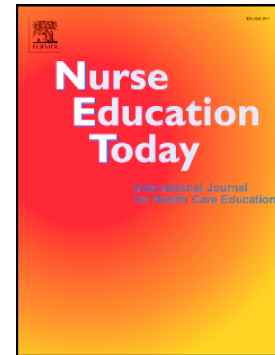


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Undergraduate student Nurses' knowledge of evidence-based practice: A short online survey

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**Title page****Undergraduate Student Nurses' Knowledge of Evidence-Based Practice: A  
Short Online Survey****Correspondence author:****Mohammad Al Qadire, RN, PhD**

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Nurses; Students; Jordan; Evidence; Practice; Clinical; Education.

**Abstract****Background:**

Various approaches and frameworks have been designed and tested to increase the uptake of research findings into practice. One approach is to base healthcare providers' practices on the best available research evidence rather than on expired policy or tradition. For which knowledge of evidence-based practice (EBP) principles is a prerequisite.

**Objective:**

The purpose of the current inquiry is to evaluate Jordanian nursing students' knowledge of EBP.

**Design:**

This study was an on-line cross-sectional survey.

**Settings:**

We targeted students in two universities in the north and one in the capital city of Amman.

**Participants**

The target population was Jordanian student nurses, and the sample consisted of 316 from the nursing schools within three government universities.

**Methods**

The EBP knowledge test was used to collect data from students. It was adapted from the EBP Knowledge, Attitudes, Access & Confidence Evaluation. Ethical approval was obtained from the principal investigator's university before the questionnaire was uploaded on to the free online survey website. The link to the survey was established and shared on Facebook.

**Results**

Just over half of the participating students were male (51.9%) and the average age was 21.6 years (SD 2.7). The mean total knowledge score as measured by the EBP Knowledge Test was low at 1.9 (SD 1.4) out of 10.

**Conclusions**

An evaluation of EBP-related content in nursing schools' curricula is needed in order to design and test the effectiveness of implementing an EBP course in improving knowledge and skills. Critical appraisal and evidence synthesis skills should be honed as they are seen to be very weak, with much room for improvement. Meanwhile, research courses could be the mainstay for a nursing faculty to introduce the EBP approach for undergraduate nurses.

## Background

The quantity of scientific research is increasing at an ever-faster rate (Hickman et al., 2018; Melnyk and Fineout-Overholt, 2015). However, the uptake of the current findings into practice does not parallel the speed of publication (Al Khalaileh et al., 2016; Hickman et al., 2018; Melnyk and Fineout-Overholt, 2015). So, the gap between research and practice is obvious. Various approaches and frameworks have been designed and tested to increase the uptake of research findings into practice. One approach is to base healthcare providers' practices on the best available research evidence rather than on expired policy or tradition (Al Khalaileh et al., 2016; Melnyk and Fineout-Overholt, 2015). Nurses have crucial role in developing and implementing research evidence, for which knowledge of evidence-based practice (EBP) principles is a prerequisite (Al Khalaileh et al., 2016; Melnyk and Fineout-Overholt, 2015). It is argued that underpinning clinical practice with research evidence could improve patients' clinical outcomes, reduce care cost and enhance the quality of care.

Previous studies have focused on working nurses' knowledge, attitudes, skills and the barriers to EBP (AbuRuz et al., 2017; Al Khalaileh et al., 2016; Almalki, 2017; Heydari et al., 2014; Hickman et al., 2018; Sherriff et al., 2007). For example, one study evaluated nurses' and midwives' (n=240) knowledge, attitude, and practice of EBP in Iran (Heydari et al., 2014). The result showed that nurses and midwives had a low level of knowledge and practice of EBP, although they reported positive attitudes towards EBP. Another study that explored the barriers to utilization of research findings found that nurses reported a high level of barriers, mostly related to the setting in which they worked (Al Khalaileh et al., 2016). For example, most nurses said that they lacked the authority to implement new research results in their practice, as they had no access or time to read research reports. More than the half of the nurses (56%) reported that published research reports were not easy to read and they found

themselves unable to critically appraise the evidence (Al Khalaileh et al., 2016). A recent review confirmed that nurses tend to have low to moderate knowledge and practice of EBP, admitting their inability to critically appraise and judge the quality of research articles (Patelarou et al., 2017). This has brought the issue of improving nurses' knowledge of EBP to the surface. Without knowledge of the EBP approach, research uptake into practice will not be as it should be. Knowledge could improve practice, skills and attitudes (Allen et al., 2015; Hickman et al., 2018). Thus, many studies have been conducted to test different educational interventions to improve nurses' knowledge and willingness to use EBP in their clinical practice (Allen et al., 2015; Hickman et al., 2018; Means et al., 2009). Assessing undergraduate nurses' knowledge might be a preliminary step to improving knowledge regarding EBP.

This interest in assessing student nurses' knowledge of EBP has begun only recently, and Allen et al. (2015) reported that many factors are involved. These factors include the ability to comprehend data analysis, results, critical appraisal, and dissemination of results within the setting of their own practice. Without doubt, student nurses would affect the future of EBP in nursing and have a crucial role in enhancing its adoption into clinical practice (Brown et al., 2010). Student nurses tended to retain more knowledge of EBP as they progressed from year one to graduation year; and those with greater confidence in clinical preparedness and decision making indicated better adoption of EBP (Brown et al., 2010). Few studies focused on undergraduate knowledge of EBP, most previous work having been on working nurses (Allen et al., 2015; Means et al., 2009) or postgraduate students (Brown et al., 2010; Hickman et al., 2018). In a recent review, the author was only able to identify nine articles that investigated the barriers to use of EBP among student nurses (Ryan, 2016). Based on the results of this review, it was concluded that students held a positive attitude but lacked the experience to use EBP, and further studies among student nurses were recommended (Ryan,

2016). Further, Al-Ghabeesh et al., 2013 reported that the main source of knowledge used by Jordanian nurses in clinical practice was the information they gained during their undergraduate study and then followed their accumulated expertise. The EBP approach to nursing care was not reported as source of gaining knowledge during practice (Al-Ghabeesh et al., 2013). Hence, undergraduate study presents a golden opportunity to occupy nurses with required knowledge and skills of EBP approach. Student nurses must learn the principles and approaches to EBP. This can be achieved with more EBP content and training within the nursing curriculum (Ruzafa-Martínez et al., 2016). Including an EBP module within the nursing education programme has been found to improve students' competencies in EBP (knowledge and skills) (Ruzafa-Martínez et al., 2016). Further, in a study that investigated the barriers to utilizing research findings into clinical nursing practice, participated nurses deemed that their research knowledge and skills were inadequate (Al Khalaileh et al., 2016). further Thus, because of the importance and scarcity of such studies at international and local levels, the purpose of the current inquiry is to evaluate Jordanian nursing students' knowledge of EBP.

## **Methods**

### **Design**

This study was an on-line cross-sectional survey.

### **Sample**

The target population was Jordanian student nurses, and the sample consisted of 316 from the nursing schools within three government universities. Students from different year of their degree were invited to participate. The required sample size depended on the expected percentage of correct answers on the EBP knowledge test. For a percentage of 40-80%, given

that these three nursing schools have an estimated 2,000 students, a sample size of 220 to 312 was sufficient. From <http://www.raosoft.com/samplesize.html>, this would allow the percentage of correct answers to be estimated with a 95% margin-of-error of at most  $\pm 5\%$ . The survey was available online during the first semester of the academic year 2017/2018.

### **Setting**

This study used an online method of questionnaire delivery. We targeted students in two universities in the north and one in the capital city of Amman. To avoid bias resulting from the inclusion of students not enrolled in the selected universities, we allowed participation online from all the universities in Jordan. In the analysis, however, we included only the completed forms from students in the three universities.

### **Instruments**

The EBP knowledge test was adapted from the EBP Knowledge, Attitudes, Access & Confidence Evaluation (Hendricson et al., 2011), that was developed for dental students. Only the knowledge part of this tool was used. The internal consistency coefficient for the original knowledge scale was 0.78. The adapted knowledge scale consisted of ten multiple-choice questions, each with five choices. The fifth choice for each question was “I don’t know” to avoid guessing. As the original tool was designed for students in dental schools, the word “dental” was replaced by “nursing” wherever it occurred. In addition, questions number 6, 9 and 10 were replaced by three new questions more specific to nursing. The test remained in English since the language of nursing teaching and examination in Jordan is English. The tool was subjected to review from three members of the nursing faculty to assess its content, the appropriateness of the questions, and its relevance to nursing. It was then piloted with 20 students, who found it easy to understand and took only five minutes to complete. The internal consistency coefficient (Cronbach alpha) for the EBP knowledge test was 0.81. Each

correct answer was given a score of “1” while wrong and “I don’t know” answers were give “0”. The total knowledge score, that is the sum of all correct answers, was calculated. It could range from zero (lowest score) to ten (highest possible score), a higher score reflecting a better knowledge level, and a score of four or less meaning that the student failed the test. Data about students’ age, gender, academic level, university, and whether or not they had completed the research methods course, was collected.

### **Procedure**

Ethical approval was obtained from the principal investigator’s university before the questionnaire was uploaded on to the free online survey website. The link to the survey was established and shared on Facebook. Messages to page administrators explaining the study purpose and requesting to share the link were sent, after which the link was sent to them. It was re-published weekly during the first semester. Finally, all completed questionnaires were printed out and entered into the statistical package (SPSS) to avoid any mistakes that might occur from the use of the export option provided on the survey website.

### **Data analysis**

Data was entered into SPSS, and descriptive and inferential statistics were produced. Descriptive statistics such as means, standard deviation, percentages and frequencies were used to describe the sample characteristics and their responses on the EBP knowledge test (Field, 2013). The Mann-Whitney-U test was used to compare the EBP knowledge test score distribution between two-group variables: gender, and had completed the research methods in nursing or not; and the Kurskal-Wallis test to compare the EBP knowledge test score distribution between variables from with more than two groups: students’ academic level and students’ university (Field, 2013).

### **Results**



At the end of the data collection, 328 questionnaires were found in the survey website repository; 12 were discarded because of incomplete data. Just over half of the participating students were male (51.9%) and the average age was 21.6 years (SD 2.7), ranging from 18 to 44. Under half (42.7%) were in their fourth year and had enrolled in the research course. See Table 1.

### **Insert table 1 here**

### **Knowledge of Evidence-Based Practice**

The mean total knowledge score as measured by the EBP Knowledge Test was low at 1.9 (SD 1.4) out of 10. It ranged from 0 to 6 with mode = 2. Question number 9, which asked about the correct definition of EBP, was the highest correctly answered question (31.3%) (see table 2). All other questions were answered correctly by 29.7% of students or fewer. The worst performance was on question number 1, about one aspect of critical appraisal; only 7.9% of students correctly answered the question and 63 selected the “I don’t know” option (see Figure 1). Only 51 (16.1%) knew what a meta-analysis means (question 7). Overall, students performed badly on the knowledge test, with the worst performance on questions related to critical appraisal (questions 2, 4 and 6).

The mean of the total knowledge score was compared against students’ gender and whether they had completed the research methods course, using the independent t-test. No significant difference was found in the mean knowledge score between males (mean = 2.0, SD 1.4) and females (mean = 1.9, SD 1.3) ( $t = -0.169$ ,  $p = .866$ , 95% CI = -0.33 to 0.28). However, students who had attended the research methods in nursing course (mean = 2.3, SD 1.2) did significantly better on the EBP knowledge test than students who had not (mean = 1.8, SD 1.4) ( $t = -3.13$ ,  $p = .001$ , 95% CI = -0.77 to -0.19). The Kurskal-Wallis test was used to compare the EBP knowledge test score distribution between variables with two or more

groups (students' academic level and university). The ANOVA test was not used because of the violation of assumption of equal groups. The result showed no significant difference in the total score with regard to students' academic level ( $H(2) = 2.61, P = .455$ ) or university ( $H(3) = 0.913, P = .634$ ).

## Discussion

This study demonstrated that student nurses had a low level of knowledge of EBP. The mean total knowledge score was low, and students seemed to have no knowledge at all of the principles of critical appraisal. This result was lower than previously reported results (AbuRuz et al., 2017; Brown et al., 2010; Jalali-Nia et al., 2011). This can be explained by the fact that the movement toward EBP in Jordan is still at an early stage, and hence not all undergraduate nursing programmes curricula yet have EBP content or training. Usually, the teaching of EBP and its related skills such as research critique are reserved for postgraduate studies. Hence, nursing faculties are advised to integrate EBP-related knowledge in the undergraduate nursing curricula. The EBP approach also need to be used in teaching the theoretical and clinical courses. Jalali-Nia et al. (2011) tested the use of this approach in teaching selected nursing topics compared to the classical teaching method, using a quasi-experimental design. A significant improvement in students' attitudes towards EBP in the treatment group was noted (Jalali-Nia et al., 2011). However, the results of study are limited by the design and very small sample size ( $n = 41$ ). Different methods can be used to improve knowledge among students, for instance one study used a journal club for this purpose (Camilla, 2013). A total of 216 qualified and 235 student nurses were subjected to multiple journal club sessions and their experience evaluated using a semi-structured interview. Student nurses found the sessions effective in improving their skills in using the EBP approach, such as the ability to search for evidence, appraise its quality and implement it within clinical practice (Camilla, 2013), although they reported that the EBP approach was

challenging and needed to be taught as early as possible in their undergraduate study. This is because using the EBP approach in clinical practice needs not only knowledge but also practising it, which has equal or more importance than knowledge alone (Camilla, 2013). Overall, improving students' knowledge and skills in the use of EBP during their undergraduate study is paramount (Hickman et al., 2018). Further research to evaluate the suitability of the content of nursing programme curricula for the movement toward evidence-based nursing practice is urgently needed (Zeleníková et al., 2014). Such research might investigate the content of courses, faculty knowledge, attitudes and competencies in EBP. This would form a baseline assessment to set a plan to enhance future nurses' knowledge and competencies related to EBP, in the hope of improving quality of care and patients' related clinical outcomes.

As already stated, most of previous work on knowledge of EBP was conducted among working nurses or masters students rather than undergraduates. This has restricted the comparison of the results of the current study with the previous work. In addition, a considerable number of EBP questionnaires is available, with varying content. These questionnaires usually measure knowledge and attitudes on a Likert-type scale rather than objective measures. Knowledge tests might be better in giving an objective indicator of EBP knowledge level. Also, integration of the evaluation of competencies could compensate for the bias of self-reported measurement and increase the validity of the results (Camilla, 2013). Developing a standard tool to evaluate students' knowledge of EBP would increase the value of research conducted among this population and allow comparisons of the results across studies from different parts of the world, to enhance and accelerate the international movement toward evidence-based nursing practice (Zeleníková et al., 2014).

Students who attended the research methods in nursing course had significantly better knowledge of EBP than those who did not. The research course strengthens the students'

ability to read, comprehend and apply the results of nursing research. It also enables them to conduct research to provide evidence wherever needed. However, it seems that such courses were not enough to supply nurses with the adequate knowledge and skills of EBP. In this context, it was reported that students' ability to comprehend statistical analysis, evaluate the quality of research and disseminate research results predicted greater competency in EBP (Blackman and Giles, 2017). Hence, nursing curricula should either include more focused content about EBP or include a separate EBP course. Previous studies have tested the effectiveness of separate courses on EBP for postgraduate students, but not undergraduates (Hickman et al., 2018). These courses, although few, have been found to be effective in honing nurses' knowledge and skills in implementing EBP into clinical practice (Hickman et al., 2018). Further research using a randomized clinical trial design on this issue is needed.

Finally, the results of this short survey should be read and utilized in the light of the following limitations. First, this was an online survey, so students without Internet access were unable to participate; they may have different levels of knowledge from students who participated. Second, the knowledge measurement used in this study was presented as a test, which may put students under exam stress and affect their response. Third, this tool was developed for the purpose of this study, and further psychometric testing might be needed. Fourth, this study included students from first and second years who had not yet enrolled in the research methods course, which might affect the results. However, statistical analysis showed no significant differences in the mean of total knowledge score regarding students' academic level.

## **Conclusions**

This study demonstrated that student nurses had poor knowledge of EBP. An evaluation of EBP-related content in nursing schools' curricula is needed in order to design and test the effectiveness of implementing an EBP course in improving knowledge and skills. Critical appraisal and evidence synthesis skills should be honed as they are seen to be very weak, with much room for improvement. Undergraduate nursing programmes plans needs to be revisited to incorporate EBP approach within its various content. Meanwhile, research courses could be the mainstay for a nursing faculty to introduce the EBP approach for undergraduate nurses. Further, short courses about EBP for registered nurses through the continuous education department are also are recommended to develop and hone nurses` knowledge and skills of EBP approach.

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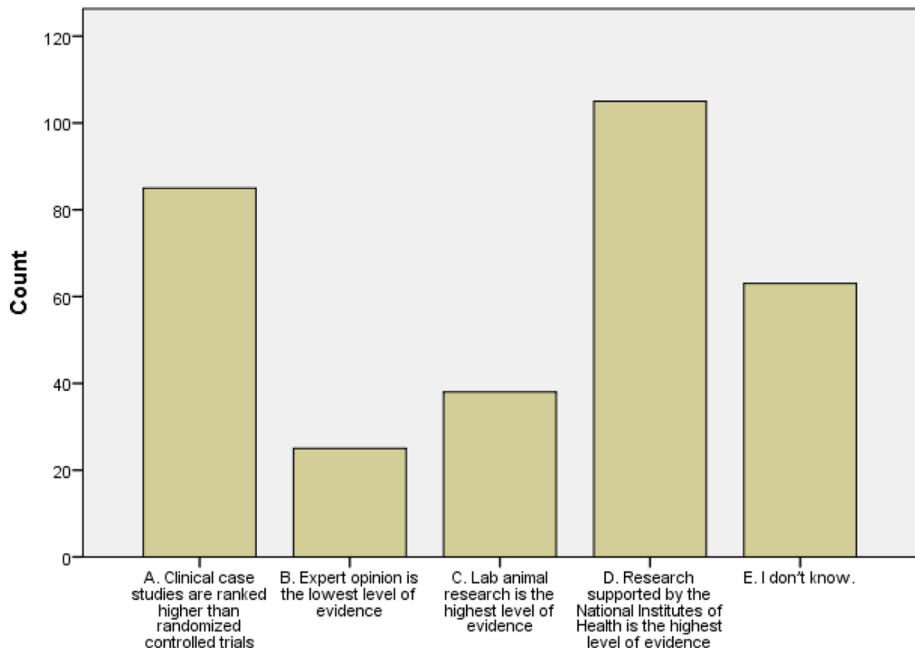
**Figure 1:** Frequency of students answers on question number 1**Table 1: Students Characteristics (n= 316)**

<b>Characteristic</b>	<b>Frequency (%)</b>
<b>Gender</b>	
Male	164 (51.9)
Female	152 (48.1)
<b>Student level</b>	
First year	33 (10.4)
Second year	29 (9.2)
Third year	101 (32.0)
Fourth year	153 (48.4)
<b>Have you enrolled in the Research Methods in Nursing course?</b>	
Yes	135 (42.7)
No	181 (57.3)
<b>University</b>	
University A	190 (60.1)
University B	77 (24.4)
University C	49 (15.5)



Table 2 Students Correct Answers on the EBP Knowledge Test (n= 316).

Question	Correct answers
	Frequency (%)
1- Published reports on treatments can be ranked with respect to the strength of the evidence. Which one of the following is the <b>most correct statement</b> with respect to ranking of evidence? ( <b>Expert opinion is the lowest level of evidence</b> ).	25 (7.9)
2- In judging the quality of the Nursing literature, which one of the following is the highest level of evidence? ( <b>Cochrane Review of Nursing or health topic</b> ).	46 (14.6)
3- If you were conducting a PubMed search to answer a clinical question pertaining to a patient, which one of the following would be the least productive search strategy? ( <b>Limit search to current year</b> ).	60 (19.0)
4- Which statement is the most accurate with respect to the number of subjects in a clinical trial? ( <b>If data are obtained from a large sample, an investigator can be confident that findings are clinically meaningful</b> ).	89 (28.2)
5- Which of the following statements best describes a PICO? ( <b>Process for converting a clinical problem into questions that can be answered by searching for evidence</b> ).	76 (24.1)
6- The least clinically useful EBP resource on the internet is? ( <b>Journal article on a clinical topic</b> ).	56 (17.7)
7- A statistical process that quantitatively pools the results of several research studies into one analysis is known as a: ( <b>Meta-analysis</b> ).	51 (16.1)
8- Which of the following is the most appropriate study design to .A evaluate the efficacy of a new diagnostic device for assessment of a selected health problems? ( <b>Blind comparison with a gold standard</b> ).	33 (10.4)
9- Evidence-based practice (EBP) is defined as: Integrating... ( <b>best research evidence with clinical expertise and patient values into clinical practice</b> ).	99 (31.3)
10- The stronger level of evidence indicates: ( <b>Greater confidence that the intervention is effective</b> ).	94 (29.7)
* Statements in bold and between brackets are the correct answers, see appendix for full version of the questionnaire	



**1. Published reports on treatment can be ranked with respect to the strength of the evidence. Which one of the following is the most correct statement with respect to ranking of evidence?**

Figure 1