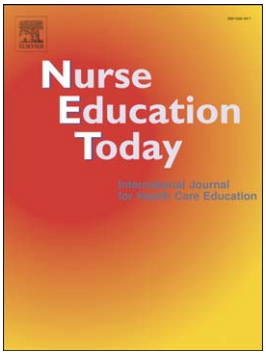

Effectiveness of an evidence-based practice course (EBP) on the EBP competence of undergraduate nursing students: A quasi-experimental study

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Title page

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Abstract

Background: International Nursing Institutions and experts recommend evidence-based practice (EBP) as a core component of the curriculum for nurses. However, the impact of EBP training on the competence of undergraduate nursing students remains unclear.

Objectives: To evaluate the effectiveness of an EBP course on the EBP competence undergraduate nursing students'.

Method:

Design: Quasi-experimental study carried out in non-randomized intervention and control groups.

Settings: The study was conducted in a Spanish public university in 2010.

Participants: Out of 420 second- and third-year nursing students, 75 enrolled in the EBP course, forming the intervention group, and 73 not enrolled in this course were recruited as controls.

Procedure: The educational intervention was a 15-week course designed to teach EBP competence. The EBP Competence Questionnaire (EBP-COQ) was administered before and after the intervention. Repeated-measure ANOVA was used to compare intervention and control group scores before and at two months after the 15-week intervention period.

Results: At two months after the EBP course, mean EBP-COQ scores of the intervention group were significantly improved *versus* baseline in attitude (4.28 vs. 3.33), knowledge (3.92 vs. 2.82) and skills (2.75 vs. 4.01) dimensions, whereas little change was observed in control group scores over the same time period. Repeated-measures ANOVA revealed a significant effect of Time x Group interaction on global competence and all three EBP-COQ dimensions.

Discussions: Undergraduate nursing students experience positive changes in EBP competence, knowledge, skills, and attitude as the result of a 15-week educational intervention on EBP. This EBP course may provide nursing school educators and policymakers with a useful model for integrating EBP teaching within the nursing curriculum.

Keywords: evidence-based practice, nursing education research, Baccalaureate Nursing Education, curriculum

INTRODUCTION

Evidence-based practice (EBP) is an instrument of great utility in nursing care, helping to reduce health costs (McGinty and Anderson, 2008) and variability in clinical practice, furthermore to improve the quality of nursing care practice (Parker, 2002) and health outcomes (Meijers et al., 2006). It is also reported to increase the satisfaction of nursing professionals (Maljanian, et al., 2002).

The acquisition of evidence-based practice (EBP) competence is regarded as important to ensure that the decisions of healthcare practitioners are based on the best available evidence (Frenk *et al*. 2010). A consensus meeting of international EBP experts affirmed the need for all healthcare professionals to understand, recognize, and implement evidence-based policies and to have a critical attitude towards their own practice and towards evidence in order to deliver best practice (Dawes et al. 2005). EBP has been declared as a professional responsibility and central characteristic of the work of nurses by the International Council of Nurses (ICN, 2007).

Nevertheless, the incorporation of EBP into clinical nursing has been slow and remains a challenge to the profession. In a recent survey by the American Nurse Association, only 46.4% of nurses believed that EBP was routinely applied in their center (Melnyk, et al., 2012), while a European study found that only 24% of nurses could be described as users of research (Wangensteen, et al., 2011). It should be taken into account that many nurses were trained before the EBP paradigm was established and lack the skills for its application. Moreover, nurses have reported numerous difficulties in implementing EBP in their daily work (Sadeghi-Bazargani, et al. 2014).

Melnyk, et al. (2008) proposed two requirements for accelerating the adoption of EBP in clinical practice: (a) the acquisition by practicing nurses of adequate EBP knowledge and skills and strong beliefs in the clinical value of EBP, and (b) the development by nursing students of life-

long skills for EBP implementation and the motivation to deliver the highest quality of care. Also, Brown, et al. (2010) showed that preparation of future nurses to engage in evidence-based practice is essential to provide the cost-effective, safe, and highest quality care and best outcomes for patients.

Hence, educators of nursing students have a major responsibility in this paradigm shift in nursing. On leaving university, nursing graduates are expected to be consumers of research, understand research procedures, identify relevant clinical problems in need of research, collaborate in research teams, and apply evidence-based research in clinical practice (American Association of Colleges of Nursing, 2006; American Nurses Association, 2010). Achievement of these objectives requires an improvement in the EBP competence of health science students, i.e., in their attitudes towards this practice and in their EBP knowledge and skills (Dawes et al. 2005).

Framework and Background

In this educational setting, competence is understood to be the capability to choose and use an integrated combination of attitudes, knowledge, and skills with the intention of developing a task in a given context (Korthagen, 2004). According to the Classification Rubric for EBP Assessment Tools in Education (CREATE), *attitudes* refer to the values ascribed by the learner to the importance and usefulness of EBP to inform clinical decision-making, *knowledge* refers to the learner's retention of facts and concepts about EBP (e.g., the ability to define EBP concepts, list the basic principles of EBP, and describe levels of evidence), and *skills* refer to the application of knowledge, ideally in a practical setting (Tilson et al. 2011).

Various strategies have been proposed for the incorporation of EBP into undergraduate nursing education. Burns and Foley (2005) suggested its inclusion in the first year to foster an EBP approach to clinical practice, while others supported its introduction at a later stage after training in research methods (Dawley, et al., 2001). Fineout-Overholt, et al. (2015) emphasized the

importance of organizational support, the identification of barriers to EBP teaching, and the utilization of faculty EBP mentors. Approaches to EBP and the degree of its implementation vary among countries and educational settings, but there is wide consensus on the need for nursing students to become well equipped as effective consumers of research (Ciliska, 2005). Melnyk, et al. (2010) described seven steps in the EBP process: (a) cultivation of a spirit of inquiry; (b) formulation of an answerable question; (c) systematic search for research evidence; (d) appraisal of the validity, relevance, and applicability of the evidence; (e) integration of the research evidence with the clinical expertise of the practitioner and the wishes and desires of the patient/family; (f) implementation of the evidence-based decision and evaluation of the outcomes; and (g) dissemination of the results.

Review of literature

The literature on EBP in university nursing education has generally centered on teaching methodologies, mainly describing models developed in North America such as ARCC-E (advancing research and clinical practice through close collaboration and education) (Fineout-Overholt, et al. 2015); the TRADE EBP model (Krainovich-Miller, et al., 2009), and the SON (School of Nursing) ladder for success in EBP (Bloom, et al., 2013).

However, few studies have evaluated the most effective approach (Smith-Strøm and Nortvedt, 2008; Kim, et al., 2009; Jalali-Nia, et al., 2011; Zhang, et al., 2012; Finotto et al. 2013). Although available data are inadequate to allow valid conclusions to be drawn, positive results have been reported with the utilization of interactive teaching (Kim et. al 2009) and self-directed learning (Zhang et al. 2012), although there was no control group in the latter study. Good results have also been claimed for curricular models developed in Norway (Smith-Strøm and Nortvedt, 2008), Iran (Jalali-Nia et al. 2011), and Italy (Finotto et al. 2013), although there was no control group in the studies in Norway or Italy, the questionnaire used in Norway was not validated, and those

applied in Iran and Italy evaluated very specific aspects of the EBP course, limiting results generalization (Jalali-Nia et al. 2011, Finotto et al. 2013).

EBP teaching to healthcare professionals has mainly been documented in medical students and physicians (Young, et al., 2014; Ilic and Maloney, 2014). There is a special need for further research on EBP teaching to undergraduate students of nursing (Moch et al. 2010), for whom the optimal approach remains under debate (Ilic and Maloney, 2014).

With the above background, the aim of this study was to evaluate the effectiveness of an EBP course for undergraduate nursing students on their EBP competence, measuring changes in their EBP attitudes, knowledge, and skills.

Methods

Design

A prospective, quasi-experimental study was performed in a non-randomized intervention group of nursing students who attended an EBP course and a control group of nursing students who did not. EBP competence scores were compared between the groups and between before and after the six-month study period in each group.

Sample/Settings

The target population comprised the 420 students enrolled in the second or third year of their Nursing Degree at a Public University in Spain during the Spring term in 2010. Based on the estimations of Bausell and Li (2002) for a two-way mixed ANOVA design (between-subject factor: EBP intervention yes/no, within-subject factor: repeated measures), a sample size of 53 students was required to achieve statistical power of 80% and 95% confidence to detect a standardized mean difference of 0.55 between intervention and control groups. Calculation of the standardized mean difference considered a minimum difference of 0.22 points in the EBP-COQ score and an estimated standard deviation of 0.40, taken from a study of the EBP-COQ in

Spanish nursing students (Ruzafa-Martinez, et al., 2015). The sample size was increased (see below) to cover possible losses to follow-up.

Procedure

It was not possible to randomly assign students to the groups, because the EBP course was offered to all second- and third-year students as one of the "free options" in the curriculum. The exclusion criterion for all study participants was an existing or previous enrolment in an EBP course. Out of the target population of 420 students, 75 eligible students enrolled in the EBP course, forming the intervention group, while 73 eligible students agreed to participate in the control group.

In both groups, EBP competence (attitude, skills, and knowledge) was measured at baseline and again at two months after the 15-week intervention period using the Evidenced-Based Practice Competence Questionnaire (EBP-COQ). This was first completed by the students during the meeting in which they were enrolled in the study. The follow-up questionnaire was administered by e-mail; non-responders were contacted a maximum of three times.

The educational intervention

The 15-week educational intervention took place in the Nursing School of a Spanish Public University during the Spring term in 2010; it comprised 60 hours in class plus 90 hours of student work, with a minimum attendance requirement of 80%. All students had already attended courses in biostatistics (in first year) and epidemiology (in first term of second year). Table 1 displays the structure, methodology, content, and assignments of the course, which focused on the first four steps of EBP described by Melnyk et al. (2010) and listed above.

An EBP expert conducted theoretical classes to groups of 37-38 students, which were subdivided into seminar groups of 18-19. A variety of learning strategies were adopted, including theoretical

classes, practical classes with access to computers, peer group discussions in small groups, individual work, team work, and oral presentation of a final project. The new skills and knowledge developed in the course included the formulation of clinical questions, search of databases, and statistical interpretation, using examples from the literature. The grade for the subject was based on a final examination and on scores obtained for assignments throughout the course.

Instrument, validity and reliability / Rigor

The primary study outcome measure was the change in the EBP competence of students, i.e., in their knowledge, skills and attitudes toward EBP. This was measured by using the EBP-COQ, a validated Spanish-language instrument specifically developed to evaluate the self-perceived EBP competence level in nursing students (Ruzafa-Martinez, et al., 2013).

The questionnaire (global score) evaluated the competence in EBP, and consists of 25 items, which are organized in a three-factor structure. Factor 1: Attitude toward EBP (13 items), for example: "The nursing contract should include time to read scientific papers and make critical appraisal of them", Factor 2: Skills in EBP (6 items) for example: "I feel able to make a clinical question to start the searching of the best scientific evidence", and Factor 3: Knowledge in EBP (6 items) for example: "I know the different evidence level of the designs of the investigation studies".

All items of the instrument are scored on a Likert-type scale of 1- 5, with a higher score indicating more self-perceived competence in EBP, greater self-perception of knowledge and skills in EBP, and more positive attitudes towards the EBP.

Cronbach's alpha for the global questionnaire was 0.888, and the value for each factor was 0.940 for attitude toward EBP, 0.756 for EBP skills, and 0.800 for EBP knowledge. (Ruzafa-Martinez et al., 2013).

The survey also gathered demographic data and information on any previous training in EBP and on other studies. In addition, students were asked to rate their journal reading habits.

Ethical considerations

We conducted our study in compliance with the principles of the Declaration of Helsinki. The administrators/teachers responsible for the nursing students were informed that participation in the study was completely voluntary. The students were informed of nonprejudicial treatment of those who decline to participate or who withdraw from the study after agreeing to participate. Verbal informed consent was obtained from all participants, and the questionnaires were identified by numeric codes to ensure confidentiality. No identifying information was sought from respondents, and so their anonymity was guaranteed.

The study was approved by the university ethics review board, which allowed the informed consent to be verbal because it was witnessed by university teachers.

Data analysis

The baseline characteristics of the intervention and control groups were compared by using the chi-square test for categorical variables and the independent-sample t-test for continuous variables. A repeated-measures ANOVA was used to compare scores between the intervention and control groups before and after the EBP course, evaluating changes in knowledge, skills and attitudes and determining the main and interaction effects of Time and Group on the outcome measures. Partial eta-squared values were calculated as a measure of effect size (Thompson, 2006). $P \leq 0.05$ was considered statistically significant. SPSS 20 (IBM Inc, Chicago, IL, USA) was used for the data analyses, which were performed by a single statistician blinded to the group membership of participants.

RESULTS

Recruitment commenced in February 2010. The follow-up questionnaire was completed by 59 (78.7%) of the 75 students in the intervention group and by 61 (83.6%) of the 73 students in the control group. Table 2 exhibits the baseline characteristics of the participants and the two groups did not significantly differ in demographic or educational variables.

Outcome measures

Table 3 exhibits the mean values (with 95% confidence intervals) obtained at baseline and at two months after the intervention period. At the baseline mean scores for attitude towards EBP (3.84 vs. 3.33) and EBP skills (3.20 vs. 2.75) were significantly lower in the intervention group than in the control group. The control group showed only small changes in questionnaire results between the two time points (3.84 vs. 3.92 for attitude towards EBP, 2.51 vs. 3.01 for EBP knowledge, 3.20 vs. 3.49 for EBP skills, and 3.37 vs. 3.62 for global EBP competence). In contrast, the scores of the intervention group were significantly higher at two months after the end of the course than at baseline (4.28 vs.3.33. for attitude, 3.92 vs.2.82 for EBP knowledge, 4.01 vs. 2.75 for EBP skills, and 4.11 vs. 3.06 for global EBP competence).

Table 4 reports the results of the repeated-measures ANOVA [Group (intervention and control) x Time (pre and post)], showing the effect of the EBP course on outcome measures in comparison to the control group. The EBP-COQ global score and all dimension scores were significantly improved after the course (Table 4). Repeated-measures ANOVA measures showed that the Time x Group interaction was significant ($p<0.0001$) for global competence and the three EBP-COQ dimensions, indicating the benefit of the EBP course over time. Table 4 also shows the partial eta^2 values for global competence and the three dimensions. According to these values, 67.5% of the variance in global competence scores was accounted for by Time, 1.2% by Group, and 44.2% by Time x Group interaction; similar values were obtained for each EBP-COQ dimension.

DISCUSSION

Following experts' recommendations to evaluate the teaching of EBP (Hatala and Guyatt 2002), in our study a control group was included and a validated and psychometrically robust tool was used to measure EBP competence in undergraduate nursing students, that involved to assess attitude toward EBP, knowledge and skills in EPB. This implies that our study reduces the typical limitations in educational researches and provides stronger evidence in this area.

Under these methodological considerations our research has demonstrated that second- and third-year nursing students, participation in an EBP course integrated within the curriculum significantly improved their global EBP competence, attitudes towards EBP, and EBP knowledge and skills. After the course the global competence in EBP, attitude and knowledge have changed around 1 point, what in the EBP-COQ scale means a 20% of increase, and in the skills in EBP the increased was 1.26 points, around a 25%.

There has been little published research on EBP teaching interventions in undergraduate nursing students (Aglen, 2015). Anyways, we can observe that the improvement in EBP knowledge and attitude achieved by the present course is in line with reports in various settings using different methodologies. Both knowledge and attitudes were significantly enhanced when EPB was integrated into the teaching of musculoskeletal and gastrointestinal systems (Jalali-Nia et al., 2011). Also, a self-directed learning approach during clinical practice was reported to significantly improve EBP knowledge, attitudes/beliefs, and behavior in undergraduate nursing students, although the absence of a control group limited the validity of the findings (Zhang et al. (2012). It should be noted that the positive impact on attitude has not always been observed. An interactive teaching strategy in partnership with clinical preceptors was reported to improve the EBP knowledge of nursing students but not their attitudes towards this practice (Kim et al. 2009). Similar results were found in another study in registered nurses (Ramos-Morcillo, et al., 2015).

Although, we have not found any experimental study in undergraduate nursing students that assess EBP skills to compare ours, the positive effect of this type of educative intervention in skills such as formulating clinical questions, searching relevant literature and critical appraisal skills, has been demonstrated in healthcare professionals (Young, et al. 2014).

Previous educative interventions have also been for one term and the contents have generally been similar to those in the present course (Kim et al. 2009, Zhang et al. 2012, Jalali-Nia et al. 2011), focusing on the aforementioned first four steps of EBP (Melnyk *et al.* 2010). Unlike in our model, EBP training was incorporated into clinical practice sessions in the studies by Kim et al. (2009), Zhang et al. (2012) and Oh et al. (2010), but without obtaining superior results to those obtained in the present study.

Our learning methodology contained some elements of the interactive strategy employed by Kim et al. (2009) and Liou, et al. (2013), based on seminars for discussions in small groups with peers and teacher. In EBP courses for medical students, better outcomes were reported with this approach in comparison to problem-based learning (Ilic et al. 2014). Also, our course included multiple interventions strategies such as lectures, computer lab sessions, small-group discussions and assignments, that have demonstrated more likely to improve knowledge, skills and attitudes compared to single interventions offered over a short duration or to no interventions (Young, et al. 2014).

Implications for nursing educators and clinical practice

Some authors have argued that EBP should be incorporated in all health care courses to run parallel with the clinical experience of learners (Ciliska, 2005; Krainovich-Miller et al. 2009; Bloom et al. 2013; Fineout-Overholt, et al. 2015). However, the present model is particularly appropriate in settings without the resources for such a comprehensive approach, especially in relation to the provision of clinical practice for nursing students.

Our experience supports the need for students to learn basic epidemiology and statistics before taking a specific EBP course, which is facilitated by statistical knowledge and contextualizes it in a critical framework, investing it with greater meaning and relevance for the students (Dawley et al. 2001, Ciliska 2005).

In the academic year following this study, the present course was included in the compulsory 4th-year (the new final year) curriculum for nursing undergraduates at our institution, in response to proposals of the European Space for Higher Education (Zabalegui et al. 2006) and based on this initial experience.

The greatest barrier to EBP implementation is a lack of knowledge and skills in finding and understanding research reports and data (Hutchinson and Johnston 2004). We assessed the impact of our course in terms of its effects on the EBP knowledge, skills and attitudes of students, a widespread approach (Nabulsi et al. 2007). Other outcomes of interest in courses for healthcare professionals include changes in clinical behavior and decision-making and in patient outcomes (Fineout-Overholt, et al. 2015). Further research is also warranted into the potential of students to promote EBP among practicing nurses by acting as role models, as suggested by Cronje and Moch (2010).

Limitations

One limitation is the non-randomized design of the study; however, no differences in demographic or educational data or in EBP knowledge were found between the groups at baseline. Before the course, EBP skills and attitudes were lower in the intervention group, which may in part explain their choice of this learning option. These differences do not influence the results of the repeated-measures analyses, in which each student acted as his/her own control (Winer, 1971). Also, we could presume that the students that choose to take the EBP course have a difference aptitude toward EBP, and that could influence their results.

EBP competence was not evaluated in an objective manner but according to the perceptions of the students, although McCluskey and Lovarini (2005) argued that objective measurement instruments are limited by the possible learning effect of the repeated administration of outcome measures. In fact, various authors have demonstrated a good correlation between self-reported and objective assessments of EBP competence (Taheri et al. 2008).

CONCLUSIONS

Our findings contribute sound empirical evidence on the incorporation of EBP as a stand-alone course into the nursing curriculum and its effectiveness. Undergraduate nursing students increase their EBP knowledge, skills, and attitudes as a result of a specific 15-week educational intervention. It is expected this could impact in nurses´ practice and, ultimately, the quality of health care and outcomes for patients.

We offer educators and policymakers a relatively inexpensive but effective model for improving EBP competence in nursing students.

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TABLE 1. Description of the Evidence-Based Practice (EBP) Course

CLASS HOURS PER STUDENT	WORKING HOURS PER STUDENT	METHODOLOGY	CONTENT	ASSIGNMENT
WEEKS 1-2 10	10	THEORETICAL CLASS	• Introduction to EBP. • The significance of EBP in the development of nursing science • General Concepts: - Nursing variability - Steps of the EBP - Magnitude, validity, bias • Hierarchy of evidence and Grades of recommendation	• Study of the contents with documentary and reference resources
WEEK 3 5	5	SEMINAR	• Clinical question formulation using the PICO format	• Formulate a Clinical PICO question
WEEKS 4-5 5	10	SEMINAR	• Designing and conducting the search for evidence in multiple evidence databases • Evidence search hierarchy: -meta search engine: Trip Database, Epistemonikos, Evidence Portal, Evidence Search, Exploraevidencia - ONLINE DATABASES OF CLINICAL PRACTICE GUIDELINES: NGC, NICE, SIGN, RNAO, Guiasalud -Systematic reviews databases: Cochrane Library, JBI, CRD •Search strategies: -controlled vocabulary (thesaurus/mesh), keywords, boolean operators, limit function •Searching databases: PubMed/Medline, CINAHL, PsycINFO®, SciELO	• Identify clinical practice guidelines, a systematic review, and an original study on the PICO question • Describe the search hierarchy for the clinical question. • Detail the search strategies (controlled vocabulary, keywords, limit function and Boolean operators)
WEEKS 6-11				

30	50	SEMINAR	• Studies design: Cross-sectional, case-control, cohort, controlled trial, systematic review, Clinical Practice Guidelines - How to evaluate the evidence (critical appraisal using CASP tools, AGREE II) - Applying the evidence to a patient care decision	• Each week the students must read and critically appraise a paper (in total 6 documents) using CASP tools and AGREE II. • Discussion of the paper in groups (up to 5 students) • Presentation and discussion in a seminar with the teacher.
WEEKS 12 – 15				
10	15	SEMINAR	- Final exercise in a clinical scenario	• In groups of up to 5 students, they must: identify a nursing problem in patients cared for during clinical training; formulate a clinical PICO question; identify clinical practice guidelines, systematic reviews and/or original articles; critically appraise search results; describe recommendations on the clinical question, and identify the level of evidence and grade of recommendation. • Present the results of the final exercise in a poster to the seminar group, giving reasons for implementation of the search results.

TABLE 2. Comparison of demographic and educational data between control and intervention groups

	Control Group	Intervention Group	P value
Sex	**N (%; 95%CI)**	**N (%; 95%CI)**	
Male	10 (16.4; 6.3-26.5)	12 (20.3; 9.2-31.4)	
Female	51 (83.6; 73.4-93.7)	47 (79.7; 68.5-90.7)	**0.577**
Age	**Mean (SD; 95%IC)**	**Mean (SD; 95%IC)**	
	22.52 (6.51; 21.2-24.8)	20.39 (2.85; 19.6-21.1)	**0.114**
Nursing academic year	**N (%; 95%CI)**	**N (%; 95%CI)**	
Second year	57 (93.4; 86,4-100)	54 (91.5; 83.5-93.4)	
Third year	4 (6.6; -0,4-13.6)	5 (8.5; 5.2-16.4)	**0.690**
Previous EBP training	**N (%; 95%CI)**	**N (%; 95%CI)**	
None	47 (79.7; 68.5-90.7)	49 (84.5; 74.3-94.6)	
40 hours or less	5 (8.5; 0.5-16.4)	6 (10.3; 1.6-19)	
More than 40 hours	7 (11.9; 2.7-20.9)	3 (5.2; -1.4-11.7)	**0.422**
Number of scientific journals consulted in previous month	**N (%; 95%CI)**	**N (%; 95%CI)**	
None	24 (41.4; 26.2-52.4)	25 (43.9; 28.9-55.8)	
One or more journals	34 (58.6; 45-72.2)	32 (56.1; 42.3-70)	**0.565**
Other studies	**N (%; 95%CI)**	**N (%; 95%CI)**	
None	48 (78.7; 67.5-90)	47 (79.7; 68.5-90.7)	
Technician qualification	7 (11.5; 2.6-20.3)	11 (18.6; 7.8-29.4)	
Other university degree	6 (9.8; 1.5-18.1)	1 (1.7; -2.4-5.8)	**0.109**

N = number of students

SD = Standard Deviation

95%CI = 95% Confidence Interval

TABLE 3. EBP competence (measured by EBP-COQ Ruzafa-Martinez et al., 2013) across the domains of attitude, knowledge and skills for control and intervention groups

	Control Group		Intervention Group	
	Baseline	**Follow-up***	**Baseline**	**Follow-up***
	N=61	**N=61**	**N=59**	**N=59**
	Mean (95%CI)	**Mean (95%CI)**	**Mean (95%CI)**	**Mean (95%CI)**
EBP Competence	3.37 (3.25-3.50)	3.62 (3.51-3.73)	3.06 (2.93-3.19)	4.11 (4.01-4.22)
Attitude	3.84 (3.65-4.03)	3.92 (3.80-4.05)	3.33 (3.14-3.52)	4.28 (4.16-4.41)
Knowledge	2.51 (2.32-2.71)	3.01 (2.87-3.15)	2.82 (2.62-3.02)	3.92 (3.77-4.06)
Skills	3.20 (3.01-3.38)	3.49 (3.32-3.65)	2.75 (2.56-2.94)	4.01 (3.85-4.18)

N = number of students; 95% CI = 95% Confidence Interval; *Follow-up at 2 months after the intervention period.

TABLE 4. Main effects of Time and Group and interaction effects on outcome measures

Outcome measure[(a)]	**Effects**	**df**	**F**	**P value**	**Partial Eta^2**
Attitude toward EBP	Time	1	64.900	<0.001	0.355
	Group	1	0.645	0.424	0.005
	Time*Group	1	45.562	<0.001	0.279
EBP Knowledge	Time	1	88.767	<0.001	0.429
	Group	1	46.417	<0.001	0.282
	Time*Group	1	12.728	<0.001	0.097
EBP Skills	Time	1	83.723	<0.001	0.415
	Group	1	0.189	0.664	0.002
	Time*Group	1	32.583	<0.001	0.216
EBP Competence	Time	1	244.952	<0.001	0.675
	Group	1	1.478	0.226	0.012
	Time*Group	1	93.467	<0.001	0.442

[(a)] Calculated from EBP-COQ questionnaire

df = degrees freedom; F = Fisher-Snedecor distribution

Highlights

- EBP competence in nursing students has been measured with a validated tool
- The intervention consist of a stand-alone course focusing in the first 4 steps of EBP
- The EBP course increased the nursing students' EBP attitude, knowledge and skills
- Skills in EBP are the domain that increases most of all
- We model the introduction of EBP into the nursing curriculum