career Development Environment'					.776
A65 I share the idea of fostering novice PHN as staff's career development in organization.				.67	
A67 I discuss precepting equation for novice PHNs among organizational members.				.79	
A68 I discuss continuing career development system with organizational members that developed through fostering novice PHN.				.83	
A76 I discuss team work for organizational health service improvement.				.45	
	Factor correlation	I	II	III	IV
	I	—			
	II	.588	—		
	III	.454	.378	—	
	IV	.418	.341	.577	—

Sub-scale I: $\chi^2 = 18.961$, $df = 9$, $P = 0.026$, $GFI = 0.984$, $AGFI = 0.962$, $CFI = 0.977$, $RMSEA = 0.054$

Sub-scale II: $\chi^2 = 16.287$, $df = 9$, $P = 0.061$, $GFI = 0.986$, $AGFI = 0.968$, $CFI = 0.989$, $RMSEA = 0.046$

Sub-scale III: $\chi^2 = 3.698$, $df = 2$, $P = 0.157$, $GFI = 0.995$, $AGFI = 0.976$, $CFI = 0.994$, $RMSEA = 0.047$

Sub-scale IV: $\chi^2 = 2.300$, $df = 2$, $P = 0.317$, $GFI = 0.997$, $AGFI = 0.985$, $CFI = 0.999$, $RMSEA = 0.020$

Factor correlaton: Values are Pearson's correlation coefficients with a P -value of < 0.01

tributions of means, standard deviation, range, and histogram (see Table 3). Cronbach's alpha coefficient for the total score was .879. The coefficients for sub-scales were: .758 (sub-scale I), .800 (sub-scale II), .708 (sub-scale III), and .776 (sub-scale IV) (Table 2). Pearson's correlation coefficients between the sub-scales are displayed in Table 2. They showed moderate correlations of .418–.588 ($P < .001$) indicating support for the interaction with the novice PHN and organizational members.

Finally, the author assessed the PHN-PELS model

fit. The $GFI = .910$, $AGFI = .884$, $CFI = .913$, $RMSEA = .058$, demonstrated an acceptable fit (Fig. 1).

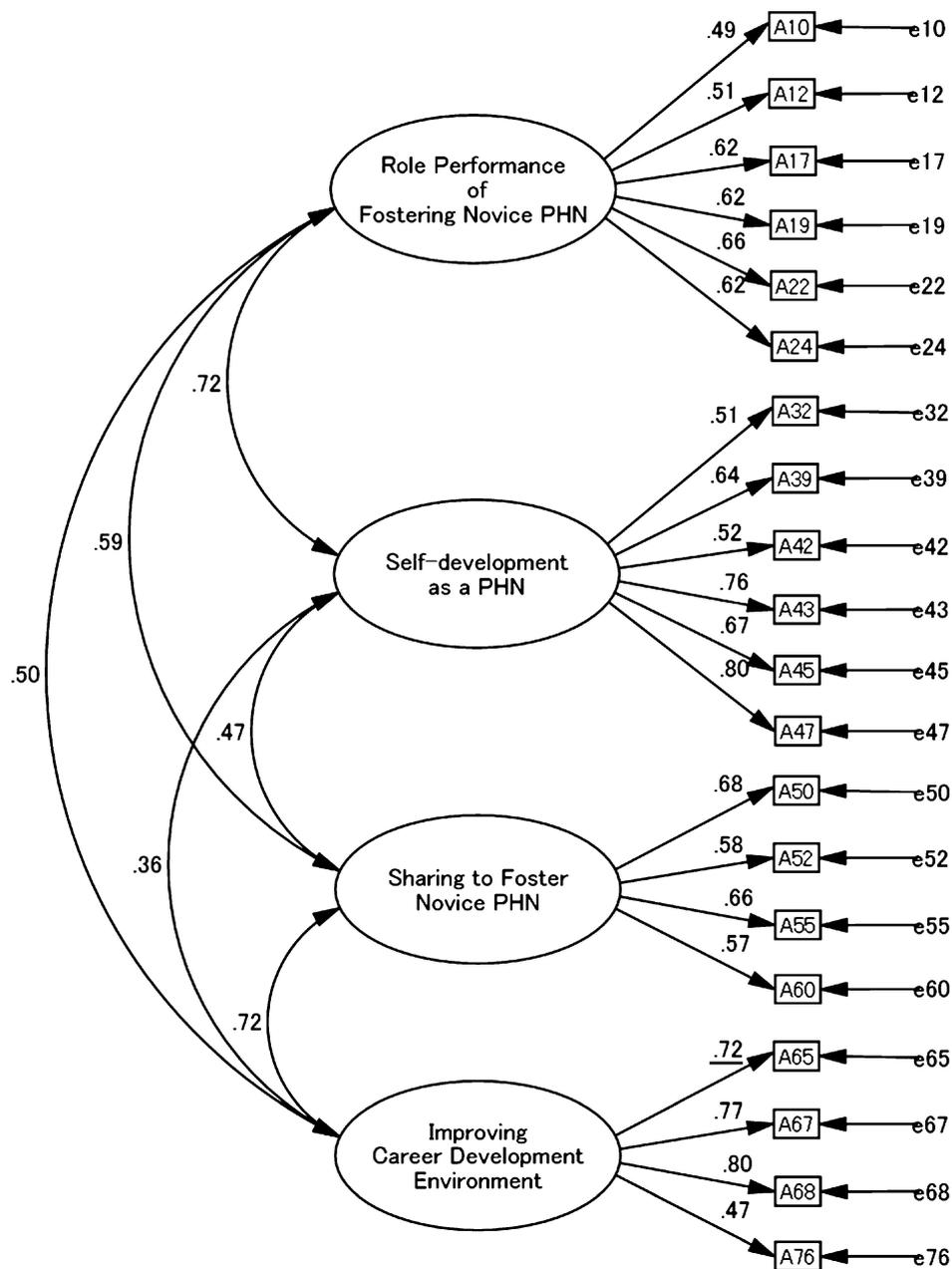
IV. Discussion

In this study, a nationwide survey provided data to develop the PHN-PELS. The result was a 20-item PHN-PELS with four sub-scales, confirmed construct and content validity, and internal consistency reliability.

Table 3 Distribution of PHN-PELS scores ($N=378$)

	Range	Mean (M)	Standard deviation (SD)	$M+SD$	$M-SD$	Cronbach's α
Sub-scale I	11-30	22.50	3.37	25.87	19.12	0.758
Sub-scale II	6-30	23.26	3.46	26.73	19.8	0.800
Sub-scale III	5-20	14.81	2.87	17.68	11.94	0.708
Sub-scale IV	4-20	12.39	3.17	15.56	9.21	0.776
Total score	42-100	72.95	9.93	82.89	63.02	0.879

Figure 1. Confirmatory Factor Analysis of PHN Precepting Experiential Learning Scale (PHN-PELS) model



$\chi^2=371.457$, $df=164$, $P<.001$, $GFI=.910$, $AGFI=.884$, $CFI=.913$, $RMSEA=.058$

Validity and reliability of PHN-PELS

The four PHN-PELS sub-scales are as follows: I “Role Performance of Fostering Novice PHN,” II “Self-development as a PHN,” III “Sharing to Foster Novice PHN,” and IV “Improving Career Development Environment.” The CFA indicated a reasonable fit to the data (GFI>.9, AGFI>.85, CFI>.9, RMSEA<.06) and internal consistency reliability was supported ($r>.7$). This means that the PHN-PELS can be used as a whole or each sub-scale can be used independently. It is a self-assessment questionnaire that is short and easy to use by preceptorships in practice and in educational programs. Moreover, precepting experiential learning occurred regardless of the number of PHNs in the organization.

In the nursing study, *Preceptorship Domain and Related Survey Items*, precepted nurses evaluated the social, advocate, and management roles of the preceptor¹⁷⁾. In the future, combining the preceptorship evaluation by precepted PHNs with the PHN-PELS will provide a more holistic and objective evaluation.

PHN-PELS based on experiential learning

Factor 1, “Role Performance Fostering Novice PHN,” is a critical factor in a PHN’s experiential learning process during preceptorship, and to the quality of fostering received by the novice PHN. The items, “I foster the critical thinking of PHNs when they had problems,” and “I foster PHN grasping what they learned in novice PHN training,” indicates an understanding of the novice PHN’s thoughts and existing learning. These two statements reflect the purpose and worth of the PHN practice, which involves connecting evidence from clients’ opinions and statistical data, role-modeling and discussing the skills required to utilize diverse information from related health organizations. The PHN preceptor’s flexibility is important in terms of respecting a novice nurse’s existing knowledge, skills, and experience, and for showing the novice how to adapt his/her skills to a new situation¹⁸⁾. This factor, which includes understanding the novices’ thoughts, and offering important knowledge or skills for a situation, is fundamental.

Factor 2, “Self-development as a PHN” occurs when PHN preceptors examine multiple aspects of their public health practice in order to cultivate novice PHNs. The PHN preceptors must think critically, for example: “I relate the meaning of the novice PHN’s work to the essence of PHN,” and, “I consider the purpose of the PHN’s practice.” This also includes recognizing and sharing the evidence of PH nursing practice from literature and advanced cases; the importance of empowering the client community, finding those in need and offering support, even if only at an application procedure for using welfare and healthcare system; the importance of respecting a client’s values and of working together with the client. PHNs face ethical issues because of the complexity of people’s

lives¹⁹⁾ and it is important to honor a client’s values, and to dialogue and collaborate with them as equal partners.

Factor 3, “Sharing to Foster Novice PHN,” relates to the coordination of staff, including managers, for the collective fostering of a novice PHN. It is asking staff to support and provide advice to novice PHNs, to discuss the advice required, and to hear a manager’s thoughts on PH nursing practices. The support of all members of an organization, including that of managers, is important for preceptorship⁷⁾; this factor expresses the skill needed to enlist the support of all staff.

Factor 4, “Improving Career Development Environment,” is extending and continuing the career development system co-created through fostering novice PHNs: “I share the idea of fostering novice PHN as staff’s career development in organization,” “I discuss precepting equation for novice PHNs among organizational members,” “I discuss continuing career development system with organizational members that developed through fostering novice PHN,” and “I discuss team work for organizational health service improvement offered by the organization.” Suzuki²⁰⁾ insists that extending the responsibility and experience of fostering novice PHNs to other members of the organization, increases commitment and promotes an “Improving Career Development Environment.”

The PHN-PELS evaluates both recognition and experimentation. Experimentation requires high motivation. The PHN-PELS sub-scales tap into interactions between the precepted and the preceptor at an individual level (sub-scale I and sub-scale II), and with organizational members and preceptor (sub-scale III and sub-scale IV). PHNs, in their roles as professionals and political officers need to become competent in creating policies²⁾, hence the importance of education at both individual and organizational levels for career development^{21,22)}. PHNs should be able to fulfill their roles, develop as nursing professionals, engage in continuous self-development, and create a learning environment within the organization.

PHNs are important professionals in the public healthcare system. If PHNs grow through learning by fostering novice PHNs and sharing tasks, and in so doing improve the organizations of which they form part, they in turn reap the benefits of the career development opportunities afforded to public health professionals.

Limitations and Future Research

This retrospective study utilized the last four years’ data, which means that more recent events may have biased responses. Nevertheless, this study established the first nationwide survey to evaluate the experiential learning of PHN preceptors. The PHN-PELS pro-

vides for the measurement of effective practice and continuous education for PHNs.

Given that approximately only 59.8% of the units responded, caution should be taken in generalizing the results. The response rates were higher among individual units, yet the overall results were biased toward the larger municipalities. The results therefore reflected the PHN preceptor situation in the larger autonomies. To extend this research, criterion validity should be established and the research replicated with a different population. Observational research is required for the examination of current experiences.

V. Conclusion

This nationwide study resulted in a 20-item PHN-PELS with four sub-scales. Its validity and reliability are supported. The PHN-PELS measures experiential learning; its usability is recommended for preceptors to evaluate their experiential learning. It can also be used for the preceptor-training program by selecting sub-scales appropriate for that purpose.

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