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RESEARCH FOR NURSING PRACTICE

Multi-institutional study of barriers to research utilisation and evidence-based practice among hospital nurses

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Aims. The study aims were to explore the relationships between perceived barriers to research use and the implementation of evidence-based practice among hospital nurses and to investigate the barriers as predictors of implementation of evidence-based practice.

Background. Evidence-based practice is critical in improving healthcare quality. Although barriers to research use have been extensively studied, little is known about the relationships between the barriers and the implementation of evidence-based practice in nursing.

Design. Cross-sectional study.

Method. Data were collected between December 2006–January 2007 for this cross-sectional study using computerised *Evidence-Based Practice Questionnaire* and *BARRIERS* surveys. A convenience sample (n = 1301) of nurses from four hospitals in southern California, USA, participated. Hierarchical multiple regression analyses were performed for each of the three dependent variables: practice, attitude and knowledge/skills associated with evidence-based practice. *BARRIERS* subscales were used as predictor variables.

Results. The perceived barriers to research use predicted only 2·7, 2·4 and 4·5% of practice, attitude and knowledge/skills associated with evidence-based practice.

Conclusions. It was unexpected that the barriers to research use predicted such small fractions of practice, attitude and knowledge/skills associated with evidence-based practice. The barriers appear to have minimal influence over the implementation of evidence-based practice for most hospital nurses.

Relevance to clinical practice. In implementing evidence-based practice, the focus on barriers to research use among general nursing staff may be misplaced. Further studies are needed to identify the predictors of evidence-based practice and to identify the subset of nurses who are most amenable to adopting evidence-based practice.

Key words: barriers, evidence, nurses, nursing, research utilisation

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Introduction

Historically, nursing decisions in patient care have been derived from ritual, tradition, communication with other nurses, knowledge gained in nursing school or preferences of medical providers (Estabrooks 1998, Thompson *et al.* 2001, Dee & Stanley 2005, Pravikoff *et al.* 2005, McKnight 2006). Improved patient outcomes have been observed when best research evidence is used in nursing care (Heater *et al.* 1988). However, evidence-based practice incorporates much broader concepts than just the use of research evidence in nursing practice. Evidence-based practice is an integration of patient values and clinical situations with the best research evidence in clinical decision making (Sackett *et al.* 2000, Shaneyfelt *et al.* 2006). Implementation of evidence-based practice involves the steps of asking an answerable question in a particular clinical situation, acquiring the best relevant evidence, appraising the evidence critically and applying the evidence with the integration of patient preference in clinical decision making (Ciliska 2005, Shaneyfelt *et al.* 2006).

Knowledge, skills, attitudes and practice are the important dimensions of implementing evidence-based practice (Estabrooks 1999a,b, Upton 1999, Estabrooks *et al.* 2003, Shaneyfelt *et al.* 2006). Upton (1999) found in a sample of nurses, midwives and health visitors in the UK that attitudes towards evidence were generally higher than the actual knowledge/skills related to evidence-based practice. A survey of 760 registered clinical nurses across the USA found that the nurses sought information from colleagues more often than from journal articles (Pravikoff *et al.* 2005). In this survey, more than half of the nurses did not use research reports in clinical decisions, and 82% had never used the hospital library. Sources of knowledge most valued by nurses were their own experience, information from colleagues, hospital policy and procedures, intuition and the patient's medical record (Estabrooks 1998, Thompson *et al.* 2001, 2008, Estabrooks *et al.* 2005, McKnight 2006).

Extensive research has been carried out to examine barriers to research use in nursing (Funk *et al.* 1991a,b, Kajermo *et al.* 1998, Parahoo 2000, Bryar *et al.* 2003, Estabrooks *et al.* 2003, Glacken & Chaney 2004, Hutchinson & Johnston 2004, Thompson *et al.* 2006). Emotional exhaustion, negative attitude towards research, insufficient authority to change practice, lack of administrative support, lack of time, lack of access to resources, poor understanding of statistics and inconsistent basic knowledge and experience with research have been reported as barriers to research utilisation. Ashley (2005) conducted a meta-analysis of research using the *BARRIERS* Scale representing 10 407 participants from 11 countries over a 13-year time period from 1991–2004. The top barriers to research utilisation included insufficient time, lack of understanding of statistics, lack of authority to change patient care and lack of time to read literature and inadequate facilities.

Rogers (2003) Diffusion of Innovations theory provided the theoretical framework for the *BARRIERS* Scale. Diffusion theory is the process by which an innovation is communicated through a social system over time. Translated to the use of research in evidence-based practice, the 'adopter' represents the individual nurse's research values, skills and awareness; the 'organisation' represents the barriers and limitations imposed by the setting; the 'innovation' indicates the characteristics and quality of research evidence; and the 'communication' represents the availability and presentation of the research.

It has been assumed that understanding the barriers to research use and efforts to reduce such barriers would foster the implementation of evidence-based practice among nurses. In an integrative review of 45 studies that have used *BARRIERS* Scale, Carlson and Plonczynski (2008) found that these studies identified the barriers, but none of them examined the relationship between barriers to research use and adoption of evidence-based practice. The authors suggested that further rigorous studies, such as randomised controlled trials, are needed to answer the question whether reducing barriers would increase adoption of evidence-based practice. However, prior to launching interventional studies, there is a need to determine the strength of the relationship between perceived barriers and adoption of evidence-based practice among nurses.

Study aims

The aims of this study were (1) to explore the relationships between perceived barriers to research use and the implementation of evidence-based practice among hospital nurses and (2) to investigate perceived barriers to research utilisation as the predictors of implementation of evidence-based practice.

Methods

Study design

This cross-sectional study used a convenience sample of nurses employed in four participating hospital systems located in close geographical proximity in southern California, USA: an academic medical centre, a government hospital,

a community hospital and a specialty paediatric hospital. The inclusion criteria for the study were (1) age 21 years or older; (2) registered nurses (RNs) employed either full-time or part-time and (3) able to read and understand English. Eligible subjects were encouraged to participate in a computerised survey study.

Institutional Review Board (IRB) approval was obtained at each of the four participating hospital systems. A unique password protected website was created for each hospital. An introductory page with the informed consent statement, the research instruments and the demographic tool were converted to electronic format. The introductory page began with the option to decline or accept the terms of the consent and had a link to an IRB-stamped consent document. Informed consent was documented as the participant accepted the terms of the study and completed the computerised surveys. An encrypted channel was used for the website, similar to those used with secure credit card transactions, to ensure that the information was protected while in transit. Eligible nurses at the participating hospitals were recruited through flyers posted on nursing units, advertising in organisational newsletters, unit-based staff meetings or other leadership meetings.

Data collection

The instruments, *BARRIERS* Scale and the *Evidence-Based Practice Questionnaire* (*EBPQ*) were used to explore the relationships between perceived barriers to research use and implementation of evidence-based practice (Funk *et al.* 1991a, Upton & Upton 2006). The *BARRIERS* scale measures nurses' perceptions of barriers to research use in clinical practice, and Diffusion of Innovation theory was used to underpin the development of the *BARRIERS* scale (Funk *et al.* 1991a). This scale consists of 29 items rated on a five-point Likert scale with one representing 'to no extent', four representing 'to a great extent' and five representing 'no opinion'. The *Characteristics of the Adopter* subscale measures nurses' values and awareness of research. The *Characteristics of the Organisation* subscale measures the nurses' perception about limitations and barriers in the work setting. The *Characteristics of the Innovation* subscale assesses nurses' perceptions of the quality of the research. The *Characteristics of the Communication* subscale measures nurses' perceptions of the presentation and accessibility of the research. Internal consistency reliability of the tool was shown with Cronbach's alpha of 0·80, 0·80, 0·72 and 0·65 for each subscale, respectively (Funk *et al.* 1991a). Content validity was established using another measure of research use as well as feedback from experts in the field.

The *EBPQ* consisting of 24 items was developed by Upton and Upton (2006) to measure attitudes towards knowledge of and implementation of evidence-based practice. Each item was rated on a seven-point Likert scale. Internal consistency reliability has been published with Cronbach's alpha of 0·87 for the entire questionnaire; 0·85 for the *Practice of EBP* subscale; 0·79 for the *Attitude towards EBP* subscale and 0·91 for the *Knowledge/Skills associated with EBP* subscale (Upton & Upton 2006). Construct validity was assessed using a measure of EBP awareness, which revealed a moderate positive correlation with *EBPQ*. A demographics questionnaire included information on age, educational preparation, gender, ethnic group, highest educational degree, years of RN experience, nursing position and hospital unit. Data collection occurred between December 2006–January 2007.

Data analysis

Correlational analyses were used to explore the relationships between perceived barriers to research use and implementation of evidence-based practice. Bivariate Pearson's correlation coefficients were calculated among the three dimensions of evidence-based practice implementation (practice, attitude and knowledge/skills associated with evidence-based practice), the demographic variables and four *BARRIERS* subscales.

To investigate the perceived barriers to research use as the predictors of evidence-based practice implementation, hierarchical multiple regression analyses were performed. The dependent variables were practice, attitude and knowledge/skills associated with evidence-based practice. Hierarchical multiple regression procedure was chosen to assess the influence of *BARRIERS* subscales as the predictor variables above and beyond the influence of demographic variables. Dummy codes were assigned for categorical demographic variables, including highest educational degree and nursing position. Demographic variables that correlated with one or more of the dependent variables without multicollinearity were entered in the first step of a hierarchical multiple regression model. In the second step, the four *BARRIERS* subscales were entered as predictor variables. SPSS software version15.0 (SPSS Inc, Chicago, IL, USA) was used for data analyses. The level of statistical significance was set at $p \leq 0{\cdot}05$.

Results

A total of 1301 nurses employed at four hospital systems participated in the computerised survey. Among participants, 327 of 1301 were excluded from further analyses because of

Table 1 Demographic characteristics (n = 1301)

	n (%)
Hospital	
Community	640 (49·2)
Academic	458 (35·2)
Government	183 (14·1)
Paediatric	20 (1·5)
Gender: female	888 (91·7)
Age (years)	
< 30	123 (12·7)
30–39	230 (23·7)
40–49	254 (26·1)
50–59	309 (31·8)
> 60	56 (5·8)
Ethnicity	
White (non-hispanic)	627 (65·2)
Black	13 (1·4)
Hispanic	37 (3·8)
Asian/Pacific Islanders	243 (25·3)
Multi-ethnic	14 (1·5)
Other	28 (2·9)
Years of RN experience	
< 1	37 (3·9)
1–7	251 (26·0)
8–12	116 (12·0)
13–20	176 (18·3)
> 21	384 (39·8)
Educational level	
Diploma/Associate	255 (26·4)
Baccalaureate	531 (55·0)
Master's	159 (16·5)
Doctoral	20 (2·0)
Nursing position	
Staff Nurse	226 (46·6)
Nurse Manager	107 (22·0)
CNS/Nurse Educator	48 (9·9)
NP/Midwife	105 (21·6)

Percentage is expressed as valid percentage, which excludes missing data. RN, Registered Nurse; CNS, Clinical Nurse Specialist; NP, Nurse Practitioner.

incomplete data, resulting in 974 evaluable respondents. Table 1 shows the demographic characteristics of the respondents. The majority was 40 years of age or older, had more than13 years of experience as RNs and held a baccalaureate degree.

Internal consistency reliability of the *EBPQ* instrument was assessed by computing Cronbach's alpha for the three subscales as follows: 0·89 for the *Practice of EBP* subscale, 0·67 for the *Attitude towards EBP* subscale and 0·94 for the *Knowledge/Skills associated with EBP* subscale. These Cronbach's alphas were similar to those reported in the original research (Upton & Upton 2006). The mean (SD) score for the *Practice of EBP* subscale was 4·53 (1·51), which is slightly higher than the middle of the response ranging from 'never' (score of 1) to 'frequently' (score of 7). For the *Attitude towards EBP* subscale, the mean score (SD) was 5·16 (1·17), which implies a somewhat positive attitude towards EBP on a seven-point semantic differential scale. For the *Knowledge/Skills associated with EBP* subscale, the mean score (SD) of 4·60 (1·08) indicates a slightly higher than mid-range response on the scale ranging from 'poor' (score of 1) to 'best' (score of 7).

Internal consistency reliability of the *BARRIERS* scale was determined using Cronbach's alpha for four subscales as follow: 0·84 for *Adopter*, 0·83 for *Organisation*, 0·81 for *Innovation* and 0·74 for *Communication* subscales. These Cronbach's alphas were similar to those reported by Funk *et al.* (1991a) and others (Parahoo 2000, Hutchinson & Johnston 2004, Fink *et al.* 2005). The mean *BARRIERS Adopter*, *Organisation*, *Innovation and Communication* subscale scores were 2·23 (SD 0·69), 2·57 (SD 0·66), 2·11 (SD 0·63) and 2·37 (SD 0·62), respectively. These scores were slightly > 2, indicating that the average subject in this study perceived barriers to research use to be between 'little extent' (score of 2) and 'moderate extent' (score of 3). *Organisation* emerged as the subscale with the highest mean score, indicating top barrier, followed by C*ommunication*, *Adopter* and *Innovation*. The proportions of nurses responding 'no opinion' to at least one of the items for *Adopter*, *Organisation*, *Innovation* and C*ommunication* subscales were 17, 28, 43 and 27%, respectively.

The individual *BARRIERS* scale items were ranked using the process consistent with the original data analysis by Funk *et al.* (1991a). The top barriers were from the *Organisation* subscale including 'nurse does not have time to read research,' 'there is insufficient time on the job to implement new ideas,' 'the nurse does not have authority to change patient care' and 'the nurse is unaware of research'. The lowest ranking barriers were 'research conclusion not justified' and 'research has methodological inadequacies'.

Bivariate Pearson's correlations among demographic variables and the three dependent variables of the *EBPQ* subscales are shown in Table 2. The respondent's age, years of RN experience, Master's degree, Doctoral degree, nurse manager and CNS/nurse educator had statistically significant positive correlations with one or more of the *EBPQ* subscales. In contrast, Baccalaureate degrees and staff nurse position showed statistically significant negative correlations with one or more of the *EBPQ* subscales. All these correlations were at very low magnitudes, with absolute correlation coefficients ≤0·20.

Table 3 shows the bivariate correlations among the *BARRIERS* subscales and the three dependent variables of the

Table 2 Bivariate correlations among demographic variables and *EBPQ* (n = 974)

	Practice of EBP	Attitude towards EBP	Knowledge/ skills associated with EBP
Age	0·10**	0·04	0·07
Years of RN experience	0·10**	0·04	0·08*
Educational level			
Diploma/Associate	−0·04	−0·05	−0·07
Baccalaureate	−0·06	−0·06	−0·15**
Master's	0·11**	0·11**	0·20**
Doctoral	0·05	0·06	0·18**
Nursing position			
Staff Nurse	−0·20**	−0·18**	−0·19**
Nurse Manager	0·13*	0·06	0·13*
CNS/Nurse Educator	0·02	0·10*	0·05
NP/Midwife	0·10	0·08	0·06

EBP, evidence-based practice; RN, Registered Nurse; CNS, Clinical Nurse Specialist; NP, Nurse Practitioner; *EBPQ*, *Evidence-Based Practice Questionnaire*.
*$p \leq 0{\cdot}05$; **$p \leq 0{\cdot}01$.

Table 3 Bivariate correlations among *BARRIERS* and *EBPQ* (n = 974)

	Practice of EBP	Attitude towards EBP	Knowledge/ skills associated with EBP
BARRIERS: Adopter	−0·07	−0·12**	−0·16**
BARRIERS: Organisation	−0·04	−0·09*	−0·16**
BARRIERS: Innovation	0·03	−0·08*	−0·06
BARRIERS: Communication	−0·13**	−0·15**	−0·20**

EBP, evidence-based practice; *EBPQ*, *Evidence-Based Practice Questionnaire*.
*$p \leq 0{\cdot}05$; **$p \leq 0{\cdot}01$.

EBPQ subscales. The *Practice of EBP* subscale had significant negative correlation only with *Communication BARRIERS* subscale (r = −0·13). In contrast, the *Attitude towards EBP* subscale had significant negative correlation with all four *BARRIERS* subscales (r = −0·12; −0·09; −0·08; and −0·15). Also, the *Knowledge/Skills associated with EBP* subscale had significant negative correlation with three *BARRIERS* subscales (r = −0·16; −0·16; and −0·20). However, all these correlations were at very low magnitudes, with absolute correlation coefficients ≤0·20.

The results of hierarchical multiple regression analyses are shown in Table 4. The residual statistics confirmed that the model assumptions of normality, homoscedasticity and linearity were met (Tabachnick & Fidell 2001). Using the *Practice of EBP* subscale as the dependent variable, the combination of demographic variables explained 2·5% of the variance in *Practice of EBP* (R^2 = 0·025, $p \leq 0{\cdot}001$). The entry of four *BARRIERS* subscales as predictor variables in the second step of the multiple regression procedure changed the R^2 by 0·027 ($p \leq 0{\cdot}001$). This indicates that the four *BARRIERS* subscales alone explained only a small fraction (2·7%) of the variance in *Practice of EBP*, with the *Adopter* (*Beta* = −0·10; p = 0·035), *Innovation* (*Beta* = 0·14; p = 0·001) and *Communication* (*Beta* = −0·16; $p < 0{\cdot}001$) *BARRIERS* subscales reaching statistical significance.

Using the *Attitude towards EBP* subscale as the second dependent variable, the combination of demographic variables accounted for 2·0% of the variance (R^2 = 0·020, p = 0·001). Adding the four *BARRIERS* subscales changed the R^2 by 0·024 ($p \leq 0{\cdot}001$). This indicates that the four *BARRIERS* subscales alone explained a small fraction (2·4%) of the variance in *Attitude towards EBP*, with the *Adopter* (*Beta* = −0·12; p = 0·009) and *Communication* (*Beta* = −0·11; p = 0·009) subscales reaching statistical significance (Table 4).

For the *Knowledge/Skills associated with EBP* subscale, the demographic variables explained 6·6% of the variance (R^2 = 0·066, $p \leq 0{\cdot}001$). The entry of four *BARRIERS* subscales changed the R^2 by 0·045 ($p \leq 0{\cdot}001$). This indicates that the *BARRIERS* subscales again explained a small fraction (4·5%) of the variance in *Knowledge/Skills associated with EBP* with the *Adopter* (*Beta* = −0·12; p = 0·005), *Innovation* (*Beta* = 0·11; p = 0·009) and *Communication* (*Beta* = −0·15; $p < 0{\cdot}001$) subscales reaching statistical significance (Table 4).

Discussion

This study was carried out to investigate barriers to research use as predictors of evidence-based practice, but it was surprising that the perceived barriers predicted such small fractions of practice, attitude and knowledge/skills associated with evidence-based practice (2·7, 2·4 and 4·5%, respectively). These results indicate that the barriers to research utilisation as measured by *BARRIERS* scale have minimal influence over the implementation of evidence-based practice for most hospital nurses.

One possible explanation for these unexpected findings may be that for most hospital staff nurses, research is far removed from their busy daily nursing practice and may have had no strong opinions in mind when answering these questions. In fact, 43% of nurses responded to at least one item in the *Characteristics of the Innovation* subscale as having 'no opinion'. This subscale contains fairly technical

Table 4 Hierarchical multiple regression: *BARRIERS* as predictors of *EBPQ* (n = 974)

	Practice of EBP			Attitude towards EBP			Knowledge/Skills associated with EBP		
Predictor	*B*	*SE*(*B*)	*Beta*	*B*	*SE*(*B*)	*Beta*	*B*	*SE*(*B*)	*Beta*
Step 1									
Constant	4·54	0·10		5·28	0·08		4·57	0·07	
Years of RN experience	0·02	0·01	0·06	0·001	0·01	0·01	0·004	0·01	0·02
Staff Nurse	−0·36	0·13	−0·10**	−0·25	0·10	−0·09*	−0·15	0·09	−0·06
Doctoral degree	0·40	0·30	0·04	0·43	0·23	0·06	1·14	0·20	0·18***
Master's degree	0·21	0·12	0·06	0·19	0·09	0·07*	0·41	0·08	0·16***
Step 2									
Constant	4·94	0·22		5·86	0·18		5·30	0·15	
Years of RN experience	0·02	0·01	0·07*	0·01	0·01	0·02	0·01	0·01	0·04
Staff Nurse	−0·33	0·13	−0·09**	−0·25	0·10	−0·09*	−0·13	0·09	−0·05
Doctoral degree	0·33	0·30	0·04	0·44	0·23	0·06	1·09	0·20	0·17***
Master's degree	0·24	0·12	0·07*	0·22	0·09	0·08*	0·44	0·08	0·18***
BARRIERS: Adopter	−0·20	0·10	−0·10*	−0·20	0·08	−0·12**	−0·18	0·07	−0·12**
BARRIERS: Organisation	0·09	0·10	0·04	0·09	0·08	0·05	−0·06	0·07	−0·04
BARRIERS: Innovation	0·33	0·10	0·14***	0·04	0·08	0·02	0·18	0·07	0·11**
BARRIERS: Communication	−0·38	0·10	−0·16***	−0·20	0·08	−0·11**	−0·25	0·07	−0·15***
	R^2 = 0·025 for Step 1;			R^2 = 0·020 for Step 1;			R^2 = 0·066 for Step 1;		
	R^2 Δ = 0·027 for Step 2			R^2 Δ = 0·024 for Step 2			R^2 Δ = 0·045 for Step 2		
	F Δ (4965) = 6·884***			F Δ (4965) = 6·11***			F Δ (4965) = 12·30***		

RN, Registered Nurse; EBP, evidence-based practice; *EBPQ*, *Evidence-Based Practice Questionnaire*.
*$p \leq 0{\cdot}05$; **$p \leq 0{\cdot}01$; ***$p \leq 0{\cdot}001$.

questions regarding the qualities of research, such as 'the research has not been replicated' and 'the research has methodological inadequacies'. It is plausible that many nurses having no opinions to *BARRIERS* subscales may have reduced the influence of the barriers over the implementation of evidence-based practice. This high rate of 'no opinion' response is consistent with previous findings (Parahoo 2000, McCleary & Brown 2003). Nevertheless, it is possible that for a subset of nurses with special interest in evidence-based practice, the barriers to research use may have a greater influence over the implementation of evidence-based practice.

Previous reports have identified multiple barriers to research use in nursing practice (Funk *et al.* 1991a,b, Kajermo *et al.* 1998, Parahoo 2000, Bryar *et al.* 2003, Estabrooks *et al.* 2003, Glacken & Chaney 2004, Hutchinson & Johnston 2004, Ashley 2005, Thompson *et al.* 2006), but the relationship between barriers to research use and the implementation of evidence-based practice have not been studied thoroughly. An interventional study using the pre- and postsurvey method showed reduction in perceived barriers to research use, but the relationship to the evidence-based practice was not explored (Fink *et al.* 2005). To our knowledge, the current study is the first to demonstrate the minimal influence of barriers to research use over the implementation of evidence-based practice in nursing. Although a randomised controlled trial is ideal for showing the causal relationship between barriers and implementation of evidence-based practice, it remains uncertain whether reducing barriers will increase the adoption of evidence-based practice among general nursing staff, based on the results of the current study.

Limitations

This study has several limitations. Because this study was a cross-sectional survey, the relationship between the predictor variables and the dependent variables should not be taken as cause-and-effect relationship. Because the subjects were self-selected, study findings may not be generalisable to entire nursing population. The use of self-reported questionnaires may have also inflated the scores. Objective testing is likely to be more reliable than subjective self-assessments. The *BARRIERS* scale included a response of 'no opinion,' which may have increased the missing data. The data collection platform for this study was computer-based rather than paper and pencil. Therefore, participants had to possess basic information literacy skills to access and complete the survey. While the skills required to complete the survey were at a fundamentally basic level, the use of the computerised methodology may have deterred some potential participants.

Relevance to clinical practice

In the past, the efforts to implement evidence-based practice in nursing have focused on describing potential barriers to the utilisation of research evidence among general nursing staff and reducing such barriers. However, findings from the current study among general nursing staff suggest that such focus may be misplaced. Further studies are needed to identify the predictors of evidence-based practice and to identify the subset of nurses who are most amenable to adopting evidence-based practice.

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Contributions

Study design: CB, LE, SK; data collection and analysis: CB, SK, LE, BR, KK, DG, MW and manuscript preparation: CB, SK, MW.

Conflict of interest

None.

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