Author's response to reviews

**Title:** Development and validation of the Competence in Evidence Based Practice Questionnaire [EBP-COQ] among nursing students

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**Author's response to reviews:** see over
Dear Reviewers,

Thank you for reading our manuscript and reviewing. We revised our manuscript, and quite a lot of changes have taken place. So we have sent the revised version that contains all the changes to be visible.

Dr. M. Ruzafa-Martinez

At the following, the points mentioned by the reviewers will be discussed:

Reviewer 1:
Minor essential revisions related to editing.

1. Is the question posed by the authors well defined? YES
   No change required.

2. Are the methods appropriate and well described? YES
   No change required.

3. Are the data sound? I think so
   No change required.

4. Does the manuscript adhere to the relevant standards for reporting and data deposition? YES, it may be a little long
   No change required.

5. Are the discussion and conclusions well balanced and adequately supported by the data? YES
   No change required.

6. Are limitations of the work clearly stated? YES
   No change required.

7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished? I know this literature well and the authors did a very good job with their description of the literature and the significance of this work
   Thank you for your comment and evaluation.

8. Do the title and abstract accurately convey what has been found? I wondered about the need to describe undergraduate competency
   Words limits in the abstract do not allow extended explanation of concepts. However, in order to clarify undergraduate competency meaning we have added in the Abstract these lines: “Nursing educators need rigorously developed instruments to assess competency in evidence based practice (EBP) at undergraduate level. This concept is defined as the capability to choose and use an integrated combination of knowledge, skills and attitudes with the intention to
develop a task in a certain context. Also, we understand that EBP is gaining knowledge and skills, as well as much as increasing positives attitudes toward EBP that will promote a change in behaviour to implement EBP in practice”.

9. Is the writing acceptable? Some editing is needed
An English language expert has reviewing the whole manuscript.

Level of interest: An article of outstanding merit and interest in its field
Thank you for your comment and evaluation.

Quality of written English: Needs some language corrections before being published
An English speaker has revised the manuscript.

Statistical review: Yes, but I do not feel adequately qualified to assess the statistics.
No change required.

Reviewer 2
The manuscript provides an overview of the development of a questionnaire to evaluate the competency in evidence based practice (EBP) for nursing students. My biggest query centres on how the authors define the assessment of competency in EBP. In certain aspects of the paper, the EBP-COQ tool gives the impression that it will assess all aspects of EBP competency (knowledge, skills, attitudes, behaviour), whilst toward the end it is defined as assessing self-perceived competency – these are two different aspects.

As the reviewer affirms, the EBP-COQ tool assesses the 3 dimensions of the EBP competency (knowledge, skills, and attitudes). This is the theoretical framework that it has used to develop the items. Finally, these 3 dimensions are found in the analyses carried out. In other hand, the tool and the items have been written to get self-perceived competency. As we remark in the Introduction page 4: “At nursing area the published questionnaires are used to evaluate self-perceived competency in EBP for registered nurses”. To be more consistent and accurate in this point, in the text we have added “self-perceived” when it was necessary.

The following suggestions may further improve the manuscript -

Major Compulsory Revisions Abstract Background
- It is stated that EBP competency is divided into 3 components (attitudes, skills and knowledge). I would suggest that behaviour must also be included (see Tilson 2011: http://www.biomedcentral.com/content/pdf/1472-6920-11-78.pdf) EBP is as much as gaining knowledge and skills, as it is as much as increasing positives attitudes toward EBP that will promote a change in behaviour to implement EBP in practice. One can have the knowledge and skills, but if they possess negative attitudes toward EBP, then it won’t be implemented (behaviour).

We appreciate this comment and suggestion. We have read very carefully the paper that the reviewer has recommended. We agree with this, totally. And we have included this reference in our manuscript. So, we have added this statement in the Abstract background: “Nursing educators need rigorously developed instruments to assess competency in evidence based practice (EBP) at undergraduate level. This concept is defined as the capability to choose and use an integrated combination of knowledge, skills and attitudes with the intention to develop a task in a certain context. Also, we understand that EBP is gaining knowledge and skills, as well as much as increasing positives attitudes toward EBP that will promote a change in behaviour to implement EBP in practice.”
Manuscript Introduction
- In the 3rd paragraph the authors describe competency as the acquisition and development of knowledge, attitudes and skills in EBP. Please refer to my comments about behaviour as an essential criterion for EBP competency as per the abstract.

As the reviewer suggests we have added this statement and the reference number 7 in the 3rd paragraph: Tilson et al. remark the significance of this concept “EBP is gaining knowledge and skills, as well as increasing positives attitudes toward EBP that will promote a change in behaviour to implement EBP in practice” [7]. Also, this reference has been used to point out other statements in the Discussion, like “...previous studies have been able to demonstrate the importance of this dimension as a predictor of a positive behavioral toward resource utilization after following educational interventions [7,32].”

- The term competency is commonly used but can be interpreted differently across disciplines. How is competency in EBP attained in the nursing field? Does it incorporate a process similar to Miller’s pyramid (knows, knows how, shows how, does)? If so, does the EBM-COQ evaluate these steps in achieving competency in EBP?

We indicate in the Discussion that the definition of the EBP competence that we use to develop the tool it is defined by the European Tuning Nursing Project (Nursing Tuning Project. 2004. Available in: http://www.unideusto.org/tuningeu/competences/specific.html) and the technical statements from the Nursing Curricula.

This shows the relevance of using the concept of competences as a basis for learning outcome. Competences are obtained or developed during the process of learning by the student/learner. In other words: Competences represent a dynamic combination of knowledge, understanding, skills and abilities. Fostering competences is the object of educational programmes. Competences will be formed in various course units and assessed at different stages.

The Nursing Tuning Project for the harmonization of Nursing Degrees in European High Education Level publishes a set of competencies to be developed by the learner in nursing studies. The Nursing Tuning Project recommends as a professional and academic competence “utilize research and development to develop evidence-based nursing and nursing activities” (Nursing Tuning Project, 2004). In Spain, from this new framework the National Government has determined a revision of the curricula, the teaching model and a definition of the competences in most of the degrees, included health care sciences (nursing, medicine, etc.). In the new Nursing Degree (four-year programme) one of the academic competencies is related to the utilization of “Evidence-based Practice (EBP)” in the clinical decision-making. The intention is that nursing graduates be able to manage knowledge translation efficiently and to distinguish useful evidence from less useful information. And, at the end that the new professionals are able to assess, apply and integrate new knowledge and have the ability to adapt to changing circumstances throughout their professional life (RD 2003, Spanish Ministry of Education).

We appreciate the reviewer recommendation, however, at the moment, our questionnaire (EBP-COQ), as other similar, only is able to assess the self-perceived knowledge “know” and understand “knows how”. We will try to incorporate the Miller’s pyramid in the following studies, but, other kind of tools is necessary. Brad Cheek mentions that “Shows how” level should be assessed by practical examinations, observed long or short cases, or OSCE style examinations. And, the only way to assess level 4, “does”, is to observe the practitioner at work in the real world. In other words this measures our ability to perform. (Available in: G:\Artículos\2012\EBP-COQ\BMC Medical Education\EVALUACION-REVISION\The Miller pyramid and prism.mht).
- On page 4 the authors state that several questionnaires have been adapted from the medical context to suit the nursing context. Can you please reference them and provide a brief comment on their limitation/s.

In order to clarify this point, we have added the next paragraph: “Several other questionnaires have been adapted from medical context. One of them is the questionnaire adapted by Watters et al. [12] from the McColl et al. [20] Evidence Based Medicine instrument. Watters et al. didn’t mention the reliability and validity results from the questionnaire adaptation. Other example of the use of medicine instruments to study the EBP in nursing is the one written by Brown et al. [13] based in the Johnston et al. [5] “KAB Questionnaire”. In this case, it was focused in United Stated nursing students from different academic years, and the authors didn’t make any adaptation of the items to the nursing context.”

Methods
- Can you please provide the completed search strategy used.

We have completed the information about search strategy: “In phase one, a review of the literature was carried out by searching for papers and questionnaires related to the measurement of competence (attitude, knowledge and skills) in EBP. Scientific databases (PubMed, CINAHL, INDEX, EMBASE, Scielo and PsychInfo) were consulted looking for research published between 1990 and 2011. General descriptors were employed, “evidence” AND “based” AND “attitud*” OR “competenc*” AND “scale” OR “test” AND “measure*” OR “psychometr*” AND “student*” AND “teach*” AND “knowledge*” AND “skills*”. Educational and pedagogical publications were also reviewed. The search was limited to English and Spanish language. Types of papers selected were those describing instruments that measure nursing/medicine students, nurses’ or other health care workers’ competence about evidence-based practice. Reference lists of articles investigating this topic were also examined. The searching period began in September 2006 and ended in February 2012.”

- A total of 34 questionnaires were reviewed. Can you provide some detail on why the articles not listed in Table 1 were excluded? Do the articles used in Table 1 differ significantly from the review by Shaneyfelt, since their review returned more than 34 tools.

From the total of the articles obtained we selected the ones with items related to the study aim. The excluded articles didn’t provide substantial information to elaborate the new instrument.

The review of Shaneyfelt was important for this investigation but our focus was in the self-perception of the EBP competences in nursing students. Only a few questionnaires reviewed by Shaneyfelt were directly related to our study aim. This reason made us to select other questionnaires not included in the Shaneyfelt SR to elaborate our own instrument.

- Can you provide some background information on the six experts in EBP? (i.e. what makes them an expert?)

The EBP experts are researchers and clinicians that their principal research area is Evidence Based Practice or Health Sciences Research Method. Also, all of them work part time as associate professor at Nursing or Medicine Degree. So, they have long experience in the area, minimum 10 years. Some of them have experience in the development of tools and have relevant research lines in nursing care.

- Under data analysis the authors dedicate one sentence to what seems to be the thematic analysis of the focus groups. Can you please provide further details on this analysis.

What it thematic analysis?
Boyatzis (1998) characterises thematic analysis not as a specific method but as a tool to use across different methods. Similarly, Ryan and Bernard (2000) locate thematic coding as a
process performed within ‘major’ analytic traditions (such as grounded theory), rather than a specific approach in its own right. One of the benefits of thematic analysis is its flexibility. Thematic analysis provides a flexible and useful research tool, which can potentially provide a rich and detailed, yet complex account of data. A thematic analysis typically focuses exclusively or primarily on one level so, the research team supposed that to get our study objective (development of a questionnaire), it was a good method for analysing focus groups.


**How many researchers performed the analysis?**
Two researchers from the team performed the analysis.

**How was consensus reached?**
Each researcher made a thematic analysis of the data, and coded them for a quite specific concepts of EBP that has been extracted from the literature (believes, feelings, knowledge, implementation, usefulness, practice). A consensus was reached by checking the concepts and themes in relation to the coded extracts and the entire data set.

**Was data saturation reached by performing only 2 focus groups?**
The purpose of the study determines how many focus groups are needed and who should be invited to each one. In our case, initial instrument development, as well as adaptation of existing instruments, for use with different populations necessitates identifying appropriate items for inclusion. There are no recommendations about an adequate number of focus group for this objective, so the research team, based in the characteristics of the population (undergraduate nursing students at University level), previous research team experience and other studies, considered that two focus groups were sufficient for the purpose of refining the items on the instruments, as well as generating additional ones. We explain in the manuscript that **two focus groups were carried out in order to develop the items. This method allowed us to explore and identify relevant aspects of EBP for nursing students. We also extracted words and expressions that could be useful for refining and creating items on the questionnaire.**

Also, in order to get accurately information from the focus groups, we taken care of getting a focus group homogeneous in terms of one or two desired characteristics, the group must also include enough diversity in other characteristics to provide an accurate portrayal of the group’s collective opinion. As, we comment in the manuscript, Method section: **The students were selected to maximize sample variation on criteria judged as likely to influence competence in EBP. The first group consisted of undergraduate nursing students who had studied EBP in their nursing programme as an optional course (n=8) and the second consisted of nursing students who had not studied this matter (n=8). Also, each group was consisted of students with different characteristics like gender, age and job experience. The goal was to build in enough variation for contrasting ideas but not so much that participants are inhibited and defer to those they perceive to be more experienced or knowledgeable on EBP.**

In order to clarify what thematic analysis means, in Data Analysis Section we have added: **For the focus groups, all references to EBP competence were coded by two researches. Each researcher made a thematic analysis of the data, and coded them for a quite specific concepts of EBP that has been extracted from the literature (believes, feelings, knowledge, implementation, usefulness, practice). A consensus was reached by checking the concepts and themes in relation to the coded extracts and the entire data set.**
Discussion
- The first paragraph of the discussion states – “All items of the instrument are scored on a Likert-type scale of 1-5, with a higher score indicating more competence in EBP, greater self-perception of knowledge and skills in EBP and more positive attitudes toward EBP.”

Given this statement, and the structure of the EBP-COQ, I’m not certain that the instrument measures actual competency, rather self-perceived competency. A measure of self-perceived competence in knowledge and skills cannot be a reliable estimate for actual competency of knowledge and skills. For example, the Berlin and Fresno instruments can differentiate competency in EBP knowledge and skills in novice, intermediate and expert users – I’m not certain that the EBP-COQ can. Additionally, self-perceived competency should be interpreted with caution, since it does not translate to actual competency (see Lai 2011: http://www.biomedcentral.com/1472-6920/11/25)

We agree with this appreciation, and we are grateful for the suggestion and the reference. To be more consistent and accurate in this point, in the text we have added “self-perceived” term in the first paragraph of the Discussion: “This paper described the development and psychometric evaluation of a questionnaire designed to explore nursing undergraduate students’ self-perceived competence in EBP”; “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,...”.

Minor Revisions
Manuscript
Introduction
- It wasn’t clear to me what the last sentence in the 1st paragraph added; “Finally, CBE assessment focuses on competencies.”
As this sentence did not add any singular information, it has been deleted.

- The new nursing degree is described. Is this 4 year program consistent across all programs in Spain?
In Spain all the Nursing Degree have 4 year program, without exception. We have to follow a law that regulates the Medicine and Nursing Degrees.

Discussion
- The authors cite the Sicily Consensus Statement on EBP under the ‘implications’ heading. I would suggest also referring to the Sicily statement on classification and development of evidence-based practice learning assessment tools (Tilson 2011: http://www.biomedcentral.com/content/pdf/1472-6920-11-78.pdf)
As the reviewer suggests we have added this reference at this point.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.
Declaration of competing interests:
I declare that I have no competing interests.
Other comments:
Provide specific name of the ethics committee which approved the study.
In the Methods section we have added: “The study was approved by the Research Ethics Committee at University of Murcia”.