



The influence of informal learning and learning transfer on nurses' clinical performance: A descriptive cross-sectional study



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ABSTRACT

Background: Workplace learning in hospitals consists mostly of informal learning processes that take place during specific work situations. Informal learning and effective learning transfer are expected to have a positive impact on nurses' clinical performance.

Objectives: The purpose of this study was to examine the influence of informal learning and learning transfer on nurses' clinical performance.

Design: A cross-sectional, descriptive survey study.

Methods: The study was conducted by 200 nurses, two tertiary university hospitals in South Korea. Characteristics of the participants, informal learning, learning transfer, and clinical performance of nurses were collected, using self-reported questionnaires, from February to March 2018. Data were analyzed by *t*-test or analysis of variance, Pearson's correlation coefficient, and hierarchical multiple regression analysis.

Results: The factors related to the nurse's clinical performance were clinical career, voluntary participation in clinical performance-related education, and the explanatory power of the model was 22.4%. When informal learning was added to the model, clinical career, informal learning, and voluntary participation in education were significantly related to clinical performance and the explanatory power increased by 4.9%. Finally, when learning transfer was added, learning transfer and clinical career level were determined to be influencing factors on clinical performance, and the explanatory power increased by 10.3%. The total explanatory power of the model was 37.6% ($F = 11.906, p < .001$).

Conclusions: This study found that significant correlations have been confirmed between the variables and learning transfer was an influential factor in clinical performance. Based on these results, the researchers suggest encouraging informal learning and developing learning transfer programs that consider the nurses' careers.

1. Introduction

Clinical performance refers to the ability of practice nurses to indicate their performance in professional skills or behavior including communication, knowledge, technical skills, clinical reasoning, emotions, and values (Epstein and Hundert, 2002; Tilley, 2008). Nurses should be able to carry out professional, knowledgeable, and highly skilled nursing practices in order to provide safe and high-quality nursing care to their patients (Torunn Bjørk et al., 2013; Hsiu and Shih, 2008). In order to improve the clinical performance of nurses, many hospitals are emphasizing the importance of continuous education, and are making efforts to promote nurses' learning activities through various educational programs.

Learning is the acquisition of knowledge or skills through study,

experience, or being taught (Angus, 2010). Learning in hospital settings is both formal and informal. Formal learning refers to planned learning activities and mostly involves institutionally sponsored and endorsed programs, which includes almost all training and development programs that organizations offer (Jacobs and Park, 2009). In contrast to formal learning, informal learning is defined as any learning not taking place within a formally organized learning program (Eraut, 2000). Informal learning includes reflection activities through trial and error, mentoring, daily conversations, and information retrieval and acquisition activities that are carried out with self-initiative. Approximately 70% to 90% of learning takes place in the workplace through informal day-to-day interaction, through which employees acquire the knowledge, skills, and attitudes necessary for their work (Ham and Cho, 2015; Marsick, 2006).

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Formal learning has been extensively studied, and there are many reports on the design and outcomes of formal continuing professional development for nurses (Ellis and Nolan, 2005; Lee, 2011). Systematic formal education positively affects the performance and adaptation of the members of the organization (Skår, 2010), but it is difficult to implement in the right place at the right time, and the level of learning transfer is low (Song and Lee, 2013). In contrast, informal learning is flexible in terms of time and space, involves self-regulated learning, and is cost-effective (Pimmer et al., 2014; Yu et al., 2007). According to earlier studies, formal learning methods have only a marginal effect on learning compared to work-based informal learning (Eraut, 2007). Therefore, it is important to identify different forms of informal learning in workplaces and make efforts to support and strengthen these learning forms at the nursing organizations (Bancheva and Ivanova, 2015; Torunn Bjørk et al., 2013; Eraut, 2007). As a result of reviewing previous studies, published studies have included a case study on aspects of informal learning by nurses in a hospital (Kim and Lee, 2009); the frequency, content, and method of informal learning among medical professionals (Varpio et al., 2014); and a qualitative study of the informal learning experience (Torunn Bjørk et al., 2013; Joynes et al., 2017). However, there have been relatively fewer studies that have identified a relationship between the nurses' informal learning and organizational performance.

It is very important to ensure that learning is actually implemented in nursing practice. Learning transfer refers to the process by which learners apply the knowledge, skills, and attitudes they have acquired through learning in their work (Baldwin and Ford, 1988). The higher the learning transfer, the more positive and creative outcomes in the challenging tasks (Holton and Baldwin, 2003; Kim et al., 2010). However, it has been reported that the level of learning transfer among members of an organization is as low as 10% to 20% (Holton and Baldwin, 2003). The process of learning transfer has not been fully characterized in previous studies, which were limited to formal learning such as continuing education or job training programs (Enos et al., 2003). Self-directed informal learning activities that take place in diverse relationships and contexts occurring in practice play an important role in learning transfer; therefore, it is necessary to study learning transfer in informal learning settings.

Informal learning and effective learning transfer are expected to have a positive impact on nurses' clinical performance. In addition, in the previous research (Park et al., 2016; Salonen et al., 2007), clinical career was the influencing factor of clinical performance, and there may be differences in learning motivation and desire, patterns of informal learning, and level of learning transition according to clinical career. Therefore, it is necessary to examine the correlations between informal learning, learning transfer, and nurses' clinical performance, and analyze the factors that influence nurses' clinical performance. The main objectives of this study were to (1) identify nurses' overall level of informal learning, learning transfer, and clinical performance; (2) analyze the relationships between informal learning, learning transfer, and clinical performance as nurses gain the necessary knowledge, skills, and abilities for clinical practice; and (3) identify the factors that influence the improvement of nurses' clinical performance.

2. Methods

2.1. Study design

This was a descriptive and cross-sectional study to identify the influence of informal learning and learning transfer on nurses' clinical performance in South Korea.

2.2. Participants, sampling, and sample size calculation

The target participants of the study were nurses working in two tertiary university hospitals located in a province of South Korea.

Nursing managers such as head nurses, unit managers, and chiefs of nursing departments were excluded. The sample size was calculated using the G-Power 3.1.6 program. The number of explanatory variables in the linear multiple regression is assumed to be 15; for a significance level (α) of 0.05, a test power ($1 - \beta$) of 0.90, and an effect size of 0.15, the required sample size was 171 participants. In consideration of potential dropouts, questionnaires were distributed to 204 nurses, and 200 were analyzed as valid data, with 4 surveys excluded due to incomplete answers. The response rate was 98%.

2.3. Data collection and ethical consideration

This study was approved by the Institutional Review Board. Participants were informed that the purpose, process, and results of the study would not be used for any purpose other than this research, that all questionnaires would be processed anonymously, and that they could withdraw at any time if they did not want to participate. After the participants who agreed to take part in the study signed the consent form, the questionnaire was filled out. Data were collected by a structured questionnaire from February to March 2018. A researcher explained the purpose of the study to the staff of the nursing departments of six tertiary university hospitals by email, requested approval to perform the study, and collected data from two approved hospitals. A researcher visited the nursing department in the hospitals directly and distributed the questionnaire. Before data collection, all participants were assured that survey participation would not influence their hospital records in any way and that the actual survey data would be discarded directly after being coded for research analysis. After the questionnaire was completed, the questionnaire was put in a sealed envelope to ensure the anonymity of the material, sealed with a sticker, and collected by the researcher. The participants took approximately 20 min to complete the questionnaire.

2.4. Instruments

2.4.1. Demographics questionnaire

The surveyed demographic characteristics were: gender, age, marital status, education, work unit, shift pattern, clinical career level, experience of job rotation between departments, participation in self-development activities such as certificate acquisition, and voluntary participation in clinical performance-related education. The clinical career level used in this study was Benner's skill acquisition model (Benner, 1984) as modified by Jang (2000). It was classified into novice, advanced beginner (2–3 years), competent (4–6 years), and proficient (over 7 years).

2.4.2. Informal learning

Informal learning was measured using the informal learning scale developed by Ham and Cho (2015), which includes items on interaction, information utilization, self-reflection, and job performance. The interaction item includes communication with peers, interactions with supervisors, peer observation, team activities, and expert advice. Information utilization includes Internet search, the use of specialized books and work performance manuals, and reference to e-mails and memos. Personal reflection includes self-reflection, experience recall, self-directed learning, and inquiry activities. Job performance includes learning acquired through trial and error, work meetings, personal work, on-site visits, and job rotation. It is a self-reported measure consisting of 24 items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The 24 items form 4 subscales: interaction (8 items), information utilization (5 items), self-reflection (4 items), and job performance (7 items). The scale score is calculated as the sum of all 24 items, with higher scores indicating greater levels of informal learning. This scale verified the content validity of the expert group, construct validity, and the convergent and discriminant validity test. In addition, the informal learning scale has shown good reliability,

with a Cronbach's alpha of 0.85 (Ham and Cho, 2015). The Cronbach's alpha for the present study was 0.88.

2.4.3. Learning transfer

Learning transfer was measured using the learning transfer scale developed by Lee (1996) and modified by Kim (2014). It is a self-reported measure consisting of 5 items rated on a 5 point Likert scale (1 = strongly disagree to 5 = strongly agree). The total score is calculated as the sum of all 5 items, with higher scores indicating greater levels of learning transfer. This scale verified content validity of nursing expert group and construct validity. In addition, the learning transfer scale has shown good reliability, with a Cronbach's alpha of 0.83 (Lee, 1996). The Cronbach's alpha for the present study was 0.86.

2.4.4. Clinical performance

Clinical performance was measured using the clinical performance scale developed by Lee et al. (1990) and modified by Lee (2016), which includes items on the nursing process and nursing skill, leadership, and cooperation. It is a self-reported measure consisting of 23 items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The 23 items form 3 subscales: nursing process and nursing skill (10 items), leadership (5 items), and cooperation (8 items). The total score is calculated as the sum of all 23 items, with higher scores indicating greater levels of clinical performance. This scale verified content validity of expert group, construct validity, convergent and discriminant validity test. In addition, the clinical performance scale has shown good reliability, with a Cronbach's alpha of 0.94 (Lee et al., 1990). The Cronbach's alpha for the present study was 0.93.

2.5. Data analysis

Data were analyzed using SPSS version 22.0 (IBM Co., Armonk, NY, USA). Descriptive statistics were used to summarize the demographic characteristics of the study participants. To identify differences in informal learning, learning transfer, and nurses' clinical performance according to demographic characteristics, *t*-test or analysis of variance were used. Correlations among informal learning, learning transfer, and nurses' clinical performance were analyzed using by Pearson's correlation coefficient. To analyze influencing factors on the nurses' clinical performance, hierarchical multiple regression analysis was used. To identify the additional explanatory power and relative importance of informal learning and learning transfer on clinical performance, demographic characteristics were included in the first step regression equation. Then, informal learning and learning transfer were included in the regression equation in order. The nominal scale was analyzed by dummy variables.

3. Results

3.1. Level of informal learning, learning transfer, and nurses' clinical performance

The mean score for informal learning was 3.09 out of a maximum score of 5. In the subscales of informal learning, self-reflection had the highest mean score (3.22), followed by interaction, information utilization, and job performance (3.17, 3.06, and 2.94, respectively). The mean scores for learning transfer and clinical performance were 3.63 and 3.78, respectively, out of a maximum score of 5 (Table 1).

3.2. Informal learning, learning transfer, and nurses' clinical performance according to demographic characteristics

There was a significantly higher level of informal learning among the subjects who had above a master's degree ($F = 3.399, p = .035$), had self-development activities ($t = 2.923, p = .004$), and voluntary participation in education ($t = 2.635, p = .009$). Learning transfer was

Table 1

Level of informal learning, learning transfer, and nurses' clinical performance ($N = 200$).

Characteristics	Categories	Mean \pm SD
Informal learning	Self-reflection	3.09 \pm 0.43
	Interaction	3.22 \pm 0.53
	Information utilization	3.17 \pm 0.49
	Job performance	3.06 \pm 0.61
Learning transfer		2.94 \pm 0.61
Clinical performance		3.63 \pm 0.51
		3.78 \pm 0.45

significantly higher in nurses who were married ($t = 2.201, p = .029$), had a master's degree or higher ($F = 3.807, p = .024$), worked at an outpatient department or as a physician assistant ($F = 2.956, p = .021$), worked daytime duty ($t = -2.151, p = .033$), and voluntary participation in education ($t = 4.141, p < .001$). Clinical performance was significantly higher in nurses who were older than 30 years ($t = -4.063, p < .001$), married ($t = 4.017, p < .001$), had a master's degree or higher ($F = 10.998, p < .001$), proficient ($F = 16.644, p < .001$), had experienced rotation ($t = 2.508, p = .013$), voluntary participation in education ($t = 2.688, p = .008$) (Table 2).

3.3. Correlations between informal learning, learning transfer, and nurses' clinical performance

Significant correlations were observed between the participants' informal learning, learning transfer, and clinical performance. Clinical performance was positively correlated with both informal learning ($r = 0.332, p < .001$) and learning transfer ($r = 0.461, p < .001$). Learning transfer was positively correlated with informal learning ($r = 0.498, p < .001$) (Table 3).

3.4. Influential factors related to nurses' clinical performance

In order to identify the influencing factors related to the participants' clinical performance, a hierarchical multiple regression analysis was performed. The tolerance of this model was 0.153–0.893 (> 0.1) and the variance inflation factor was 1.089–6.526 (< 10). Therefore, multicollinearity was not an issue. All the other assumptions of multiple regression analysis were satisfied as well.

In the first-step hierarchy with general characteristics, the explanatory power was 22.4% ($F = 7.396, p < .001$). Among the input variables, clinical performance was higher in advanced beginner ($\beta = 0.100, p = .006$), competent ($\beta = 0.110, p < .001$), and proficient participants ($\beta = 0.155, p < .001$), and in those who voluntarily participated in education ($\beta = 0.086, p = .005$). When informal learning was added to the model, the explanatory power increased by 4.9% compared to the first stage, to 27.3% ($F = 8.467, p = .001$), and informal learning was a significant influencing factor ($\beta = 0.236, p < .001$). Finally, when learning transfer was added to the model, the explanatory power increased 10.3% compared to the first stage, to 37.6% ($F = 11.906, p < .001$), and only learning transfer was a significantly influential factor ($\beta = 0.384, p < .001$). Among the subjects' characteristics, the clinical career was found to affect nurses' clinical performance (Table 4).

4. Discussion

The purpose of this study was to analyze the correlations between informal learning, learning transfer, and clinical performance of nurses, and to identify the factors which influence clinical performance. Informal learning and learning transfer were in fact associated with clinical performance. However, only learning transfer was independently associated with nurses' clinical performance in the

Table 2
Informal learning, learning transfer, and nurses' clinical performance according to demographic characteristics (N = 200).

Characteristics	Categories	n (%)	Informal learning			Learning transfer			Clinical performance		
			Mean ± SD	t or F	p	Mean ± SD	t or F	p	Mean ± SD	t or F	p
Gender	Female	192 (96.0)	3.08 ± 0.44	-0.691	.490	3.62 ± 0.51	-1.682	.094	3.78 ± 0.45	0.039	.969
	Male	8 (4.0)	3.19 ± 0.26			3.93 ± 0.38			3.77 ± 0.38		
Age (yr)	< 30	147 (73.5)	3.08 ± 0.44	-0.429	.669	3.63 ± 0.53	0.123	.903	3.71 ± 0.44	-4.063	< .001
	≥30	53 (26.5)	3.11 ± 0.41			3.62 ± 0.46			3.99 ± 0.43		
Marital status	Married	37 (18.5)	3.17 ± 0.47	1.264	.208	3.79 ± 0.50	2.201	.029	4.04 ± 0.49	4.017	< .001
	Unmarried	163 (81.5)	3.07 ± 0.42			3.59 ± 0.50			3.72 ± 0.42		
Education	College	29 (14.5)	2.97 ± 0.51	3.399	.035	3.48 ± 0.67	3.807	.024	3.83 ± 0.45	10.998	< .001
	University	142 (71.0)	3.08 ± 0.42			3.62 ± 0.49			3.71 ± 0.43		
Work unit	Master or doctor	29 (14.5)	3.26 ± 0.38			3.83 ± 0.34			4.11 ± 0.41		
	Medical ward	44 (22.0)	3.01 ± 0.41	2.081	.085	3.63 ± 0.51	2.956	.021	3.80 ± 0.47	0.683	.604
	Surgical ward	48 (24.0)	3.07 ± 0.48			3.55 ± 0.53			3.83 ± 0.41		
	Intensive care unit	43 (21.5)	3.01 ± 0.50			3.49 ± 0.57			3.75 ± 0.54		
	Emergency department	48 (24.0)	3.19 ± 0.34			3.75 ± 0.40			3.71 ± 0.42		
	Etc.	17 (8.5)	3.26 ± 0.34			3.88 ± 0.41			3.88 ± 0.34		
Shift duty pattern	3 shift	180 (90.0)	3.07 ± 0.44	-1.624	.106	3.60 ± 0.51	-2.151	.033	3.77 ± 0.46	-1.154	.250
	Day duty	20 (10.0)	3.24 ± 0.35			3.86 ± 0.41			3.89 ± 0.32		
Clinical career level	Novice	22 (11.0)	3.01 ± 0.29	1.517	.211	3.61 ± 0.31	0.311	.818	3.38 ± 0.28	16.644	< .001
	Advanced beginner	60 (30.0)	3.01 ± 0.47			3.60 ± 0.47			3.64 ± 0.35		
	Competent	60 (30.0)	3.12 ± 0.43			3.62 ± 0.59			3.86 ± 0.49		
	Proficient	58 (29.0)	3.16 ± 0.43			3.68 ± 0.52			4.01 ± 0.40		
Experience of rotation	Yes	101 (50.5)	3.09 ± 0.44	0.073	.942	3.64 ± 0.51	0.325	.746	3.86 ± 0.46	2.508	.013
	No	99 (49.5)	3.09 ± 0.42			3.62 ± 0.50			3.70 ± 0.43		
Self-development activities	Yes	67 (33.5)	3.21 ± 0.53	2.923	.004	3.64 ± 0.61	0.232	.817	3.81 ± 0.47	0.591	.555
	No	133 (66.5)	3.03 ± 0.36			3.62 ± 0.45			3.77 ± 0.44		
Voluntary participation in education	Yes	27 (13.5)	3.29 ± 0.51	2.635	.009	3.99 ± 0.47	4.141	< .001	4.00 ± 0.47	2.688	.008
	No	173 (86.5)	3.06 ± 0.41			3.57 ± 0.49			3.75 ± 0.44		

Table 3
Correlations between nurses' clinical performance and main independent variables (N = 200).

Characteristics	Informal learning	Learning transfer	Clinical performance
	r (p)		
Informal learning	1		
Learning transfer	0.498 (< .001)	1	
Clinical performance	0.332 (< .001)	0.461 (< .001)	1

Table 4
Influential factors related to nurses' clinical performance (N = 200).

Variables	Model 1				Model 2				Model 3				
	B	β	t	p	B	β	t	p	B	β	t	p	
(Constant)	3.374		21.295	< .001	2.688		11.176	< .001	1.973		7.710	< .001	
Age (< 30 = 0)	≥ 30	-0.083	0.121	-0.687	.493	-0.018	-0.018	.878	0.059	0.058	0.535	.593	
Marital status (unmarried = 0)	Married	0.070	0.093	-0.757	.450	-0.074	-0.064	-0.825	.411	-0.017	-0.015	-0.201	.841
Education (college = 0)	University	0.034	0.087	0.396	.693	-0.010	-0.010	-0.114	.910	-0.028	-0.029	-0.361	.718
	Master or doctor	0.138	0.125	1.102	.272	0.067	0.052	0.542	.588	0.026	0.020	0.228	.820
Clinical career level (novice = 0)	Advanced beginner	0.280	0.100	2.791	.006	0.270	0.275	2.786	.006	0.274	0.280	3.054	.003
	Competent	0.531	0.110	4.808	< .001	0.474	0.483	4.386	< .001	0.491	0.500	4.900	< .001
	Proficient	0.674	0.155	4.337	< .001	0.570	0.576	3.728	< .001	0.551	0.556	3.889	< .001
Experience of rotation (no = 0)	Yes	-0.053	0.066	-0.800	.425	-0.035	-0.039	-0.551	.583	-0.053	-0.059	-0.890	.374
Voluntary participation in education (involuntary = 0)	Voluntary	0.242	0.086	2.825	.005	0.191	0.145	2.265	.025	0.096	0.073	1.208	.228
Informal learning					0.246	0.236	3.698	< .001	0.070	0.067	1.010	.314	
Learning transfer									0.340	0.384	5.682	< .001	
R ² (adjR ²)			0.259 (0.224)				0.309 (0.273)				0.411 (0.376)		
ΔR ²							0.050				0.101		
F (p)			7.396 (< .001)				8.467 (.001)				11.906 (< .001)		

regression analysis.

In the current study, the nurses' informal learning was at a moderate level and mostly occurred through self-reflection and interaction. These results are consistent with those of previous studies reporting that nurses often learn through personal networking and cooperation with their colleagues, as well as individual inquiry activity and trial and error (Bahn, 2007; Kim and Lee, 2009). Nurses face various situations in which they need to reflect and evaluate their own actions or those of the whole work community in their daily work (Nevalainen et al., 2018). In addition, nurses' work involves plenty of tacit knowledge and experiential skills (Eraut, 2007; Jensen, 2007), which is why interactions such as observations, questions, and feedback are highlighted in informal learning.

The level of learning transfer was slightly higher than the moderate level and similar to that reported in a previous study of nurses (Kim, 2014). It can be understood that nurses are trying to apply knowledge and skills acquired through education and diverse work-based learning in practical work. The level of nurses' clinical performance was similar to that reported in a previous study (Lee, 2016; Shin et al., 2017), and the nurses recognized their clinical performance as higher than the intermediate level.

The level of informal learning and learning transfer according to demographic characteristics showed significant differences in education level and voluntary participation in education. A higher level of education and voluntary participation in clinical performance-related training programs are thought to correspond to high levels of engagement in informal learning activities such as personal inquiry activities, trial and error, and learning with others (Kim and Lee, 2009). In addition, these results are similar to those of previous studies showing that the motivation for participation in education is strong, and graduate school students are more likely to have higher levels of learning transfer (Kim, 2014). This implies that the higher the level of education, the greater the tendency to continue learning for self-development and management, and highlights the importance of education, the study of various learning methods.

The level of nurses' clinical performance according to demographic characteristics showed significant differences in age, marital status, education level, clinical career level, and voluntary participation in hospital education. This is consistent with previous studies showing that novice nurses have acquired sufficient experience and knowledge to improve their clinical performance in the process of becoming proficient nurses, and clinical expertise increases according to age and clinical career level (Martin, 2002; Park and Kim, 2009). In addition, self-directed learning related to voluntary participation in educational programs significantly influenced clinical performance (Park et al., 2016). Improving nurses' clinical performance requires changing direction from a collective and standardized learning system that was previously led by nursing organizations. Rather, nursing organizations need to support and encourage a flexible learning environment such that individual nurses can take the initiative in planning and carrying out learning in consideration of the nurses' clinical careers and education level.

As for the results of the correlation analysis, informal learning and learning transfer were found to be correlated factors in nurses' clinical performance. However, the regression model for nurses' clinical performance revealed that learning transfer was only a significant factor. This is similar to previous research findings (Lee and Park, 2015) that learning transfer in nursing-college students is a significant factor in explaining core fundamental nursing performance. One potential explanation for why learning transfer is the only significant predictor of nurses' clinical performance is that informal learning activities such as external search and learning with others should not be limited to the mere sharing of experience and information; when they are efficiently transferred into various tasks beyond learning itself, nurses can improve their clinical performance.

However, informal learning should also be considered as a way to enhance nurses' clinical performance. Previous studies have focused on formal learning. They point out that it is not possible to guarantee nurses' professional clinical performance only through formalized and standardized education, perhaps because of the nature of shift work, and the complexity and diversity of organizations. Opportunities for informal learning through communication, interaction with others, role modeling, and team-based learning play an important role in motivating nurses and developing their essential competencies such as problem-solving ability (Choonara et al., 2017; Kim et al., 2016). Therefore, it is necessary to consider approaches to informal learning that can be integrated into everyday tasks and practices. In addition, informal learning is more flexible than formal learning; it can contribute to creating an environment and building a culture that allows

nurses to choose an appropriate method and that supports and promotes learning.

The clinical career level was also an influencing factor in clinical performance, similar to previous research results (Park et al., 2016; Salonen et al., 2007). Therefore, it is necessary to establish a clinical performance enhancement strategy that considers proficiency and expertise according to the nurses' careers. Based on these results, the researchers suggest improving the nurses' clinical performance by developing a customized learning transfer program that considers the nurses' careers and verifies the program's effects.

As this study was conducted only among nurses in two tertiary university hospitals and had a small sample size, the results might not be generalizable to all nurses. All the variables were measured and assessed using self-reporting with a Likert scale, which may have potentially led to common method bias through participants' under- or overestimating certain responses (Podsakoff et al., 2003). Future studies should use other methods, such as observation measurements.

5. Conclusion

This study found that significant correlations have been confirmed on informal learning, learning transfer, and clinical performance. Learning transfer was a significant predictor of nurses' clinical performance. These results might contribute to the development of educational methods for enhancing the effectiveness of nurses' clinical performance. Enhancing nurses' clinical performance through efforts to boost informal learning might maximize the potential effect of learning transfer, and would potentially be very useful for nursing education. Such practices to improve the clinical performance of nurses could include establishing an organizational culture to support various types of informal learning and developing programs for effective learning transfer. Based on these results, the researchers suggest conducting research to develop and validate the effect of learning transfer programs that consider the nurses' careers.

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Ethical approval

This study was approved by the Institutional Review Board (IRB NO: H-1708-031-058) of Pusan National University Hospital in South Korea.

Declaration of Competing Interest

None of the authors have any personal or financial conflicts of interest to declare.

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