

FACTORS INFLUENCING NURSES' PARTICIPATION IN CLINICAL RESEARCH: A CROSS-SECTIONAL SURVEY IN HOSPITAL PUTRAJAYA, MALAYSIA

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ABSTRACT

Background: The Malaysian nurses encounter many barriers in their involvement in clinical research [and also in research utilization (RU)]. **Objective:** This cross-sectional survey utilized a self-administered questionnaire within a study population of the Malaysian nurses working in a government hospital to determine the level of involvement of nurses in clinical research at Hospital Putrajaya from May to August 2015, which led to an assessment of the level of association between a list of pre-specified demographic and job-related characteristics and the involvement of nurses in clinical research, in order to identify any plausible factors which might have an association with either facilitating or hindering these nurses from their involvement in clinical research. **Methods:** After having prepared and validated the self-administered questionnaires for this study, they were then distributed to a total of 406 nurses working in Hospital Putrajaya. This self-administered questionnaire was specifically designed to achieve the objectives of this study which aimed to collect the baseline socio-demographic information of the respondents, and also information pertaining to their nursing practice and their participation in activities that were related to nursing research. **Results:** This study had provided some valuable insights into several plausible factors that were associated with the low level of involvement of Malaysian nurses in clinical research. **Conclusion:** The study provides valuable information for formulating strategies to increase nurses' participation in research activities at Hospital Putrajaya by providing more research training opportunities and enhancing the level of awareness and increasing the accessibility to these resources by the nurses.

Keywords: Nurses; Research; Hospital Putrajaya

INTRODUCTION

Throughout the world, nurses have an important role within the healthcare setting by providing safe and most efficient nursing care (MacArthur, Hill & Callister, 2014). The daily job routines and responsibilities of a nurse will typically include the provision of direct nursing care to their patients, such as to perform daily nursing assessments of the patients including checking their vital signs, to administer daily medications to patients, as well as to be involved in many other types of administrative work. Hence, these nurses play a highly

significant role in providing optimal patient care all over the world by being the largest group of health team members (World Health Organisation, 2010).

In Malaysia, the nursing profession comprises approximately 50.7% of the total human resource within the Malaysian healthcare system (Ministry of Health Malaysia, 2016). Although the nurses in Malaysia are shouldering an important daily responsibility for providing optimal nursing care to the patients, a recent study reported by Bashar (2019) had noted that a majority of nurses who were working in a public teaching

hospital in Malaysia had rarely applied evidence-based practice (EBP) when discharging their daily duties and responsibilities. This was probably attributed to the fact that most of these Malaysian nurses are currently diploma or certificate holders only. Moreover, according to a recent systematic review of the literature on EBP among nurses in low-and middle-income countries (LMICs) conducted by Shayan, Kiwanuka & Nakaye (2019), which identified a total of sixteen included studies, one of which was conducted in Malaysia. They concluded that a change in nursing practice will entail close attention to be paid to both clinical and research involvement of nurses; after having broadly categorized the barriers to EBP among nurses in these LMICs as three main themes, namely (i) institutional-related barriers, (ii) interdisciplinary barriers, and (iii) nurse-related barriers. Hence, it is of paramount importance to facilitate Malaysian nurses in overcoming any potential barriers that may prevent them from engaging in useful research and utilizing these research findings by basing real nursing practice on sound research evidence about the effectiveness of health care interventions and procedures, which constitutes the basic tenet of evidence-based nursing practice. This is because the importance of providing evidence-based nursing care stems from the assumption that integrating research findings into clinical practice will increase the quality of health care and improve patient's health (Umarani, 2014).

The term 'evidence-based medicine' was initially coined by Guyatt, Cairns & Churchill in 1992 (Guy, Cairns & Churchill, 1992). Later, Ingersoll (2000) then postulated the notion that evidence-based nursing (EBN) was the "conscientious, explicit, and judicious use of theory-derived, research-based information in making decisions about care delivery to individuals or groups of patients which was reflective of individual needs and preferences". This definition of EBN, therefore, contained three pillars to inform decisions pertaining to the optimal provision of healthcare: research (research-based information), patients' preferences (individual needs and preferences), and clinicians' expertise (conscientious, explicit, and judicious use). Therefore, a clear description of EBN will include research utilization (RU) as its core component, which had been defined by Estabrooks and colleagues as 'that process by which specific research-based knowledge (science) is implemented in practice.' (Estabrooks, Wallin & Milner, 2003).

Since 2000, both the health care community and regulatory agencies had recognized the importance of using research to inform EBN as the critical step for improving nursing quality and for provision of safe nursing (Brown *et al.*, 2009). Moreover, the American Association of Colleges of Nursing (AACN) also described nursing research as part of the field "clinical research" which "attends to issues such as acute to chronic care experiences throughout life, health promotion and preventive care to end-of-life care; and care for individuals, families and communities in diverse settings" (Polit & Beck, 2004). This undoubtedly underscores the importance for a nurse to apply research findings in his/her workplace, which will enable him/her to provide the most efficient and effective patient care by enhancing the quality of nursing care and by serving as a means to evaluate his/her own performance (Nurmi *et al.*, 2015). This is because by utilizing the research findings and applying them in their daily nursing practice; the nurses will not only be able to improve the quality and standards of nursing care (Niederhauser & Kohr, 2005), but also to contribute to the nurses' personal and professional development (Yanagawa *et al.*, 2014).

Despite the high significance of the involvement of nurses in clinical research (and also that for the implementation of research findings in nursing practice, in a process called research utilization [RU]), several published studies had reported the nurses' lack of preparation and lack of sufficient skills in conducting research studies and using their findings, which had probably resulted from their lack of skills or their failure to study the nursing-related journals and updated clinical findings (Egerod & Hansen, 2005; Hutchison & Johnston, 2004). In addition, Melnyk *et al.* (2004) had also concluded that having research skills and engaging in research activities are necessary for preparing nurses to apply research findings, which should be considered parallel to the development of clinical skills.

Therefore, it seems likely that many barriers might have hindered these direct care nurses from having successfully mastered the requisite skills to conduct research and to apply EBN skills to search for, appraise and use all relevant research evidence when making clinical decisions. In congruence with this, Nkrumah *et al.*, (2018) had produced a very important finding which pinpointed the need to create intuitional support to facilitate and encourage nurses' participation in

research. Such efforts shall aim to remove any institutional barriers that may interfere with the ability of nurses to be involved in research and to apply such research findings in their daily nursing practice.

Indeed, many other more recently published studies had similarly reported that several barriers might have impeded the nurses from acquiring the relevant knowledge and skills for conducting research and utilizing its findings and applying them in daily nursing practice; and examples of these include Bahadori *et al.*, (2016), Chien *et al.*, (2013), Efstratios (2013), Evans *et al.* (2014), Konwar & Kalita (2018), Lewis *et al.* (2014), Nkrumah *et al.*, (2018), Oluwatosin (2014), Shifaza *et al.*, (2014), Wang *et al.*, (2013), Wu *et al.*, (2019), and Hutchinson & Johnston (2004).

Since these nurses do not adequately apply these research findings in nursing to their daily nursing practice, therefore the extent to which the nursing practice is based on scientific research findings shall remain very limited; which raises a major concern for researchers (Thompson *et al.*, 2007). This disparity between research evidence and actual practice has resulted in the formation of a wide research-practice gap, and many examples of the research-practice gap were highlighted in the nursing literature over the past thirty years (Walsh & Ford, 1989; Hunt, 1981; Gould, 1986). In fact, the situation in Malaysia had already been assessed by a project conducted by Birks *et al.*, (2009), who reported that although the notion of evidence-based practice in nursing was appreciated and accepted by most of the nurses in Malaysia; however they were continually being negatively impacted upon by the existence of many barriers to their involvement in clinical research and also their implementation of such research findings within their daily nursing practice. Nevertheless, it is heartening to learn that Malaysian nurses are still continually and relentlessly seeking opportunities to enhance positive patient outcomes through implementation of EBN in their daily practice.

As already alluded to earlier, Bashar (2019) had reported that most Malaysian nurses did not incorporate research evidence into their daily nursing practice, despite them having a positive attitude toward EBN. Therefore, it seems very likely for these Malaysian nurses to be encountering many barriers in their involvement in clinical research (and also in RU). This provides the underlying rationale for this study, which aims to identify any plausible factors which may have an association with their involvement in clinical research

(and also in RU) in Malaysia.

Hence, this study utilizes a questionnaire within a cross-sectional survey of the Malaysian nurses, by administering it to these nurses in order to determine the level of involvement of Malaysian nurses in clinical research, so as to identify any plausible factors which may have an association with facilitating or hindering these nurses from getting involved in clinical research.

METHODOLOGY

Research Design and Study Instrument

This was a correlational study design based on an observational, non-experimental, cross-sectional survey conducted in all the departments within Hospital Putrajaya. A quantitative cross-sectional survey had been designed for this study to obtain information from the nurses regarding their involvement in clinical research and the factors affecting such an involvement, since the adoption of a quantitative approach enables the researcher to describe and examine the level of association among variables.

This cross-sectional survey was conducted to determine the level of involvement of nurses in clinical research at Hospital Putrajaya from May to August 2015, which led to an assessment of the level of association between a list of pre-specified demographic and job-related characteristics and the involvement of nurses in clinical research.

Data were collected by using a self-administered questionnaire which was specifically designed to achieve the objectives of this study and it consisted of two parts. Part A of the questionnaire included information on the baseline socio-demographic profile of the respondents, and Part B of the same questionnaire included information pertaining to their nursing practice and their participation in activities that were related to nursing research. The questions in part B of the questionnaire were developed based on a literature review of this research topic which is supplemented by an addition of other relevant elements identified by other researchers (Rashid *et al.*, 2012).

Prior to administering the questionnaire to the respondents in this study, its content validity was being assessed by two subject matter experts, one of whom was a medical doctor, and was found to be satisfactory. Its face validity was assessed based on a careful review of the responses elicited from two matrons and one staff nurse, which was also found to be satisfactory. After the

questionnaire was finalized, it was pilot tested among a convenient sample of 30 staff nurses who were not involved in the actual study. The respondents were asked to identify any items they found difficult to understand, and also to specify the length of time they had taken to complete the questionnaire. Based on the results obtained from this pilot test, all the staff nurses were found to be able to respond to all the questions without having any problems in understanding the questions asked by this questionnaire.

Study Population, Recruitment of Study Participants, Sampling Method & Sample Size Calculation

The study population included all the registered nurses working in Hospital Putrajaya who were willing to participate in this survey. However, due to both time and financial constraints, we did not recruit any nurses who were working in Pusat Bersalin Berisiko Rendah (PBBR) in Hospital Putrajaya even though it was part of this hospital.

To recruit the study respondents for this study, the researcher informed the nurses who were working in the hospital about this survey and then invited them to participate in this survey by distributing the questionnaires only to those who were willing to participate. These questionnaires were delivered to all the departments in the hospital, and the total number of questionnaires distributed in each department would depend on the total number of nurses working within that department. The person-in-charge at each department of the hospital would then assist to retrieve all the completed questionnaires from those nurses who were willing to participate in this survey one week later.

Since there were a total of 726 nurses were working in Hospital Putrajaya when this study was conducted, therefore convenience sampling was chosen as the sampling method for recruiting all the potential respondents to the questionnaire in this study. To determine the minimum sample size required for this study, it is necessary to perform a calculation according to a formula which has been derived from a study with a primary purpose of examining the impact of sample size on the mean estimated bias and efficiency of parameter estimation and inference for the logistic regression model (Bergtold, 2011). Findings obtained from this study suggest that sample size can affect parameter estimates and inferences in the presence of multicollinearity and nonlinear predictor functions, but marginal effects estimates are relatively robust to sample

size; therefore a very large sample size may not always be necessary, even though a small sample size will usually adversely affect the quality of parameter estimates.

By using the formula derived from this study, it was estimated that at least 100 respondents would be required for this study. However, the rule-of-thumb is that a larger sample will always be better. Hence, a sample size of approximately 250 to 500 has been calculated to be able to yield fairly good parameter estimates and inferences for the logistic regression model in this study. By making allowances for both the attrition rates and non-response rates, we therefore aimed to distribute a minimum of 400 questionnaires to the nurses from Hospital Putrajaya. Therefore, after having prepared and validated the self-administered questionnaires for this study, we then distributed them to a total of 406 nurses working in Hospital Putrajaya.

Data Collection Procedures and Statistical Analysis

All the data were collected by a self-administered questionnaire that was distributed to each respondent of this study, who was informed that participation in this study was entire voluntary and so he/she would have the absolute right to decline participation. The respondents were also informed that the maximum time allowed to complete the survey would be approximately 2 to 4 minutes. Written informed consent was obtained from each respondent who agreed to participate in the survey, and the survey questionnaire would be collected by the researcher after the questionnaire had been filled out by each respondent.

The data were analyzed using Statistical Package Social Sciences (SPSS) (IBM Corp. Released 2012. IBM SPSS Statistics for Windows, Version 21.0. Armonk, NY: IBM Corp.). Descriptive statistics were used to tabulate the respondents' responses to each of the survey items, which were calculated as frequencies and percentages for categorical (ordinal and nominal) data and as averages (means, medians, and/or ranges) and standard deviations for continuous data. At univariate stage, Pearson's chi-square or independent sample *t*-test was applied to determine the level of association between each of the factors and the involvement of nurses in research. A *p*-value < 0.05 was considered to be statistically significant. Those factors found to be statistically significant during the univariate analysis were subsequently entered into a multivariate analysis via logistic regression and then the level of association

was considered independently significant when $p \leq 0.05$. Both enter method and stepwise backward elimination (Wald) method were applied.

Ethical Considerations

Ethical approval was obtained from Medical Research and Ethics Committee, Ministry of Health, Malaysia. All investigators have an ethical obligation to ensure that all pertinent information of the study participants will be kept strictly private and confidential, therefore they must take adequate measures to maintain both anonymity and confidentiality of all the study participants in this study.

RESULTS

Characteristics of Respondents

Among 406 nurses from Hospital Putrajaya who received the questionnaires, a total of 300 nurses had completed this questionnaire, meaning that the response rate was 300/406 or 73.9%. Most of the nurses who did not respond to the questionnaire were from the Coronary Care Unit (CCU), the Intensive Care Unit (ICU) and the Accident & Emergency (A&E) Department at Hospital Putrajaya.

Table 1 provided the baseline socio-demographic characteristics of the respondents, who were mostly female (94.3%), of Malay ethnicity (94.0%), with a mean age of 30.9 years, having an average 7.9 years of service and were married (77.3%). Most of these respondents were Staff Nurses (75.2%), followed by Community Nurses (13.1%), Sister-KUP (7.7%) and Sister (4.0%). In terms of their academic qualifications, the majority of them were holding a Diploma in Nursing (83.6%) and were receiving a monthly income of less than or equal to RM 3000 (62.2%).

Table 1: Baseline Socio-demographic Characteristics of the Study Participants

Variable	Mean	Standard Deviation
Age ^a	30.9	6.6
Year of Service ^s	7.9	6.4
Variable	Frequency (N)	Percentage (%)
Gender (N=300)		
Male	17	5.7
Female	283	94.3

Race (N=299)		
Malays	281	94.0
Chinese	6	2.0
Indian	10	3.3
Others	2	0.7
Marital status (N=299)		
Single	67	22.3
Married	232	77.3
Others	1	0.3
Designation (N=298)		
Community Nurses	39	13.1
Staff Nurses	224	75.2
Sister-KUP	23	7.7
Sister	12	4.0
Qualification (N=298)		
Certificate in Nursing	42	14.1
Diploma in Nursing	249	83.6
Degree in Nursing	6	2.0
Others	1	0.3
Income per month (N=296)		
≤ RM 3000	184	62.2
RM 3001 – RM 5000	107	36.1
RM 5001 – RM 7000	4	1.4
≥ RM 7001	1	0.3

Proportion of Nurses Who Have Ever Participated in Clinical Research

As shown in Table 2, only 31.5% of the respondents had previously been involved in research, of which 71.3% of them were involved in clinical research; more specifically in the field of preventive medicine (19.4%) and also in clinical trials (36.6%). The reason for them not being involved in research before was that (i) they had no opportunity to do research (43.7%) and (ii) they were not interested in research (27.4%). They also reported that they did not read journals regularly

(58.1%) and were not confident in interpreting medical literature (69.0%). Only 19.9% of the respondents had received additional training in statistics, 14.9% of them had previously used a statistical package for analyzing data, and 3.4% of them had a prior experience of publishing research articles in scientific journals. The majority of the respondents had reported that they were not interested in doing research (59.7%) and the two main reasons for their lack of interest in doing research was that they had no interest in research (41.7%) and also they did not have enough time to do research (25.7%).

Table 2: Involvement of Nurses in Research-Related Activities

Variable	Frequency (N)	Percentage (%)
Involved in research before (N=298)		
Yes	94	31.5
No	204	68.5
Field of research conducted (N=94)		
Clinical research	67	71.3
Basic science research	14	14.9
Clinical and basic science research	13	13.8
Specific area in which research was conducted (multiple responses) (N=93)		
Clinical trials	34	36.6
Preventive medicine	18	19.4
Diagnostics	8	8.6
Screening	15	16.1
Epidemiology	7	7.5
Others	11	11.8
Reason not involved in research before (N=197)		
Not interested in the field	54	27.4
No chance	86	43.7
Do not know about research	22	11.2
No have enough time	35	17.8
Read medical journals regularly (N=296)		
Yes	124	41.9
No	172	58.1
Confident in interpreting medical literatures (N=296)		
Yes	89	29.7
No	207	69.0

Additional training in statistic (N=297)			
Yes	59	19.9	
No	238	80.1	
Used a statistical package before (N=295)			
Yes	44	14.9	
No	251	85.1	
Published article in journals (N=295)			
Yes	10	3.4	
No	285	96.6	
Interested in research (N=298)			
Yes	120	40.3	
No	178	59.7	
Reason not interested in research (N=175)			
Not interested in the field	73	41.7	
No chance	32	18.3	
Do not know about research	23	13.1	
No have enough time	45	25.7	
Others	2	1.1	

Association between background characteristics of the respondents and their level of involvement in research

As shown in table 3, four out of a total twelve factors were found to be significantly associated with the nurses' level of involvement in research ($p < 0.05$). In particular, the nurses' level of involvement in research was found to be higher in the Malay ethnic group, which was followed by the Indian and the Chinese nurses. This ethnic difference in their level of involvement in research was found to be statistically significant ($p < 0.022$). Those respondents who were most actively involved in research were Staff Nurse, followed by Sister-KUP and Sister, and this difference was also found to be statistically significant ($p < 0.001$). The respondents who were holding a Diploma in Nursing were more actively involved in research ($p < 0.001$). Those who had received additional training in statistics were also more actively involved in research ($p < 0.001$). Meanwhile, even though the p -value was found to be approaching a statistically significant result, there was in fact no statistically-significant difference between those respondents who were interested in research and those who were not ($0 = 0.069$).

Table 3: Logistic Regression Analysis of the Factors influencing the Nurses' Involvement in Research at Hospital Putrajaya

Factors	No Involved		Involve		P-value
	Frequency (n)	Percentage (%)	Frequency (n)	Percentage (%)	
Age ^a	30.9	6.6	31.1	6.7	0.813
Gender					
Male	9	4.4	8	8.5	0.156
Female	195	95.6	86	91.5	
Race					
Malay	197	96.6	82	88.2	0.022
Chinese	3	1.5	3	3.2	
Indian	4	2.0	6	6.5	
Others	0	0.0	2	2.2	
Marital Status					
Single	41	20.1	26	27.7	0.284
Married	162	79.4	68	72.3	
Others	1	0.5	0	0.0	
Designation					
Community Nurses	38	18.8	1	1.1	<0.001
Staff Nurses	145	71.8	77	81.9	
Sister-KUP	14	6.9	9	9.6	
Sister	5	2.5	7	7.4	
Income per Month					
< RM 3000	132	66.0	50	53.2	0.134
RM 3001 - RM 5000	64	32.0	43	45.7	
Income per Month					
< RM 3000	132	66.0	50	53.2	0.134
RM 3001 - RM 5000	64	32.0	43	45.7	
RM 5001 - RM 7000	3	1.5	1	1.1	
> RM 7001	1	0.5	0	0.0	
Qualification					
Certificate in Nursing	40	19.8	2	2.1	<0.001
Diploma in Nursing	162	80.2	91	96.8	

Others	0	0.0	1	1.1	
Years of service ^a	7.7	6.4	8.2	6.2	0.597
Additional Training in Statistics					
Yes	27	13.4	31	33.3	<0.001
No	175	86.6	62	66.7	
Read Medical Journals Regularly					
Yes	81	40.5	42	44.7	0.498
No	119	59.5	52	55.3	
Confident in Interpretating Medical Literatures					
Yes	55	27.5	33	35.1	0.184
No	145	72.5	61	64.9	
Interested in Research					
Yes	75	36.8	45	47.9	0.069
No	129	63.2	49	52.1	

Results obtained from a logistic regression analysis by using the enter method had shown that only three of the factors had a statistically significant association with the level of nurses' involvement in research, namely (i) ethnicity, (ii) having received additional training in statistics and (iii) having a keen interest in research (Table 4). However, the results obtained from the same analysis by using the stepwise backward elimination (Wald) method had shown a statistically significant association between the following four factors, namely (I) ethnicity, (ii) official job designation, (iii) having received additional training in statistics and (iv) having a keen interest in research; and the level of their involvement in research. The Indian nurses were more actively involved in research compared with the Malay nurses ($p = 0.012$). Meanwhile, it was also found that Staff Nurse ($p = 0.001$), Sister-KUP ($p = 0.004$) and Sister ($p = 0.007$) were much more actively involved in research compared with Community Nurse. Finally, those who had attended additional training in statistics were 4.5 times more likely to be involved in research ($p < 0.001$) and those who had a keen interest in research were 2 times more likely to be involved in research.

Table 4: Independent Factors Associated with Being Involved in Research Activities

Factors	Enter Method				Stepwise Method			
	OR	95% CI		P-value	OR	95% CI	P-value	
Race				0.015			0.013	
Malay	Reference group				Reference group			
Chinese	4.5	0.7	27.2	0.104	4.8	0.7	29.6	0.094
Indian	7.8	1.5	39.7	0.013	8.0	1.6	40.2	0.012

Qualification								
Certificate	Reference group							
Diploma & degree	2.4	0.3	19.6	0.401				
Designation				0.327				0.016
Community Nurse								
	Reference group				Reference group			
Staff nurse	12.9	0.8	198.3	0.066	28.7	3.7	224.1	0.001
Sister-KUP	12.2	0.7	203.7	0.082	26.4	2.9	240.9	0.004
Sister	13.0	0.7	231.6	0.081	26.6	2.5	287.6	0.007
Additional Training in Statistics								
Yes	4.6	2.3	9.3	< 0.001	4.5	2.3	9.2	< 0.001
No	Reference group				Reference group			
Interested in Research								
Yes	1.9	1.1	3.3	0.027	1.9	1.1	3.3	0.026
No	Reference group				Reference group			

Due to small sample (N=2 for race "others and N=1 for marital status "others), these responses were categorized as missing in the multivariate analysis.

DISCUSSION

Proportion of Nurses who Are Interested to be Involved in Clinical Research in this study, it was found that fewer than half of the nurses in this study were interested in doing research (40.3%). Such an undesirable finding could possibly result from the nurses' intrinsic belief that research was not one of their primary job functions and so they showed no interest in doing research (41.7%). This finding was comparable to that obtained from another study reported by Oluwatosin (2014), in which a cross-sectional survey was conducted in Nigeria to assess how registered nurses' conduct and utilize research, and it had found that most (74.1%) of the respondents conducted research only to fulfill certificate or degree requirements, which means that these nurses were not motivated to actively engage in research as an integral part of nursing practice. Bahadori *et al.*, (2016) had also identified the nurses' lack of interest in conducting research as one of the major barriers to application of research findings from the studied nurses' perspective.

Proportion of Nurses Who Have Ever Participated in Clinical Research

In addition, this study also suggested that less than half of the nurse respondents were previously involved in

research (31.5%), in several specific areas such as clinical trials (36.6%) and also research in the field of preventive medicine (19.4%). The fact that a minority of the nurses in this study were found to have previously been involved in research does reflect to some extent the problems and/or barriers encountered by these Malaysian nurses prior to them embarking on research activities.

Similar results were also reported by Wu *et al.*, (2019), which had found that nurses were not sufficiently involved in scientific research activities, and had rarely directed the conduct of research projects in the capacity of principal investigators. This was partially attributed to the common misconception among the nursing workforce that nursing research had not been sufficiently integrated into clinical practice.

Wang *et al.*, (2013) had reported that prior research experience would have an influence on the perceptions of barriers in research utilization, in that those nurses with prior research experience had perceived fewer barriers in research utilization, especially in searching for research findings, and understanding and applying research findings in practice. This underpins the importance of prior research experience, which will facilitate the nurse to assimilate the findings of clinical research and to integrate them into daily nursing practice.

Proportion of Nurses Who Have Adequate Knowledge in Research Methodology and Statistical Analysis.

In terms of the ability of nurses to read and interpret research findings in published scientific literature, this study had reported that although 41.9% of the nurse respondents were regularly reading medical journals; however only 29.7% of them were confident in interpreting the published medical research articles. Again, this highlighted the abovementioned point that the ability to (i) perform a literature review for a research topic, and to (ii) develop a scientifically-valid research protocol with the suitable research design and research methodology, and to (iii) correctly interpret statistical analysis as commonly reported in scientific research journals, will only be acquired by those nurses who have received proper training in research methodology and biostatistics, including the use of statistical software for data analysis. These nurses will also be able to fully appreciate the benefits of clinical research and to pursue research as a possible future career direction.

Chien *et al.*, (2013) had identified the lack of training in nursing research, either from basic training or continuous nursing education, as a major obstacle which prevented the nurses from embarking on research activities. This probably also explains why this study had also found that only 19.9% of respondents had received additional training in statistics, meaning that most of them were still lacking in knowledge of both research methodology and statistical analysis.

In addition, knowledge on evidence-based nursing was also found to be an important facilitator towards the nurses' research utilization. For example, Wang *et al.*, (2013) reported that knowledge of evidence-based nursing was a predominant factor which influenced perceptions of the setting-related barriers ($B = -1.151$, $t = 2.807$, $P = 0.005$) towards research utilization, in that knowledge of evidence-based nursing would enable him/her to perceive fewer barriers towards research utilization within the working environment.

Proportion of Nurses who have Prior Experience of Publishing Research Articles

This study also reported that only 3.4% of the nurse respondents had a prior experience of publishing research articles in scientific journals, a finding which corroborated the previous contention that proper training in research methodology and biostatistics is very important for all nurses since it can equip them with essential research knowledge and skills to actively

participate in clinical research, and to publish clinical research findings.

Oluwatosin (2014) reported that publication of research reports among nurses was very low as only 10 (3.9%) of the study participants had published in peer review journals. It also found that even the research conducted to fulfil certificate or degree requirement were not published. This is an area of major concern because any conduct of research without its resultant publications will not enable research evidence to be applied for improving nursing practice.

Another study reported by Wu *et al.*, (2019) had found similar results in that the nurses' research participation rates were very low (with 4.13%, 7.85%, 5.35%, and 2.04% in research projects, research attendance, studies published, and patent, respectively). In addition, it was also found that nurses with Master's degree had higher number of papers published than those with secondary education or diploma certificate or Bachelor's degree ($p < 0.01$). This highlighted the fact that education level does have a positive effect on the ability of a nurse to publish research articles.

Barriers and Socio-Demographic Factors Influencing Nurses' Participation in and Utilisation of Clinical Research Findings by Nurses.

Based on the findings obtained by this study, it is now clear that the Malaysian nurses might have encountered various barriers in their quest for their involvement in clinical research and utilizing these findings in their daily nursing practice. Two of the most important barriers identified by this study are (i) the lack of having undergone appropriate training in research methodology and also (ii) the lack of the necessary statistical expertise for analyzing research findings.

Similarly, Wu *et al.*, (2019) reported a similar study in China that the nurses in China did not attain a sufficient level of scientific research participation and self-rated research ability that were currently expected of a nursing professional. Meanwhile, Nkrumah *et al.*, (2018) reported another study in Ghana which concluded that (i) the nurses were having a misconception that research not being a nursing role and (ii) they also did not have sufficient time to read articles; and both these factors were found to be significantly associated with their low level of participation in clinical research.

Again, these previous research findings further corroborated the findings obtained from this study that

the nurses' lack of interest in clinical research and their low level of participation in clinical research was possibly due to (i) their misconception about research not being a nursing role and (ii) also time constraints make it difficult for the nurses to be involved in research.

The above observations again probably explain why another two studies, namely Evans *et al.* (2014) and Shifaza *et al.* (2014), which were conducted in Western Australia and Maldives respectively, also concluded that these barriers to research utilization among the nurses could be reduced by providing appropriate education to enhance their skills related to evidence based practice in nursing, and also providing them with additional time for activities that promote evidence-based practice development.

Finally, despite this study had provided some valuable insights into several plausible factors that were associated with the low level of involvement of Malaysian nurses in clinical research; nevertheless, it still had several limitations. The most important limitation of this study was its small sample size, which resulted in its findings being prone to bias. In addition, it was using convenience sampling technique, which can possibly introduce bias since some nurses choose to take part in this study while others do not. Furthermore, the results were slightly attrited by the presence of survey non-response, which again posed an additional risk of bias.

CONCLUSION

In conclusion, our findings in this study showed that both the proportion of nurses who were interested in clinical research (40.3%) and also those with prior experience in conducting clinical research (31.5%) remained very low. In addition, this study had also found that several barriers to research utilization by the Malaysian nurses had hindered them from getting involved in clinical research; notably two examples of these were a lack of adequate knowledge in both (i)

research methodology and (ii) statistical skills.

Hence, several recommended strategies are now proposed to enhance nurses' participation in research activities at Hospital Putrajaya; examples of these include (a) to provide more opportunities for research training, (b) to increase an awareness of the significance of research in order to advocate research to be included as a key performance indicator (KPI), (c) to encourage research collaboration with external organizations such as private universities and (d) to facilitate researchers to gain access to vital research resources such as funding, statistical expertise and online access to scientific journals.

By equipping the Malaysian nurses with relevant knowledge and skills in both research methodology and statistical analysis, it will enable them to read, evaluate, analyze, disseminate and implement research evidence; all of which constitute the ability to conduct research and to incorporate relevant research findings in nursing practice for effective implementation of evidence-based practice in nursing. Hence, this study provides valuable information for formulating strategies to increase nurses' participation in research activities at Hospital Putrajaya by providing more research training opportunities, and enhancing the level of awareness and increasing the accessibility to these resources by the nurses. Therefore, it is our sincere hope that the results obtained from this study can be aptly utilized for promoting quality and ethical research among the nurses at Hospital Putrajaya by providing adequate support to and facilitating their future research endeavors.

Conflict of Interests

The authors declare that they have no conflict of interest.

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