

Evidence-Based Practice

Knowledge, attitudes, practice and perceived barriers among nurses in Oman

*Ali A. Ammouri,¹ Ahmad A. Raddaha,² Preethy Dsouza,³ Renu Geethakrishnan,⁴ Judith A. Noronha,⁴
Arwa A. Obeidat,² Lina Shakman⁴

الممارسة المبينة على الأدلة

المعرفة، التوجهات، الممارسات و العوائق التي تحول دون الممارسة لدى الممرضين و الممرضات في سلطنة عمان

علي أحمد العموري، أحمد حسن أبو رداحة، بريتي ديسوزا، رينو جيثاكريشنان، جودث أنجيلينا نورنغا، أروى عاطف عبيدات، لينا شقمان

ABSTRACT: Objectives: The aim of this study was to describe nurses' practices, attitudes, knowledge/skills and perceived barriers in relation to evidence-based practice (EBP) in Oman. **Methods:** This descriptive cross-sectional study was conducted between February and November 2012. A self-reported 24-item questionnaire was used to measure EBP practices, attitudes and knowledge/skills among a convenience sample of 600 nurses working in four governmental hospitals in Muscat, Oman. Responses were scored on a one to seven rating scale. Barriers to EBP were measured on a five-point Likert scale using two subscales. Descriptive statistics and general linear regression were used to analyse the data. **Results:** A total of 414 nurses were included in the study. The greatest barriers to developing EBP among nurses were insufficient time for research (3.51 ± 0.97) and insufficient resources to change practices (3.64 ± 0.99). Nurses with more years of experience reported increased use of EBP ($P < 0.01$), more positive attitudes towards EBP ($P < 0.001$) and fewer barriers to research ($P < 0.01$). Significant positive correlations were found between years of experience and practice ($r = 0.16$) and attitudes ($r = 0.20$). Nurses with a baccalaureate degree reported fewer barriers to research than those qualified at a diploma level ($P < 0.001$). Nurses who perceived more barriers to research reported less use of EBP ($P < 0.001$), less positive attitudes towards EBP ($P < 0.001$) and limited EBP knowledge/skills ($P < 0.001$). **Conclusion:** These findings provide a basis for enhancing nursing practices, knowledge and skills. Continuing education for nurses and minimising barriers is crucial to increasing the use of EBP in Oman.

Keywords: Evidence-Based Practice; Nurses; Attitudes; Knowledge; Oman.

المخلص: الهدف: هدفت هذه الدراسة إلى وصف الممارسات و التوجهات و المعرفة و المهارات و عوائق التنفيذ عند الممرضين و الممرضات فيما يتعلق بالممارسة المبينة على الأدلة في سلطنة عمان. الطريقة: أجريت هذه الدراسة المقطعية الوصفية ما بين فبراير ونوفمبر عام 2012. تم استخدام استبيان ذاتي مكون من 24 بند و مقسم إلى ثلاثة أقسام لقياس الممارسات و التوجهات و المعرفة و المهارات للممارسة المبينة على الأدلة. سجلت الإجابات على مقياس مصنف من واحد إلى سبعة. وتم قياس العوائق للممارسة المبينة على الأدلة باستخدام مقياس ليكرت من خمس نقاط. أجريت الدراسة على عينة من 600 ممرض و ممرضة يعملون في أربعة مستشفيات حكومية في العاصمة مسقط، سلطنة عمان. تم استخدام الإحصاء الوصفي والاندحار الخطي العام لتحليل البيانات. النتائج: تم تضمين ما مجموعه 414 ممرض و ممرضة في الدراسة. أظهرت نتائج الدراسة أن أكبر العوائق التي تحول دون تطوير الممارسات المبينة على الأدلة بين الممرضين و الممرضات هي عدم كفاية الوقت للبحث العلمي (3.51 ± 0.97)، وعدم كفاية الموارد لتغيير الممارسة التمريضية (3.64 ± 0.99). كان الممرضين و الممرضات الأكثر خبرة أكثر ممارسة ($P < 0.01$)، وأكثر إيجابية تجاه الممارسة القائمة على الأدلة ($P < 0.001$)، وكانت لديهم أقل العوائق تجاه البحث العلمي ($P < 0.01$). تم العثور على ارتباطات إيجابية ذات دلالة إحصائية بين عدد سنوات الخبرة والممارسة ($r = 0.16$) والتوجهات ($r = 0.20$). الممرضين و الممرضات من حاملي شهادة البكالوريوس في التمريض كانت لديهم عوائق أقل تجاه البحث العلمي من نظائريهم حاملي شهادة الببلوم ($P < 0.001$). الممرضين و الممرضات الذين يعتقدون أن هناك كثير من العوائق تجاه البحث العلمي كانوا أقل ممارسة ($P < 0.001$)، وأقل إيجابية ($P < 0.001$) وأقل معرفة ومهارة ($P < 0.001$) للممارسة المبينة على الأدلة. الخلاصة: توفر نتائج هذه الدراسة أسس لتعزيز المعرفة، والمهارات، و الممارسات التمريضية. التعليم المستمر للممرضين و الممرضات مع تقليل العوائق أمر حاسم لزيادة الممارسة المبينة على الأدلة في سلطنة عمان.

مفتاح الكلمات: الممارسة المبينة على الأدلة؛ الممرضات؛ التوجهات؛ المعرفة؛ الممارسة؛ عمان.

ADVANCES IN KNOWLEDGE

- The results of this study show that nurses in Oman view evidence-based practice (EBP) positively. However, their greatest perceived barriers to engaging in EBP were insufficient time and resources.
- Omani nurses with more years of experience reported greater engagement in EBP, more positive attitudes towards EBP and fewer barriers to finding and reviewing research.
- The nurses with baccalaureate degrees reported fewer barriers to finding and reviewing research than nurses with diploma qualifications.

APPLICATION TO PATIENT CARE

- The results of this study highlight the need for continuing education activities for nurses, including statistical analysis, research application and utilisation of the internet. This may encourage nurses to further engage in EBP in order to promote excellence in clinical practice.
- In addition, inexperienced nurses should be supported and led by senior nurses. Through encouragement and the provision of necessary resources, newer nurses can better engage in EBP.

EVIDENCE-BASED PRACTICE (EBP) HAS become a major focus for healthcare policymakers, practitioners and researchers.¹ It has gained momentum as an approach that can influence knowledge and practice within the nursing profession.² EBP is defined as a systematic adoption of the most current evidence to answer a clinical question, along with consideration of the practitioner's own clinical experience and the patient's values and preferences.³

Recently, greater emphasis has been placed on EBP and it is now considered critical for promoting excellence in healthcare.⁴ Melnyk *et al.* found that patient outcomes were improved by 28% when clinical care was based on evidence rather than traditional practices.³ A 2003 report from the Institute of Medicine in the USA emphasised that EBP is an important aspect in maintaining the quality of healthcare.⁵ In the last 20 years, there has been progress in implementing EBP in patient care; however, a study of nurses working at rural hospitals in the USA found that the use of EBP as a routine and integral part of patient care was inconsistent.⁶

A review of the literature indicates that EBP results in a more efficient use of resources, improved patient care, decreased costs and length of hospital stay, increased patient satisfaction and the elimination of unnecessary or ineffective practices.^{3,5,7} In contrast, previous research has shown that nursing methods are not consistently based on evidence. Common drivers of nursing care and practices have traditionally included rituals, precedent (e.g. the way a certain practice has always been done) and personal opinions, at times with a lack of concern for patient values. Pravikoff *et al.* used a descriptive, exploratory method to study 3,000 nurses' readiness for EBP in the USA.⁸ The results showed that only 46% of respondents were familiar with the term EBP, while 67% obtained information from other nurses to guide their own practices. Encouraging findings were recorded with regards to the nurses' computer skills, as 83% reported that they were somewhat successful in searching the internet. However, adequate search skills using the MEDLINE or Cumulative Index to Nursing and Allied Health Literature (CINAHL) databases were identified among only 36% and 19% of the nurses, respectively.

Additionally, only 36% of the respondents reported that they had access to electronic databases at their facility and 46% classified the available online resources as inadequate. Similarly, Roberts *et al.* reported that, although nurses agree with evidence-based findings, many continue to practice by tradition.⁹ Koehn *et al.* studied nurses' perceptions, attitudes and knowledge associated with EBP. Their findings indicated that participants had lower scores on knowledge and skills, and moderate scores on practice and attitudes.¹⁰

The available scientific literature on nurses and EBP describes several barriers to the implementation of nursing research. In a study of 500 nurses, Melnyk *et al.* found that while the participants realised the importance of EBP, there was a lack of knowledge regarding research information.³ Paramonczyk revealed that inadequate time and knowledge were the top barriers to the implementation of research among nursing professionals in Canada.¹¹ In a study of 340 nurses and midwives (response rate: 51%), the study population stated that the complexity of statistics and a lack of time were the major barriers to research utilisation.¹² However, a number of the participants reported some knowledge on the topic. Other studies have indicated the role of the institution and administration as a barrier to EBP. Happell *et al.* reported that workplace culture had a significant influence on their participants' perception of research importance.¹³ In addition, Valente described the lack of role models to support staff in research as the major barrier.¹⁴

In summary, although research has indicated that nursing care is not consistently based on evidence, nurses worldwide continue to have positive attitudes towards the utilisation of EBP. In general, lack of time and knowledge of research information are the major barriers to implementing EBP.

Strategies to promote EBP among nurses should be based on evidence and address current EBP knowledge/skills and practice of EBP as well as barriers to the adoption of EBP in general nursing practice.¹⁵ Therefore, in hospitals where nurses are underutilising EBP, it is prudent to consider their characteristics and perceptions prior to developing an EBP implementation plan. In Oman, several initiatives have been implemented to train health personnel working

at the Ministry of Health (MOH) and Sultan Qaboos University (SQU) in the use of EBP. Conferences and workshops have been conducted by experts from the USA, UK and Australia to train medical and nursing staff on the concepts and application of EBP. Despite the rising emphasis on this form of practice, as yet nothing is known about the existing knowledge/skills and practice of EBP among nurses in Oman and the barriers faced in its application within general practice. The purpose of this study, therefore, was to examine and describe the practices, attitudes, and knowledge/skills associated with EBP, as well as the perceived barriers to EBP implementation, reported by nurses in Oman.

Methods

This descriptive, correlational, cross-sectional study was conducted between February and November 2012. Self-reported questionnaires were designed to fulfill the following research objectives: (1) to determine perceptions of EBP practice, attitudes, knowledge and skills among nurses in Oman; (2) to discover perceived barriers to the implementation of EBP; (3) to investigate associations between selected demographic variables (age, gender, nationality, academic qualifications, years of experience and year of last academic degree) and perceived EBP practice, attitudes, knowledge/skills and barriers, and (4) to detect associations between perceived barriers to EBP and perceived EBP practice, attitudes, and knowledge/skills.

The study was conducted in four major governmental referral hospitals in Muscat, Oman, including a university teaching and referral hospital (557 beds and 1,240 nurses), a referral hospital (630 beds and 1,298 nurses), a tertiary national referral hospital providing specialised services (517 beds and approximately 903 nurses) and an armed forces referral hospital providing specialised services (350 beds and approximately 400 nurses). The four hospitals were selected for this study because they provide both intensive care and coronary care (with accessible cardiac laboratories) as well as outpatient and inpatient care in the areas of clinical, medical, surgical, orthopaedic, emergency and open heart surgical medicine. In addition, the four hospitals all provide specialised healthcare for patients referred from other hospitals within Oman. All four hospitals are also designated teaching hospitals, using electronic patient information systems and with internet-connected computers in the clinical units. Due to the utilisation of electronic computer-based patient

record systems in all hospitals, all of the nurses were considered to be familiar with and able to use computers. As these hospitals are adequately staffed and offer specialised nursing care, they provided the most appropriate setting from which to recruit an adequate number of nurses to participate in this study. The majority of nurses employed in these hospitals have a baccalaureate or diploma in nursing with specialised experience.

All registered nurses working in the hospitals were invited to participate in the study. A total of 600 questionnaires were distributed to nurses in the four hospitals during the study period. To avoid a selection bias, a convenience sample of approximately 150 nurses were invited from each hospital. Nurses working on all three shifts in the participating hospitals were invited to participate. The researchers provided potential participants with detailed verbal information, including a brief description of the study's purpose and instructions on how to complete the questionnaire. A total of 414 participants responded, resulting in a response rate of 69%. A power analysis based on Cohen's power table using regression analysis with six independent variables was conducted. This analysis calculated that a sample size of 97 was required, based on a medium effect size ($f^2 = 0.15$), a 0.05 significance level and a power of 0.80.¹⁶ Therefore, it was determined that the sample size of 414 was adequate for the planned statistical analysis.

The English version of the 24-item self-reported Evidence-Based Practice Questionnaire (EBPQ) developed by Upton *et al.* was used to measure EBP practices, attitudes, knowledge and skills.¹⁷ This 24-item questionnaire is categorised under three distinct subscales: practice of EBP, attitudes towards EBP and knowledge of/skills associated with EBP.¹⁷ Items were scored on a visual rating scale ranging from one to seven, with a higher score representing a more positive attitude towards EBP and greater use and knowledge of EBP. In the attitudes subscale, each item had two pairs of opposing statements, with a negative statement and a corresponding positive statement. The respondents were asked to rank their attitudes towards EBP using these statements. Responses were considered positive if scores were greater than four. Previous studies have assessed the internal consistency of the EBPQ and found a Cronbach's alpha coefficient of 0.87 for the entire questionnaire: 0.85 for the practice subscale, 0.79 for the attitudes subscale and 0.91 for the knowledge/skills subscale.¹⁷ The construct validity was assessed by using an independent measure of EBP awareness, with the results yielding a positive relationship between the scales.¹⁷ In this study, the Cronbach's alpha coefficient

was 0.91 for the entire questionnaire, 0.84 for the practice subscale, 0.74 for the attitudes subscale and 0.94 for the knowledge/skills subscale.

Barriers to EBP were measured using two subscales of the English version of the Developing Evidence-Based Practice Questionnaire (DEBPQ).¹⁸ The first 10-item subscale focused on barriers to finding and reviewing evidence; the second five-item subscale addressed barriers to changing practice. A five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) was used to measure items. The mean scores for each item and for subscales were calculated; higher scores indicated a greater perception of EBP barriers. The percentage of 'agree' or 'strongly agree' responses for each item was calculated. Construct validity was assessed by the identification of 10 factors that showed interpretable structure and measurable approaches to EBP.¹ In this study, Cronbach's alpha coefficient for internal consistency was 0.84 for the barriers to finding and reviewing evidence subscale and 0.78 for the barriers to changing practice subscale.

The demographic variables of the participants were measured using a six-item data collection instrument designed for the purpose of the study. The demographic data included age, gender, nationality, academic qualifications, years of experience and the year that each nurse had completed their last academic degree.

The data analysis was performed using the Statistical Package for the Social Sciences (SPSS), Version 19 (IBM Corp., Chicago, Illinois, USA). Categorical data were reported as frequencies and percentages. Continuous data were used to report measures of central tendency. Prior to testing, methods of assessing statistical assumptions, collinearity and the adequacy of the regression were employed. Based on the test for collinearity, one variable (age) was excluded from the regression analysis because it had a high correlation with another variable (years of experience). All data were analysed at an alpha level of 0.05.

Descriptive statistics were used to answer the first two research objectives outlined earlier. To fulfil the third objective, a multiple regression analysis was used to assess the associations between demographic variables and perceived EBP practice, attitudes and knowledge/skills and barriers to EBP implementation. For the fourth objective, a multiple regression analysis was used to assess the associations between perceived barriers to EBP and perceived EBP practice, attitudes, knowledge and skills.

The survey and protocol used in this study were reviewed and approved by the Research & Ethics Committee of the College of Nursing at Sultan Qaboos University (CRC#2012/20.1.2012). Written

consent was obtained from the nurses prior to the administration of the questionnaires. Participation was voluntary and data were kept confidential. Every participant was given an identification number used throughout the study to ensure anonymity.

Results

The sample was comprised of 414 respondents. The mean age of the participants was 35 ± 8.25 years and the mean number of years of experience was 12.6 ± 8.03 years. The majority of the participants (89.6%) were female. Of the participants, 47% were Indian, 31.4% were Omani, 13.3% were Filipino and 8.3% were of another nationality. The highest level of professional education for 267 (65.4%) of the participants was a nursing diploma, while 141 (34.6%) held a baccalaureate degree in nursing. Just over half of the participants (52.1%) had gained their last academic degree before 2004 while the rest reported completing their last academic qualification after 2005.

In terms of the nurses' perceptions of practice, attitude towards and knowledge/skills regarding EBP, the DEBPQ results found that the attitudes subscale had the highest mean score (6.63 ± 1.18) followed by the knowledge/skills subscale (4.97 ± 0.86) and then the practice subscale (4.92 ± 1.25) [Table 1]. For each subscale, the respondents' overall mean scores were rank-ordered to determine the priority of each item as a top learning need. For the practice subscale, the two most frequently reported practices were sharing information with colleagues (5.68 ± 1.46) and evaluating the outcomes of their practice (5.45 ± 1.52). On the attitudes subscale, the top two attitudes among the nurses were that EBP was fundamental to professional practice (6.14 ± 1.37) and that nurses welcomed questions on their practice (5.82 ± 1.46). The top two items among the nurses for the knowledge/skills subscale were the sharing of ideas and information to colleagues (5.68 ± 1.08) and the ability to review their own practice (5.44 ± 1.10) [Table 1].

The nurses also reported the barriers faced in implementing EBP. The results from the DEBPQ subscales indicated that the greatest barriers to EBP were the difficulty in finding research reports (3.85 ± 0.92) and insufficient time to find research reports (3.51 ± 0.97). The lowest scored barriers were not knowing how to find and difficulty in finding organisational information, e.g. guidelines of protocols (3.13 ± 1.07 and 3.15 ± 1.02 , respectively). Insufficient resources to change practice (3.64 ± 0.99) and insufficient time at work to implement changes in practice (3.53 ± 0.97)

Table 1: Nurses' questionnaire scores by education level regarding their perceived knowledge, skills, attitude and practice of evidence-based practice (N = 414)

Item	Scores		
	Total % of positive responses (mean ± SD)	Education level Mean ± SD	
		Baccalaureate degree n = 141	Diploma n = 267
Practice	74.6 (4.92 ± 1.25)	4.87 ± 1.28	5.01 ± 1.17
Determining how useful (clinically applicable) material is	72.7 (5.13 ± 1.09)	5.09 ± 1.10	5.19 ± 1.01
Identifying gaps in professional practice	69.8 (5.06 ± 1.12)	5.06 ± 1.11	5.07 ± 1.12
Monitoring and reviewing practice	69.3 (5.05 ± 1.10)	5.04 ± 1.10	5.04 ± 1.08
Determining the validity (close to the truth) of material	64.3 (4.89 ± 1.15)	4.91 ± 1.13	4.85 ± 1.13
Retrieving evidence	63.3 (4.88 ± 1.21)	4.84 ± 1.20	4.94 ± 1.17
Critically analysing evidence against set standards	61.4 (4.80 ± 1.17)	4.75 ± 1.18	4.89 ± 1.08
Awareness of major information types/sources	61.4 (4.79 ± 1.17)	4.75 ± 1.14	4.89 ± 1.17
IT skills	59.9 (4.75 ± 1.18)	4.67 ± 1.18	4.88 ± 1.53
Converting information needs into a research question	44.9 (4.31 ± 1.23)	4.21 ± 1.18	4.51 ± 1.23
Research skills	39.1 (4.16 ± 1.24)	4.04 ± 1.25	4.40 ± 1.13
Attitudes	75.4 (5.63 ± 1.18)	5.67 ± 1.17	5.53 ± 1.18
EBP is fundamental to professional practice	84.8 (6.14 ± 1.37)	6.12 ± 1.39	6.16 ± 1.34
Welcoming questions on own practice	79.0 (5.82 ± 1.46)	5.86 ± 1.46	5.72 ± 1.44
Changing practice due to evidence found	77.8 (5.68 ± 1.54)	5.76 ± 1.46	5.49 ± 1.66
Making time in a work schedule for research	60.1 (4.89 ± 1.90)	4.93 ± 1.94	4.78 ± 1.80
Knowledge/skills	63.3 (4.97 ± 0.86)	4.93 ± 0.86	5.04 ± 0.79
Sharing ideas and information with colleagues	86.5 (5.68 ± 1.08)	5.64 ± 1.09	5.76 ± 1.01
Reviewing own practices	81.4 (5.44 ± 1.10)	5.42 ± 1.14	5.48 ± 0.98
Disseminating new ideas about care to colleagues	76.8 (5.38 ± 1.16)	5.35 ± 1.15	5.44 ± 1.16
Applying information to individual cases	74.4 (5.25 ± 1.10)	5.24 ± 1.12	5.26 ± 1.04

SD = standard deviation; EBP = evidence-based practice; IT = information technology.

were identified as the two greatest barriers to changing practice. The least significant barrier to changing practice was a lack of confidence about beginning to change practices (3.07 ± 0.85) [Table 2].

Correlations between the demographic variables and the EBP subscales are shown in Table 3. There were significant positive correlations between the nurses' years of experience and the practice (r = 0.16) and attitude (r = 0.20) subscales. Participants with more years of experience had better practice and attitude scores compared to the newer nurses. Further, the nurses with more years of experience perceived fewer barriers to finding research (r = -0.17) or changing their practice (r = -0.12). Moreover, academic qualifications were significantly associated with perceived barriers to finding research. Nurses who had a bachelor's degree in nursing tended to perceive fewer barriers to finding research compared to nurses with a diploma only (r = 0.18).

Table 2: Nurses' questionnaire scores by education level regarding their perceived barriers to evidence-based practice (N = 414)

Item	Scores		
	Total % of positive responses (mean ± SD)	Education level Mean ± SD	
		Baccalaureate degree n = 141	Diploma n = 267
Barriers to finding and reviewing research	51.6 (3.40 ± 0.67)	3.32 ± 0.65	3.49 ± 0.64
Research reports are not easy to find	77.1 (3.85 ± 0.92)	3.77 ± 0.94	3.96 ± 0.81
Insufficient time to find research reports	60.4 (3.51 ± 0.97)	3.46 ± 0.95	3.59 ± 0.98
Lack of confidence in judging the quality of research reports	60.1 (3.47 ± 0.96)	3.44 ± 0.96	3.51 ± 0.91
Difficulty identifying the implications of research findings for own practice	55.8 (3.44 ± 0.83)	3.37 ± 0.81	3.54 ± 0.80
Difficulty understanding research reports	50.9 (3.40 ± 0.99)	3.30 ± 1.01	3.54 ± 0.92
Not knowing how to find appropriate research reports	46.1 (3.37 ± 0.89)	3.29 ± 0.89	3.48 ± 0.83
Difficulty identifying the implications of organisational information (guidelines/protocols etc.) for own practice	45.6 (3.30 ± 0.91)	3.19 ± 0.91	3.47 ± 0.87
Insufficient time to find organisational information	43.7 (3.28 ± 0.91)	3.19 ± 0.91	3.40 ± 0.87
Organisational information is not easy to find	43.3 (3.15 ± 1.02)	3.15 ± 1.01	3.14 ± 1.01
Not knowing how to find organisational information	37.5 (3.13 ± 1.07)	2.99 ± 1.03	3.34 ± 1.06
Barriers to changing practice	64.6 (3.30 ± 0.65)	3.27 ± 0.65	3.31 ± 0.64
Insufficient resources (e.g. equipment) to change own practice	70.6 (3.64 ± 0.99)	3.61 ± 0.82	3.66 ± 0.86
Insufficient time at work to implement changes in own practice	62.2 (3.53 ± 0.97)	3.57 ± 0.87	3.44 ± 0.89
Team culture is not receptive to changing practice	43.2 (3.12 ± 0.90)	3.08 ± 0.98	3.19 ± 0.94

Lacking the authority to change practice	42.2 (3.12 ± 1.06)	3.14 ± 1.06	3.06 ± 1.02
Lack of confidence about beginning to change own practice	40.3 (3.07 ± 0.85)	2.99 ± 1.00	3.22 ± 0.96

SD = standard deviation.

Three demographic variables (years of experience, academic qualifications and year of last academic achievement) had significant associations with the EBP subscales [Table 4]. Nurses who had more years of experience reported more frequent use of EBP ($\beta = 0.170$; $P < 0.01$), more positive attitudes towards EBP ($\beta = 0.197$; $P < 0.001$) and fewer barriers to finding and reviewing research ($\beta = -0.162$; $P < 0.01$). Meanwhile, nurses with baccalaureate degrees in nursing reported fewer barriers to finding and reviewing research than nurses with diplomas only ($\beta = -0.198$; $P < 0.001$). Nurses who had gained their last academic qualification after 2005 reported less knowledge and fewer skills associated with EBP ($\beta = -0.109$; $P < 0.05$) as well as more barriers to changing their practice ($\beta = 0.123$; $P < 0.05$) in comparison to nurses whose last academic degree was gained on or before 2004 [Table 4].

In terms of perceived barriers to implementing EBP, and the practice, attitudes and knowledge/skills associated with EBP, the study's results indicated that nurses who perceived more barriers to finding and reviewing research described reduced use of EBP ($\beta = -0.242$; $P < 0.001$). They also reported less positive attitudes towards EBP ($\beta = -0.280$; $P < 0.001$) and reduced EBP knowledge/skills ($\beta = -0.306$; $P < 0.001$). Meanwhile, there was no significant association between barriers to changing practice and EBP-associated practice, attitudes and knowledge/skills.

Discussion

The results of this study indicate that the nurses viewed EBP positively and their attitudes towards EBP tended to be more positive than their knowledge/skills and use of EBP. These results were consistent with previous studies describing attitudes, practices and knowledge/skills associated with EBP.^{10,15,19} Therefore, it appears that nurses' EBP attitudes commonly differ from their ability to implement EBP and that this is not unique to nurses in Oman.

Insufficient time and resources were identified as the main barriers to using EBP among nurses in Oman. Similar responses have been observed in other

Table 3: Correlations between the nurses' demographic variables and their scores on the evidence-based practice questionnaire by subscale (N = 414)

Variable	Questionnaire subscale				
	Practice	Attitudes	Knowledge/skills	Barriers to finding research	Barriers to changing practice
Gender	-0.18	-0.021	-0.070	0.014	-0.045
Nationality	-0.051	0.049	-0.031	-0.063	-0.033
Years of experience	0.160 [‡]	0.202 [‡]	0.062	-0.014 [†]	-0.123 [‡]
Academic qualification	0.067	-0.039	0.076 [*]	-0.179 [‡]	-0.049
Year of last academic qualification	-0.076	-0.091 [*]	-0.101 [*]	0.073	0.152 [†]

* $P < 0.05$; [†] $P < 0.01$; [‡] $P < 0.001$.

Table 4: Multiple regression analysis of the evidence-based practice questionnaire subscales on selected demographic variables (N = 414)

Variable	Questionnaire subscale									
	Practice ^a		Attitudes ^b		Knowledge/skills ^c		Barriers to finding research ^d		Barriers to changing practice ^e	
	β	t value	β	t value	β	t value	β	t value	β	t value
Gender	-0.048	-0.96	-0.024	-0.47	-0.095	-1.87	0.033	0.660	-0.010	-0.189
Nationality	-0.011	-0.114	0.044	0.451	-0.083	-0.915	-0.020	-0.223	-0.062	-0.671
Years of experience	0.170	3.18 [†]	0.197	3.71 [‡]	0.049	0.91	-0.162	-0.308 [†]	-0.082	-1.53
Academic qualification	0.084	1.72	-0.017	-0.340	0.080	1.63	-0.198	-4.08 [‡]	-0.060	1.39
Year of last academic qualification	-0.027	-0.507	-0.019	-0.360	-0.109	-2.03 [*]	0.031	0.590	0.123	2.31 [*]

^a $F(4, 409) = 3.79, P < 0.01, R^2 = 0.036$; ^b $F(4, 409) = 4.45, P < 0.01, R^2 = 0.042$; ^c $F(4, 409) = 2.82, P < 0.05, R^2 = 0.017$; ^d $F(4, 409) = 2.87, P < 0.001, R^2 = 0.061$; ^e $F(4, 409) = 1.42, P < 0.01, R^2 = 0.033$; * $P < 0.05$, [†] $P < 0.01$; [‡] $P < 0.001$.

studies.^{8,15,19} In their study of Turkish nurses' use of research evidence in clinical practice, Ozdemir *et al.* were of the opinion that the perceived lack of time by nurses was a justification adopted in order to guard themselves from unfamiliar ideas that might require changing their practices.²⁰ It appears that a better understanding of the practice environment is crucial to the understanding and development of interventions to advance EBP in the nursing community.²¹ In this light, hospital management should consider making adjustments to nurses' work schedules so that nurses have additional time to attend classes on conducting EBP, reviewing relevant literature and planning practice changes.

The results of this study also indicated that nurses with more years of experience reported greater use of EBP, more positive attitudes towards EBP and fewer barriers to finding and reviewing research. These results are consistent with those reported in a previous study which found that nurses with more years of experience in nursing were more confident in implementing EBP because they had had more

exposure to evidenced-based information as part of their continuing education.²² In a similar study, Ferguson *et al.* concluded that new nurses were less confident in using EBP due to their limited practical knowledge and experience.²³ On the other hand, Majid *et al.* found that the relationship between years of experience and the implementation of EBP was weak.²⁴ The current study, and another study with similar findings, seem to suggest that, in order to effectively implement EBP, less experienced nurses should be supported by senior nurses and nursing leaders with encouragement and the provision of necessary resources.²⁵ Such support could be provided by increasing the opportunities for nurses to attend EBP training, as this is likely to improve their confidence in and utilisation of EBP.²⁴

Nurses with baccalaureate degrees reported fewer barriers to finding and reviewing research than nurses with diplomas. The reason could be that baccalaureate education programmes prepare their graduates to read and understand research findings, as compared to diploma programmes, which usually do not. Majid

et al. found that nurses with higher qualifications were better able to benefit from EBP activities.²⁴ Youngblut *et al.* indicated that nurses who had graduated from baccalaureate programmes had knowledge of the research process, which facilitated their interpretation of scientific evidence.²⁶ Additionally, Majid *et al.* concluded that the creation of an environment that provides opportunities for nurses to share knowledge and information should be a key priority for hospital management.²⁴ This suggests that nurses who have not received any research or EBP training need additional education—perhaps enabled by providing additional tuition assistance for those who wish to complete a nursing baccalaureate qualification.

Most higher education systems prepare nurses to generate different types of evidence, accumulate evidence in a mental repository for subsequent application in clinical practice, synthesise different forms of evidence and translate this information by evaluating, interpreting and disseminating data through formal and informal means. The importance of education was emphasised in a study conducted in the UK by Grant *et al.*²⁷ They found that nurses with a master's degree often promoted EBP among their clinical nursing colleagues.²⁷

Although baccalaureate degree-holding nurses are educated in research techniques, unless these skills are maintained and supported within their place of employment, they may quickly be forgotten. Additionally, if nurses do not have access to the appropriate technology to conduct comprehensive searches of the literature (for example, using databases such as CINAHL or MEDLINE), then such issues become major barriers to practicing EBP. Future research is recommended targeting nurses with a diploma-level qualification to determine their EBP skills and practices.

The current study's results indicated that nurses who perceived more barriers to finding and reviewing research reported less frequent use of EBP, fewer positive attitudes towards EBP and less knowledge/skills associated with EBP. Several studies have also shown that nurses do not readily integrate research into their clinical setting, reporting inadequate organisational support, lack of knowledge about research studies/utilisation, lack of time and difficulty in understanding statistical analyses as the major barriers of implementation.^{1,28,29} Nurses should receive sufficient education in informational technology to be able to implement EBP. Continuing education should include training in statistical analysis, research application and the utilisation of the internet so as to encourage nurses to use EBP in clinical practice. The results for this study were congruent with the wider research literature on this topic.

The results of this study should be viewed cautiously, taking into account some limitations. The cross-sectional nature of this study hindered the ability to infer causal relationships between the study variables. Furthermore, this study was based on self-reported data which may represent an inherent bias. Additionally, the recruitment method relied on convenience sampling and may not be truly representative of the nursing population in Oman.

Conclusion

The findings of this study provide a basis from which Omani organisations can begin educational initiatives to increase the utilisation and implementation of EBP among nurses. This study found that nurses' attitudes towards EBP were more positive than their knowledge/skills and practices of EBP. The greatest barriers to developing EBP among nurses in Oman were insufficient time to find and read research and insufficient resources to change their practice. More years of nursing experience and a baccalaureate-level education were positively associated with EBP attitudes, practice and knowledge/skills, and were negatively associated with barriers to EBP. Additionally, barriers to finding and reviewing research were negatively associated with EBP practice, attitudes and knowledge/skills. These findings suggest that continuing education regarding EBP for nurses is crucial in order to enhance nurses' clinical practice, knowledge and skills, and that hospital management should take steps to minimise the barriers to EBP implementation.

CONFLICT OF INTEREST

The authors report no conflict of interest.

References

1. Gerrish K, Ashworth P, Lacey A, Bailey J. Developing evidence-based practice: Experiences of senior and junior clinical nurses. *J Adv Nurs* 2008; 62:62–73. doi: 10.1111/j.1365-2648.2007.04579.x.
2. Sherriff KL, Wallis M, Chaboyer W. Nurses' attitudes to and perceptions of knowledge and skills regarding evidence-based practice. *Int J Nurs Pract* 2007; 13:363–9. doi: 10.1111/j.1440-172X.2007.00651.x.
3. Melnyk BM, Fineout-Overholt E. Evidence-Based Practice in Nursing & Healthcare: A guide to best practice. Philadelphia, Pennsylvania, USA: Lippincott Williams & Wilkins, 2005. Pp. 3–39.
4. Coopey M, Nix MP, Clancy CM. Translating research into evidence-based nursing practice and evaluating effectiveness. *J Nurs Care Qual* 2006; 21:195–202.
5. Institute of Medicine of the National Academies. Health Professions Education: A bridge to quality. Washington, D.C., USA: National Academies Press, 2003.
6. Olade RA. Evidence-based practice and research utilization activities among rural nurses. *J Nurs Scholarsh* 2004; 36:220–5. doi: 10.1111/j.1547-5069.2004.04041.x.

7. Titler MG. The Evidence for Evidence-Based Practice Implementation. In: Hughes RG, Ed. Patient Safety and Quality: An evidence-based handbook for nurses. Vol. 1. Rockville, Maryland, USA: Agency for Healthcare Research and Quality, 2008. Pp. 113–61.
8. Pravikoff DS, Tanner AB, Pierce ST. Readiness of U.S. nurses for evidence-based practice. *Am J Nurs* 2005; 105:40–51.
9. Roberts K, Belcher D, Jacobson J. The evidence TRIP: A researcher helps nurses 'practice by evidence, not tradition'. *Am J Nurs* 2004; 104:102–3.
10. Koehn ML, Lehman K. Nurses' perceptions of evidence-based nursing practice. *J Adv Nurs* 2008; 62:209–15. doi: 10.1111/j.1365-2648.2007.04589.x.
11. Paramonczyk A. Barriers to implementing research in clinical practice. *Can Nurse* 2005; 101:12–5.
12. Veeramah V. Utilization of research findings by graduate nurses and midwives. *J Adv Nurs* 2004; 47:183–91. doi: 10.1111/j.1365-2648.2004.03077.x.
13. Happell B, Johnston L, Hill C. Implementing research findings into mental health nursing practice: Exploring the clinical research fellowship approach. *Int J Ment Health Nurs* 2003; 12:251–8. doi: 10.1046/j.1447-0349.2003.t01-3-x.
14. Valente SM. Research dissemination and utilization improving care at the bedside. *J Nurs Care Qual* 2003; 18:114–21.
15. Brown CE, Wickline MA, Ecoff L, Glaser D. Nursing practice, knowledge, attitudes and perceived barriers to evidence-based practice at an academic medical center. *J Adv Nurs* 2009; 65:371–81. doi: 10.1111/j.1365-2648.2008.04878.x.
16. Cohen J. A power primer. *Psychol Bull* 1992; 112:155–9. doi: 10.1037/0033-2909.112.1.155.
17. Upton D, Upton P. Development of an evidence-based practice questionnaire for nurses. *J Adv Nurs* 2006; 53:454–8. doi: 10.1111/j.1365-2648.2006.03739.x.
18. Gerrish K, Ashworth P, Lacey A, Bailey J, Cooke J, Kendall S, et al. Factors influencing the development of evidence-based practice: A research tool. *J Adv Nurs* 2007; 57:328–38. doi: 10.1111/j.1365-2648.2006.04112.x.
19. Yadav BL, Fealy GM. Irish psychiatric nurses' self-reported barriers, facilitators and skills for developing evidence-based practice. *J Psychiatr Ment Health Nurs* 2012; 19:116–22. doi: 10.1111/j.1365-2850.2011.01763.x.
20. Ozdemir L, Akdemir N. Turkish nurses' utilization of research evidence in clinical practice and influencing factors. *Int Nurs Rev* 2009; 56:319–25. doi: 10.1111/j.1466-7657.2009.00707.x.
21. Cummings GG, Estabrooks CA, Midodzi WK, Wallin L, Hayduk L. Influence of organizational characteristics and context on research utilization. *Nurs Res* 2007; 56:S24–39. doi: 10.1097/01.NNR.0000280629.63654.95.
22. Griffiths JM, Bryar RM, Closs SJ, Cooke J, Hostick T, Kelly S, et al. Barriers to research implementation by community nurses. *Br J Community Nurs* 2001; 6:501–10. doi: 10.12968/bjcn.2001.6.10.9466.
23. Ferguson LM, Day RA. Challenges for new nurses in evidence-based practice. *J Nurs Manag* 2007; 15:107–13. doi: 10.1111/j.1365-2934.2006.00638.x.
24. Majid S, Foo S, Luyt B, Zhang X, Theng YL, Chang YK, et al. Adopting evidence-based practice in clinical decision making: Nurses' perceptions, knowledge, and barriers. *J Med Libr Assoc* 2011; 99:229–36. doi: 10.3163/1536-5050.99.3.010.
25. Stichler JF, Fields W, Kim SC, Brown CE. Faculty knowledge, attitudes, and perceived barriers to teaching evidence-based nursing. *J Prof Nurs* 2011; 27:92–100. doi: 10.1016/j.profnurs.2010.09.012.
26. Youngblut JM, Brooten D. Evidence-based nursing practice: Why is it important? *AACN Clin Issues* 2001; 12:468–76. doi: 10.1097/00044067-200111000-00003.
27. Grant HS, Stuhlmacher A, Bonte-Eley S. Overcoming barriers to research utilization and evidence-based practice among staff nurses. *J Nurses Staff Dev* 2012; 28:163–5. doi: 10.1097/NND.0b013e31825dfaff.
28. Gerrish K, Guillaume L, Kirshbaum M, McDonnell A, Tod A, Nolan M. Factors influencing the contribution of advanced practice nurses to promoting evidence-based practice among front-line nurses: Findings from a cross-sectional survey. *J Adv Nurs* 2011; 67:1079–90. doi: 10.1111/j.1365-2648.2010.05560.x.
29. Gerrish K, McDonnell A, Nolan M, Guillaume L, Kirshbaum M, Tod A. The role of advanced practice nurses in knowledge brokering as a means of promoting evidence-based practice among clinical nurses. *J Adv Nurs* 2011; 67:2004–14. doi: 10.1111/j.1365-2648.2011.05642.x.