

# PREDICTIVE FACTORS FOR RESEARCH UTILIZATION IN NURSING PRACTICE AMONG PROFESSIONAL NURSES, REGIONAL HOSPITALS, THAILAND

Cattaliya Siripattarakul Sanluang, Yupin Aunguroch\*

Faculty of Nursing, Chulalongkorn University, Bangkok, 10330, Thailand

## ABSTRACT:

**Background:** Research utilization in nursing practice (RUNP) is a judgmental activity of nurses in using an applicable specific research finding in their practice to promote optimal clinical care. Although research utilization is crucial for improving quality of patient care, there exists a research-practice gap. A number of papers have expressed concern about barriers to research utilization. However, little is known about the predicting factors of research utilization in nursing practice.

**Methods:** The purposes of this predictive correlational study were to explore RUNP and identify predictive factors of RUNP among professional nurses based on a selected part of the Johns Hopkins Nursing Evidence Base Practice Model and a literature review. Participants were 447 registered nurses recruited from five regional hospitals selected by multistage sampling from all regional hospitals under the Jurisdiction of the Thailand Ministry of Public Health. Data were collected based on five self-reported questionnaires: Personal Data Form, Research Utilization in Nursing Practice Scale, Research Climate Scale, Support Resources Scale, and Staffing Scale. Content validity and reliability were tested to confirm the psychometric properties of the instruments. Four-hundred forty completed questionnaires were analyzed with descriptive statistics, bivariate analysis, and multiple linear regression analysis.

**Results:** Participants were between 23–59 years old (Mean = 39.41, SD = 8.64) and educated at the bachelor's level (86.14%). Some had research experience (37.73%), and were employed in nursing for .83 to 37 years (Mean = 16.13, SD = 8.44). Their RUNP was classified at the moderate level. Research climate, support resources, staffing, and research experience had significant moderate positive relationships with RUNP ( $r = .440, .430, .376, \text{ and } .316$  respectively,  $p < .01$ ). Education level had a weak positive relationship with RUNP ( $r = .158, p < .01$ ). The significant predictors in multiple regression were research experience, support resources, and research climate ( $\beta = .273, .256, \text{ and } .244$  respectively,  $p < .01$ ), and accounted for 30.40% of total variance in RUNP ( $R^2 = .304, p < .01$ ).

**Conclusion:** To promote RUNP among nurses requires research experience, support resources, and creation of a research climate. This study suggests that administrators of hospitals should consider and manage these significant factors to increase RUNP among nurses.

**Keywords:** Predictive factors, Research utilization, Nursing practice, Professional nurses, Thailand

DOI:

Received: June 2015; Accepted: August 2015

## INTRODUCTION

In recent years, research utilization has received increased attention in the literature because it concerns the quality of healthcare service. This concept has been emphasized in nursing since the early 1970s [1]. Research utilization in nursing practice (RUNP) consists of a series of activities, and is viewed as an essential strategy to promote

optimal clinical care [2- 4]. Research utilization has been defined as the use of research findings in the realm of clinical practice to improve the quality of patient care in nursing practice [5, 6]. In addition, research utilization could refer to the innovation diffusion process that accounts for new ideas, knowledge, or practice, which is then transferred to clinical practice [7, 8]. The use of research findings should lead to better patient care outcomes because patient care decisions are conscientiously based on the best scientific evidence [9]. These concepts

\* Correspondence to: Yupin Aunguroch

E-mail: Yupin.a@chula.ac.th

## Cite this article as:

Sanluang CS, Aunguroch Y. Predictive factors for research utilization in nursing practice among professional nurses, regional hospitals, Thailand. *J Health Res.* 2016; 30(1): 25-31. DOI:

implicate a series of judgmental activities of nurses in appraising the applicability of specific research for their practice [5, 9].

Although research utilization is crucial for improving the quality of patient care, there exists a gap between research and practice. A study of nurses from various practice areas of the southwestern United States revealed that only 20.80% were currently involved in research utilization [3]. However, in Thailand, a study showed that 62.20 % of nurses had applied research findings in their practices [10]. Several researchers have continuously expressed concern about factors that facilitate and form barriers to research utilization. The common facilitating factors include availability of research reports, library and consultant services, administrator support, and ongoing research in the agency [10-12]. On the other hand, the failure to find studies relating to clinical problems, limited accessibility of research findings, the inability to understand research reports, lack of work time to read research reports, lack of nursing research consultants, and lack of authority to change patient care procedures has led to the underutilization of research findings in nursing practice [13-15]. Moreover, lack of time was the most common barrier to research utilization [15-17]. Literature in Thailand suggests that the top ten barriers to RUNP are as follows: most research is written in English, books or relevant literature are not centrally located, statistical analyses are not understandable, lack of opportunity to discuss new research findings with knowledgeable colleagues, research reports/articles are not widely publicized and updated, insufficient authority to change patient care procedures, facilities are inadequate for implementing research, no time to read research papers, insufficient time on the job to implement new ideas, and the research is not reported clearly [18].

Nurses generally think positively about research utilization; however, we know little about what determinants affect their use of research findings (research utilization). We do know that various individual and internal organizational factors are related to RUNP [19]. Individual factors, such as education level, research experience, and nursing experience have been viewed as controversial [20]. Similarly, previous studies in the Thai context reveal that important factors in RUNP include education level, research experience, and duration of nursing experience. Those internal organizational factors are policy, management, and administrative support and research use [11, 12]. Regarding these empirical data, individual and organizational factors are highly related to RUNP.

Therefore, a selected part of the Johns Hopkins Nursing Evidence Base Practice (JHNEBP) model and a literature review focusing on individual and internal organizational factors were used to guide this study [2].

RUNP is a means of improving nursing practice outcomes. To date, patient illness is increasingly complex; in order to provide effective healthcare delivery, innovation knowledge needs to be integrated with clinical data. The availability of resources and research evidence that provide nurses with current and specific information to address clinical issue is crucial. The administrators have to prioritize and utilize the key success factors involved with RUNP among professional nurses. Through this, they can develop effective management strategies. Therefore, thoroughly understanding predictive factors of RUNP as emphasized in this study is critically needed.

## MATERIALS AND METHODS

### Participants and data collection

A cross-sectional descriptive study was conducted from February to April 2015 to explore predictive factors of RUNP among nurses working in clinical practice as registered nurses without an administrative position. The sample size was calculated by using Taro Yamane's formula [21, 22], with the assumption of a 95% confidence interval (two-sided). Four-hundred forty-seven participants were recruited by a multistage random sampling from all nurses working in five of 27 regional hospitals under the Jurisdiction of the Ministry of Public Health (MOPH) of all regions in Thailand. After data collection, 440 respondents completed the questionnaires (n = 440, 98.43%).

### Ethical considerations

This study was approved by ethics committees of five MOPH regional hospitals (COA-RBHEC 011/58). All participants signed informed consent forms before participation in this study.

### Measures

Data were collected by using five Thai self-reported questionnaires developed by researcher under selected parts of the JHNEBP model [2] and supportive literature [15-20]. The item selection and precision of the items were examined using correlated item-total correlation (.30-.70). Exploratory Factor Analysis (EFA) with the principal component method was used to identify complex interrelationships among items and group items that formed part of united concept. Content validity by five experts, and reliability with

Cronbach's alpha were tested. The five scales were as follows:

**1) Personal Data Form (PDF):** This form was used for individual characteristics investigation including age, working unit, educational level, duration of nursing experience, income, research experience, and training experience. Each item was set as a dichotomous or multiple response choice.

**2) Research Utilization in Nursing Practice Scale (RUNPS):** The RUNPS was developed to measure the degree to which nurses incorporate research findings into practice. It included 17 nurse activities in incorporating research findings into clinical nursing practice according to three key processes of evidence-based practice based on the JHNEBP model (1) practice question: items 1–2; (2) evidence evaluation: items 3–8; and (3) translation: items 9–17. The self-report item was a 4-point rating scale, in which 1 = not at all, 2 = very little, 3 = moderate, and 4 = great. The RUNP score was classified by mean score into three levels: low (< 2), moderate (2–3), and high (>3). The corrected item-total correlations were .48-.83. Regarding the EFA, all 17 items had a factor loading ranged from .58 to .86. The result of EFA with varimax rotation for the scale had Eigen value 1.17, which was acceptable. This indicated the RUNPS contained 17 items with three components. The scale-level Content Validity Index (S-CVI) was .98, and item-level Content Validity Index (I-CVIs) were .80–1.00, which indicated a good content validity for the RUNPS. The Cronbach's alpha was .95.

**3) Research Climate Scale (RCS):** The RCS was developed to measure the degree to which nurses perceived policy, management, and research culture to facilitate RUNP. It was comprised of 8 items to reflect the logical and semantic content of the concept of research climate. Respondents rated each item on a 5-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree. The score of the RCS was classified by mean score into three levels: low (< 2), moderate (2–3), and high (> 3). The corrected item-total correlations were .53-.74. Regarding the EFA, all 8 items had a factor loading ranged from .67 to .86. The result of EFA with varimax rotation for the scale had Eigen value 1.09, which was acceptable. In brief, the RCS contained 8 items with two components. The S-CVI was .95, and I-CVIs were .80–1.00, which indicated a good content validity for the RCS. The Cronbach's alpha was .88.

**4) Support Resources Scale (SRS):** The SRS was constructed to assess the degree to which nurse perceived equipment and supplies in the organization according to time, fund or rewards, and

documental support. The SRS included 18 items, consisting of (1) time: items 1–6; (2) funds/rewards: items 7–12; and (3) assets: items 13–18. It asked respondents to rate support resources on a 5-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree. The mean scores of the RCS were classified into three levels: low (< 2), moderate (2–3), and high (> 3). The corrected item-total correlations were .54-.78. Regarding the EFA, all 18 items had a factor loading ranged from .40 to .88. The result of EFA with varimax rotation for the scale had Eigen value 1.54, which was acceptable. In brief, the SRS had 18 items with three components. The S-CVI was .93, and I-CVIs were .80–1.00, which indicated a good content validity for the SRS. The Cronbach's alpha was .94.

**5) Staffing Scale (SS):** The SS was constructed to assess the degree to which nurses perceived the adequacy of nursing personnel to facilitate research utilization in nursing practice. It included 10 items evaluated on a 5-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = unsure, 4 = agree, and 5 = strongly agree. Mean SS scores were classified into three levels: low (< 2), moderate (2–3), and high (> 3). The corrected item-total correlations were .65-.81. Regarding the EFA, all 10 items had a factor loading ranged from .54 to .87. The result of EFA with varimax rotation for the scale had Eigen value 1.29, which was acceptable. This indicated the SS contained 10 items with three components. The S-CVI was .92, and I-CVIs were .80–1.00, which indicated a good content validity for the SS. The Cronbach's alpha was .93.

### Data analysis

Descriptive statistics including frequency, mean, and standard deviation were used to interpret demographic data and to examine distribution of demographic and major variables. As education level and research experience are nominal scales, the variables were recoded into two dummy variables (education level: bachelor's degree and graduate degree; research experience: research experience and no research experience). Pearson correlation analysis and multiple linear regression were analyzed with IBM SPSS 22 for Windows (licensed to Chulalongkorn University).

### RESULTS

The majority of participants were female (96.82%); 86.14% had a bachelor's degree and the rest had graduate degrees. Most had nursing experience of more than 5 years (85.23%). The age of the nurses ranged from 23 to 59 years (mean = 39.41, SD = 8.64). Some had continuous nursing

**Table 1** Level of research utilization in nursing practice (RUNP) activities among nurses (n = 440)

RUNP activities	Mean	SD	RUNP level
1. Identify a practice question	2.91	.72	moderate
2. Define the scope of the practice question	2.63	.73	moderate
3. Summarize the research finding	2.66	.77	moderate
4. Conduct an internal search for research findings	2.61	.78	moderate
5. Conduct an external search for research findings	2.47	.72	moderate
6. Appraise research findings	2.44	.80	moderate
7. Rate the strength of the research findings	2.30	.81	moderate
8. Develop recommendations to change the processes of care based on the strength of the research findings	2.17	.76	moderate
9. Determine feasibility of translating recommendations into setting	2.60	.81	moderate
10. Determine appropriateness of translating	2.57	.80	moderate
11. Secure support from decision-makers to implement the change internally	2.56	.86	moderate
12. Communicate the findings	2.42	.82	moderate
13. Report results of the preliminary evaluation to decision makers	2.40	.87	moderate
14. Evaluate outcomes	2.36	.82	moderate
15. Identify the next step	2.35	.79	moderate
16. Implement the change	2.35	.80	moderate
17. Create an action plan	2.24	.81	moderate
<b>Total</b>	<b>2.48</b>	<b>.62</b>	<b>moderate</b>

**Table 2** Comparison of research utilization in nursing practice (RUNP) by demographic characteristics (n = 440)

Demographic characteristics	RUNP (Mean ± SD)	Level of RUNP	t-test/F-test	p-value
<b>Age (years)</b>			0.053 <sup>f</sup>	.984
21–30	2.49 ± 0.54	moderate		
31–40	2.46 ± 0.63	moderate		
41–50	2.48 ± 0.66	moderate		
51–60	2.48 ± 0.60	moderate		
<b>Education level</b>			3.346 <sup>t</sup>	.001
Bachelor degree	2.44 ± 0.59	moderate		
Graduated degree	2.72 ± 0.69	moderate		
<b>Continuous nursing education in a nursing specialty program</b>			1.85 <sup>t</sup>	.065
Yes	2.57 ± 0.67	moderate		
No	2.44 ± 0.59	moderate		
<b>Nursing experience (years)</b>			0.76 <sup>f</sup>	.989
< 1 year	2.45 ± 0.59	moderate		
1–2 years	2.45 ± 0.42	moderate		
2–3 years	2.46 ± 0.73	moderate		
3–5 years	2.53 ± 0.44	moderate		
> 5 years	2.47 ± 0.64	moderate		
<b>Research experience</b>			6.970 <sup>t</sup>	.001
No	2.32 ± 0.59	moderate		
Yes	2.73 ± 0.59	moderate		
Principle investigator (PI)	2.79 ± 0.58	moderate		
Research assistant (RA)	2.72 ± 0.57	moderate		

<sup>t</sup> = t-test; <sup>f</sup> = F-test

**Table 3** Mean and standard deviation of research climate, support resources, and staffing (n = 440)

Variable	Mean ± SD	Level
Research climate	3.52 ± 0.63	High
Support resources	3.23 ± 0.63	High
Staffing	3.16 ± 0.69	High

**Table 4** Correlation of all factors with research utilization in nursing practice (n=440)

Variables	Correlation coefficients	p-value
Research climate	.440	.000
Support resources	.430	.000
Staffing	.376	.000
Research experience	.316	.000
Educational level	.158	.002

**Table 5** Predictors of research utilization in nursing practice (n= 440)

Predictors	B	SE	$\beta$	t	p-value
Constant	.692	.149		4.655	.000
Research experience	.348	.051	.273	6.796	.000
Support resources	.250	.051	.256	4.895	.000
Research climate	.240	.052	.244	4.646	.000

R = .551, R<sup>2</sup> = .304, adjusted R<sup>2</sup> = .299, SE = .517, R<sup>2</sup> change = .038, F change = 23.965

education in a nursing specialty program (25.91%) and had research experience (37.73%).

In table 1, the participants engaged RUNP at a moderate level (mean = 2.48, SD=.62). Considering activities list of the RUNP, "Identify a practice question" had the highest mean score (mean = 2.91, SD = .72). As the comparison of RUNP by demographic variables, there were statistical significant different among educational level and research experience ( $p < .01$ ) (Table 2).

Organizational factors such as research climate, support resources, and staffing were scored at high levels (Table 3).

#### Predictive factors of RUNP

The relationships between all factors and RUNP were indicated in Table 4. Research climate, support resources, staffing, and research experience had moderate positive relationships with RUNP ( $r = .440, .430, .376, \text{ and } .316$  respectively,  $p < .01$ ). Educational level had a weak positive relationship with RUNP ( $r = .158, p < .01$ ).

Regarding multiple linear regression, education level and staffing were not significant predictors (Table 5). Three significant predictors of RUNP at  $p < .01$  were research experience, support resources, and research climate. These variables accounted for 30.40% ( $R^2 = .304$ ) of the variance in research utilization in nursing practice.

The predictive equation was as follows:

$$\hat{Y}_{\text{RUNP}} = .692 + .348 \text{ research experience} + .250 \text{ support resources} + .240 \text{ research climate}$$

The multiple regression equation for explaining the variables of RUNP in the standardized score function was as follows:

$$Z_{\text{RUNP}} = .273 Z_{\text{research experience}} + .256 Z_{\text{support resources}} + .244 Z_{\text{research climate}}$$

#### DISCUSSION

The current situation among nurses in MOPH regional hospitals revealed that they perform RUNP at a moderate level. This may come from that the most of them (86.14%) completed Bachelor degree, had no experience in research method (62.27%), and had no research training (50.45 %). Likewise, the previous study revealed that 26.10 % of nurses at one governmental hospital in Bangkok Metropolitan have research experiences, and 62.2 % had applied research findings in their practice [2].

This study also revealed factors predicting RUNP. First, research experience had a significant positive relationship with RUNP, and was its best predictor. The current study revealed that nurses with no research experience had RUNP score lower than those who had research experience. Other studies also found that nurses' research experience results in their extended RUNP [23-25]. Professional nurses are increasingly working within the evidence-based practice paradigm to support the provision of safe and high-quality care for their patients [2, 20]. To be able to successfully implement evidence-based practice, nurse professionals must first understand research methodology to enable informed critique of relevant evidence [2, 19]. In this study, nurses who had research experience were likely more understanding about the importance of evidence-based nursing. They might act as mentors to colleagues who are unaware of its potential impact on the range of information available. Once persuaded, nurses could collaborate to promote research utilization in the workplace. Therefore, nurses with research

experience had RUNP score higher than nurses with no research experience.

Second, support resources had a significant positive relationship with RUNP, and were the second best predictor of RUNP. This study indicated that high support resources increased RUNP. A possible explanation of this might have to do with promoting accessibility. In this study, more than a half of nurses 1) could obtain sources of research information from academic forum and journal, 2) could access research information from website, board, intranet or group research journal, 3) took course about research conducting. As previous study, asset as computer and accessibility to the internet for updated knowledge based practice were significant to increase the research utilization [25]. Furthermore, to promote accessibility could be occurred by the supports as money, equipment, library time, use of computers, meeting space, salary, and paid work time given for the facilities are important [18, 19, 25].

Lastly, the research climate had a positive relationship with RUNP, and was the third best predictor of RUNP. This illustrates that when nurses work in a good research climate, they were more likely to have a higher RUNP than those in a less conducive research climate. The roles of nurses working in hospitals as clinical nurse practitioners involved not only direct care of patients or clients, but also coordinating with others in the healthcare team. If the organization was focused on RUNP and promoted it by formal communication of the policy, creating a research culture, and clearly indicating how to manage the change to enhance quality of care, nurses would effectively join RUNP activities [2, 3]. This finding was congruent with results of various studies that promotion of a formal research climate as a management policy and valuing research culture was highly impacted on nurses' RUNP [6, 13].

The remaining predictors, educational level and staffing variables could not predict RUNP among professional nurses. It was likely to be described as follows. Firstly, to consider the RUNP was focused on the activities of nurses in order to translate knowledge into practice more than the understanding of the RUNP. The educational level reflected one's cognitive ability to utilize research [2]. Most participants were completed Bachelor degree which provide basic research method. Therefore, this study resulted that educational level had weak positive relationship with the RUNP, and could not predict the RUNP. The finding were inconsistent with previous studies that educational level was strong related to RUNP abilities [19] and

the time spent study (off duty) is significantly related to research utilization [16-19]. Secondly, staffing had a significant positive correlation with RUNP, but could not predict RUNP. The literature showed that staffing predicts RUNP [13-14]; however, staffing did not predict RUNP in this study. This difference might be the result of a different operational definition. Most researchers had studied staffing in terms of sufficient staffing. In contrast, staffing in this study was not defined only by sufficient staffing but also included strategies for nurses' perceived adequacy of nursing personnel to facilitate research utilization in nursing practice. This might be described that nurses with expected competency as attitude, knowledge, and practice of research utilization were essential for leading other nurses to do the RUNP [2]. In staffing, if nurses with the qualification were adequate allocated for each clinical nursing area or working unit, they could implement the RUNP. Moreover, the participants in previous studies varied in racial make-up and socioeconomic background, whereas participants in this study consisted of Thai nurses. Therefore, the contradictory finding may be attributed to the differences in the characteristics of the participants. These factors are important issues for future research.

## CONCLUSION

These findings emerged from a cross-sectional descriptive study. The RUNP among participants was moderate level. Research experience, education level, support resources, research climate, and staffing had positive relationship with RUNP. Only research experience, support resources, and research climate were significant predictive factors of RUNP. This results was valuable information for nursing administrators to manage key success factors and develop proper strategies to increase RUNP among nurses. First priority to extend research experience should be done for individual level by promoting the further study in master or doctoral degree, formal and informal research training as short course or continuing education. In addition, combining the research climate factors by implementation of policy and management, with support resources factors as facilitating of time, funds/rewards, and assets should be supported as the significant organizational factors. In advance, effective RUNP program to enhance research utilization among nurses should be designed and implemented.

## ACKNOWLEDGEMENTS

The authors are grateful to the participants from the five MOPH regional hospitals for their

co-operation in providing useful information.

### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

### REFERENCES

1. Abdellah FG. Overview of nursing research 1955-1968. *Nurs Res.* 1970; 19(3): 239-52.
2. Newhouse RP, Dearholt SL, Poe SS, Pugh LC, White KM. Johns Hopkins nursing evidence-based practice model and guidelines. Indianapolis, IN: Sigma Theta Tau International; 2007.
3. Olade RA. Evidence-based practice and research utilization activities among rural nurses. *J Nurs Scholarsh.* 2004; 36(3): 220-5.
4. Lindeman CA. Priorities in clinical nursing research. *Nurs Outlook.* 1975; 23(11): 693-8.
5. Fawcett J. Another look at utilization of nursing research. *Image J Nurs Scholarsh.* 1984; 16(2): 59-62.
6. Institute of Medicine. Patient safety: a standard for care. crossing the quality chasm series. Washington DC: National Academy Press; 2008.
7. Crow G. Diffusion of innovation: the leaders' role in creating the organizational context for evidenced-based practice. *Nurs Adm Q.* 2006; 30(3): 236-42.
8. Rogers E. Diffusion of innovations. 3<sup>rd</sup> ed. New York: The Free Press; 1983.
9. Marram G, Stetler C. Utilization of research: critiquing research for practice. [S.l.:s.n.]; 1985.
10. Yimboonna C, Poomnikom N, Kanoknunthapong M, Boonnun D, Hankhunasate W, Namthep J, et al. Research utilization and barriers to research utilization in nursing practice. *Siriraj Nurs J.* 2007; 1(2): 11-26.
11. Just WP. Information needs and uses of Thai nurses: a national sample survey [Doctoral dissertation]. The University of North Carolina at Chapel Hill; 2008.
12. Tiloksakulchai F, Apanakapant P, Karnjanakunakorn D. A survey of research utilization and barriers to research utilization of Thai nurses working at hospitals under the responsibility of University Affairs. *J Nurs Sci.* 2000; 18(3): 45-54.
13. Champion VL, Leach A. Variables related to research utilization in nursing: an empirical investigation. *J Adv Nurs.* 1989; 14(9): 705-10.
14. Thurstone I, Tenove S, Church J. Hospital nursing research is alive and flourishing. *Nurs Manag.* 1990; 21(5): 50-4.
15. Funk SG, Champagne MT, Wiese RA, Tornquist EM. Barriers to using research findings in practice: the clinician's perspective. *Appl Nurs Res.* 1991; 4(2): 90-5.
16. Miller J, Messenger S. Obstacles to applying nursing research findings. *Am J Nurs.* 1978; 78(4): 632-34.
17. Pettengill MM, Gillies DA, Clark CC. Factors encouraging and discouraging the use of nursing research findings. *Image J Nurs Scholarsh.* 1994; 26(2): 143-8.
18. Estabrooks CA, Midodzi WK, Cummings GG, Wallin L. Predicting research use in nursing organization: a multilevel analysis. *Nurs Res.* 2007; 56(4): s7-23.
19. Squires JE, Estabrooks CA, Gustavsson P, Wallin L. Individual determinants of research utilization by nurses: a systematic review update. *Impl Sci.* 2011; 6(1): 20. [cited 2015 January 12]. Available from: <http://www.implementationscience.com/content/6/1/1>
20. Suwanraj M. Current practice, perceived barriers, and perceived facilitators of Thai nurses on using the evidence-based practice on pain assessment and pain management in older adults. The University of Iowa; 2010.
21. Yamane T. Statistic: an introductory analysis. 3<sup>rd</sup> ed. New York: Harper and Row; 1973.
22. Hair JF, Black WC, Babin BJ, Anderson RE. Multivariate data analysis: a global perspective. 7<sup>th</sup> ed. Philadelphia, PA: Pearson; 2010.
23. McCleary L, Brown GT. Barriers to paediatric nurses' research utilization. *J Adv Nurs.* 2003; 42(4): 364-72.
24. Tsai SL. Nurses' participation and utilization of research in the Republic of China. *Int J Nurs Stud.* 2000; 37(5): 435-44.
25. McCloskey, D.J. Nurses' perceptions of research utilization in a corporate health care system. *J of Nurs Scholarsh.* 2008; 40(1): 39-45.