



## Teaching evidence-based practice (EBP) in nursing curricula in six European countries—A descriptive study

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### ABSTRACT

**Background:** Teaching evidence-based practice (EBP) in nursing education

varies among nurse educators and universities. Lack of nurses' knowledge and skills are among the barriers commonly associated with the limited use of EBP in practice.

**Objectives:** To describe the presence, characteristics and content of courses of EBP in nursing bachelor's, master's, and PhD programs in six European countries.

**Design:** A descriptive study design was employed.

**Settings:** The study was implemented as part of the EBP e-Toolkit Project as a strategic partnership of six European higher education institutions from six countries in the framework of the Erasmus+ Programme.

**Participants:** Census sampling ( $N = 225$ ) was used. A total of 162 (72%) faculties responded from the following countries: Spain (79), Italy (44), the Czech Republic (15), Poland (12), Greece (7), and Slovenia (5).

**Methods:** Three structured instruments were developed by using the consensus development panel. The research was conducted from December 2018 to March 2019. For names of subjects, a manual narrative Template Analysis was used with open descriptive coding.

**Results:** Subjects in "EBP in Nursing or Health Care" are included in 45 (29.2%) bachelor's programs, mostly worth 180 European Credit Transfer System (ECTS) credits, 30 (28%) master's, and 6 (40%) PhD programs. In bachelor's programs, an average of 134 h are spent teaching EBP steps, followed by 127 h in master's programs and 52 h in PhD programs. EBP subjects have different focuses: clear topics in EBP, development of research knowledge, awareness of the need for evidence-based clinical work, and understanding the needs of the profession.

**Conclusions:** Teaching EBP is not yet sufficiently integrated into nursing curricula. For more efficient integration, guidelines on the standardization of teaching approaches and content have to be developed in all three cycles of higher education. Further research is needed on the implementation of teaching at master's and PhD levels of nursing curricula.

### 1. Introduction

Evidence-based practice (EBP) ensures that health care employs optimal evidence from quality studies and integrates it with patient needs, values and clinician expertise (Melnyk and Fineout-Overholt, 2019). Methods and teaching strategies for enhancing EBP knowledge and skills among nursing students have been described extensively

(Aglen, 2016); however, research evidence shows that nurses are not properly trained to apply EBP and do not use it often enough (Kyriakoulis et al., 2016; Skela-Savič et al., 2016, 2017; Horntvedt et al., 2018). Melnyk et al. (2018) focused on EBP competences for nurses (RN, ANP) and found that nurses, according to their own estimate, were not competent in any of the 24 EBP competences. The authors recommend that academic programs ensure nursing students'

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competency in EBP by graduation and that healthcare systems set it as an expectation and standard for all clinicians (Melnyk et al., 2018).

International nursing institutions and experts recommend EBP as a core component of nursing curricula (Satu et al., 2013; Ruzafa-Martínez et al., 2016). The European Higher Education Area (EHEA) framework specifies expected learning outcomes for bachelor's degree candidates, including skills in finding, evaluating, referring and applying scientific information (Lahtinen et al., 2014). In its technical guide for member states, the World Health Organization sets the fourth priority area as "Promoting evidence-based practice and innovation" and declares that "evidence-based practice is every nurse's and midwife's concern. It should be enabled by means of education, research, leadership and access to evidence sources" (WHO, 2015). As the European Union Directive 2005/36/EC (EU, 2005) became updated and the competences in its revised version 2013/55/EU (EU, 2013) became clearly defined, EBP knowledge became mandatory in undergraduate nursing education throughout Europe. It should be stressed that as many as 44 out of 46 countries included in the European Higher Education Area comply with the European Union Directive 2005/36/EC in an effort to harmonize minimum nursing education requirements (Lahtinen et al., 2014). For these reasons and as a result of the Bologna Process which has driven the implementation of nursing education in Europe during the last decade, there is a need for further efforts by nurses at policy level to reach an agreement on the requirements and standards for nursing education and educators across Europe (Humar and Sansoni, 2017).

EBP is a relatively young discipline of nursing. There is no European framework for EBP competency and no guidelines for EBP teaching methods which is why a consensus should be reached among European countries on this issue (Ruzafa-Martínez, 2019). Currently, there is a lack of baseline data on the provision of EBP teaching in European nursing programs. As international literature reveals, teaching EBP in nursing education varies among nurse educators and universities; moreover, clinical preceptors may have insufficient knowledge to support students (Ryan, 2016). In addition, not all faculties have knowledge in EBP or quality improvement (Dols et al., 2017).

Inadequate education and knowledge are among the barriers commonly associated with lack of EBP use in practice (Saunders and Vehviläinen-Julkunen, 2017; Skela-Savič et al., 2016, 2017). Systematic curriculum design with multiple teaching strategies and links with the clinical practicum is required (Horntvedt et al., 2018). Research evidence revealed that different EBP education programs were effective in improving the knowledge, skills, attitudes, competences, and future use of EBP among nursing students (Finotto et al., 2013; Ruzafa-Martínez et al., 2016; Kim et al., 2019). Well-designed curricula require imagination, creativity, and an effort from both theoreticians and clinical faculty. Designing projects applicable to the clinical site provides an avenue for students to engage in EBP while demonstrating the achievement of course learning outcomes (Keiffer, 2018).

### 1.1. Aim and goals

The aim of the study was to describe the presence, characteristics and content of EBP courses in nursing study programs (bachelor's, master's, and PhD cycles) in six European countries.

## 2. Methods

### 2.1. Research design

A mixed-methods design was adopted, including descriptive cross-sectional and descriptive qualitative research methods.

### 2.2. Settings and sample

The study was implemented as part of the EBP e-Toolkit Project as a strategic partnership of six European higher education institutions from

**Table 1**  
Number of faculties and nursing study programs included in the study.

Country	Faculties			Nursing study programs in sample		
	Invited faculties		Responded faculties	First cycle (BSc/BA)	Second cycle (MA)	Third cycle (PhD)
	N	n	%	n	n	n
Czech Republic	15	15	100	15	9	4
Greece	10	7	70	7	7	0
Italy	48	44	91.7	39	24	3
Poland	16	12	75	11	12	5
Slovenia	8	5	62.5	5	7	3
Spain	128	79	61.7	77	48	0
<i>Total</i>	<i>225</i>	<i>162</i>	<i>72</i>	<i>154</i>	<i>107</i>	<i>15</i>

the Czech Republic, Greece, Italy, Poland, Slovenia, and Spain in the framework of the Erasmus+ Programme. This is a EU program in the fields of education, training, youth and sport for the period 2014–2020 (EU, 2013). EBP e-Toolkit Project seeks to promote and harmonize the teaching and learning of EBP in the European nursing curricula (Ruzafa-Martínez, 2019).

The study sample consisted of the faculties where nursing study programs were taught at any of the three cycles of higher education (bachelor's/master's/doctoral programs) in the six project partner countries. The unit of analysis were the number of nursing programs in bachelor's, master's, and PhD programs. Each partner used a national updated census ( $N = 225$ ) that included the total number of faculties offering nursing degrees. Vocational nursing schools were excluded. Faculties were included from Spain (128), Italy (48), Poland (16), the Czech Republic (15), Greece (10), and Slovenia (8). Each project institution was responsible for inviting nursing faculties in their country. A total of 162 (72%) faculties provided data (Table 1). Country characteristics of study programs in all three cycles of higher education are shown in Table 2.

### 2.3. Instrument

Three structured instruments were developed with the consensus development panel—a highly structured meeting to gather information from relevant experts about a given issue. We followed the recommendation that panels consist primarily of experts in a given field who are presented with literature and data, making this particular method more reliant on evidence-based opinions rather than personal experience (Waggoner et al., 2016). The experts were project partners (12 in total) with an average experience of ten years in teaching and research on EBP in nursing programs in the three cycles of higher education. Two rounds of on-line discussions were implemented, followed by comments on the proposals of questionnaires. Questions were divided into bachelor's (14 closed-ended questions), master's (12), and PhD cycles (14) and determined whether study programs included stand-alone EBP subjects/modules or subjects incorporating EBP-related content, number of subjects, teaching hours, ECTS credits awarded for such subject (Table 2), and who was teaching the subject. Five items belonged to the types of study programs in each cycle of higher education (Table 2). Seven steps of EBP in nursing (Melnyk and Fineout-Overholt, 2019) were employed to determine the level and content of EBP included in study programs (Table 4). Each questionnaire also included open-ended questions for names of stand-alone EBP subjects and for subjects in which EBP was incorporated into another subject (Tables 3 and 5). Most questionnaires were available in English, and some also in the language of the expert (Italy, Spain). The face validity of the instruments was tested at nine faculties according to

**Table 2**  
Main characteristics of study programs included in three cycles of higher education by countries.

	Bachelor's degree in nursing (n = 154 study programs)					Master's degree in nursing (n = 107 study programs)				PhD in nursing (n = 15 study programs)		
	Professional nursing programs BSc n (%)	Academic nursing programs BA n (%)	3-year programs, 180 ECTS (%)	4-year programs, 240 ECTS n (%)	Programs with EBP subject (yes) n (%)	Subjects with EBP content n	1-year program, 60 ECTS n (%)	2-year program, 120 ECTS n (%)	Programs with EBP subject (yes) n (%)	Subjects with EBP content n	Programs (3 or 4 years) n (%)	Programs with EBP subject (yes) n (%)
Czech Republic	15		15		9	10		9	2	6	4	3
Greece		7		7	2	14		7	3	7		
Italy		39	39		19	5		24	5	9	3	
Poland		11	11		1	11		12	3	12	5	
Slovenia	5		5		2	3		7	3	1	3	3
Spain		77		77	12	145	45	3	14	24		
$\Sigma$ (%)	20 (13)	134 (87)	70 (45.5)	84 (54.6)	45 (29.2)	188	45 (42.1)	62 (57.9)	30 (28)	59	15 (100)	6 (40)

Note: n = number of answers, BSc = Professional Bachelor BA = Academic Bachelor, ECTS = European Credit Transfer and Accumulation System, EBP = Evidence-Based Practice.

recommendations by Sousa and Rojjanasrirat (2011). Small modifications were made for the Spanish and Italian versions, while the English version was not altered.

2.4. Data collection and analysis

The research was conducted from December 2018 to March 2019. To ensure the maximum response, personal e-mails were sent to the dean and the teachers in charge of the nursing program at each institution, using a template letter to invite faculties to complete the online questionnaire. Three reminders were issued in case no response was received. Partners adhered to their approval processes for collecting data and reported the obtained information. Ethical approval was not required since all data were categorized as public. The anonymity and confidentiality of data were ensured. We followed the directions of Stiles et al. (2011) for appropriate ethical use of administrative data for research purposes. That is, ensuring that the data and their limits are well understood so that the interpretation of findings is adequately informed. Furthermore, several actions were taken to prevent a potential conflict of interest. Data collection and results were monitored by the Quality Committee of the Erasmus Project. The Committee consists of internal and external researchers and ensures the transparency of the process and strict adherence to research ethics policies.

Quantitative data were analysed using statistical software SPSS 22. We used descriptive analysis, chi-squared test ( $\chi^2$ ), independent t-test, and ANOVA. Statistical significance was set at the  $p < 0.05$  level. For written qualitative data of the names of subjects, a manual narrative

Template Analysis (Polit and Tatano Beck, 2010, pp. 464) was used. A content frame was developed (Gomm, 2008), focusing on open descriptive coding of written qualitative data on the names of subjects with EBP content.

3. Results

A total of 162 faculties provided data; 149 (91.98%) of these were part of universities. Of the 276 nursing programs analysed, 55.8% belonged to the first cycle of higher education (bachelor's degree), followed by 38.8% and 5.4% from the second (master's degree) and third (doctoral degree) cycles, respectively (Table 1). Participation was high and comparable in all countries, although the figures between countries vary due to size differences.

3.1. Bachelor's degree in nursing

A total of 154 first-cycle nursing programs were included; of these, 20 had the status of a professional bachelor's program and 134 of an academic bachelor's program. Three-year study programs worth 180 ECTS were offered by 70 faculties, and four-year programs worth 240 ECTS by 84 faculties (Table 2).

3.1.1. Courses on EBP—bachelor's nursing programs

Subjects or modules in "EBP in Nursing or Health Care" (abbr. EBP/BSc) are offered in 45 bachelor's programs (Table 2), mostly worth 180 ECTS ( $\chi^2 = 12.920$ ;  $p < 0.001$ ). Only 29 faculties provided information on the number of EBP/BSc subjects ( $M = 1.31$ ,  $SD = 0.66$ ). The

**Table 3**  
Qualitative content analysis for names of EBP subjects in bachelor's nursing programs.

	Themes
Content categories for stand-alone EBP subjects (n = 21)	
Evidence-based nursing (n = 7 subjects)	Subjects with clear topics in EBP in nursing and health care
Nursing practice and evidence-based nursing (n = 2)	
Research in nursing (n = 4)	Basic and conditional subjects to understand EBP in nursing and health care
Research and evidence-based practice in nursing (n = 3)	
Nursing and science (n = 4)	Basic subjects to understand the needs of the profession
Nursing care (n = 1)	
Content categories for EBP content which is part of another subject (n = 71)	
Different clinical subjects in nursing care (n = 20)	Subjects aimed at developing the awareness that clinical work needs to be evidence-based
Nursing as theory and science (n = 14)	
Sociology subject with healthcare content (n = 8)	
Research methods (n = 20)	Subjects aimed at developing research knowledge
Statistics and biostatistics (n = 5)	
Bachelor's thesis (n = 4)	

Note: n – number of subjects with comparable content.

most bachelor's programs with subjects/modules in EBP/BSc are offered in the Czech Republic (64.30%), followed by Italy (48.72%), Slovenia (40%), Greece (33.33%), Spain (15.59%), and Poland (9.09%).

A total of 40 obligatory subjects/modules in EBP/BSc were established, mostly in the second study year ( $n = 16$ ; 40%), followed by the third ( $n = 10$ ; 25%), fourth ( $n = 8$ ; 20%), and first ( $n = 6$ ; 15%) years. The average number of contact hours was 50 (SD = 48), the individual student workload was 55.1 h (SD = 32.8), and the number of online learning hours was 6.13 (SD = 9.4). On average, the subject was worth 3.5 ECTS (SD = 2.4). From 38 answers, it can be inferred that the subject EBP/BSc is taught mainly by nurses with a PhD (50%) or a master's degree (41.1%), and publications in the field. A total of 21 different names for the subject EBP/BSc were established. Open descriptive coding of the names of subjects revealed six content categories from which three themes were developed for stand-alone EBP subjects (Table 3).

EBP content was incorporated into 188 subjects at the bachelor's level, with an average of 49.59 (SD = 66.02) contact hours and 2.6 (SD = 2.19) subjects per faculty. As many as 76 different names of subjects including EBP content were found. We identified 71 subjects with open descriptive coding of the names of subjects; subsequently, six content categories and two themes were developed for EBP content which is part of another subject (Table 3).

### 3.1.2. EBP description and content in bachelor's nursing programs

Information was collected on the content and contact hours for each of the seven steps of EBP in nursing (Melnyk and Fineout-Overholt, 2019). The average number of contact hours per step was 19.50, and the sum of the average hours for all steps was 136.48; most hours are spent teaching steps 0, 3 and 4 (Table 4). The highest average number of hours taught was in the Czech Republic (M = 35.97; SD = 22.31). Programs worth 180 ECTS include, on average, more hours per EBP step (M = 32.92; SD = 23.46) compared to programs worth 240 ECTS (M = 4.73; SD = 5.52) ( $F = 13.696$ ;  $p = 0.002$ ). Programs worth 180 ECTS (M = 230.46; SD = 164.19) include more hours for all seven steps compared to programs worth 240 ECTS (M = 33.10; SD = 38.62) ( $t = 3.701$ ;  $p = 0.002$ ).

### 3.2. Master's degree in nursing

A total of 86 faculties offering 107 master's nursing programs participated, with 1–4 programs per faculty on average (M = 1.35, SD = 0.69). Of those, 45 were one-year programs and 62 were two-year programs (Table 2).

#### 3.2.1. Courses on EBP—master's nursing programs

Only 30 master's programs offer subjects/modules on “EBP in Nursing or Health Care” (abbr. EBP/MA), 11 EBP/MA subjects were part of programs worth 60 ECTS and 17 part of programs worth 120 ECTS. The average number of subjects/modules was 1.86 (SD = 1.27); most study programs have one such subject ( $n = 18$ ). The most subjects/modules on EBP/MA are offered in Greece and Slovenia (42.86%), followed by Spain (29.17%), Italy (29.16%), Poland (25%), and the Czech Republic (22.22%). Twenty subjects (76.92%) were obligatory and six (23.08%) were elective. Master's programs with obligatory EBP/MA subjects are offered in Spain ( $n = 11$ ), Italy ( $n = 5$ ), Slovenia ( $n = 3$ ), and the Czech Republic ( $n = 1$ ).

The average number of contact hours for an EBP/MA subject was 34.68 (SD = 20.71), individual students' workload was 91.72 h (SD = 58.70), the average number of online learning hours was 15 (SD = 13.06), and the average number of ECTS awarded was 5.07 (SD = 3.12). According to countries, Greece awarded 11 ECTS (SD = 4.24), Slovenia 9 (3.61), Italy 4.4 (SD = 2.07), Spain 4.39 (SD = 1.71), the Czech Republic 3 (SD = 0), and Poland 2 (SD = 0). Mostly, EBP/MA subjects were taught by nurses with a PhD and

**Table 4**  
Steps of evidence-based practice by Melnyk and Fineout-Overholt (2019) in nursing study programs in all three cycles of higher education.

Steps	Bachelor's degree in nursing (n = 154)			Master's degree in nursing (n = 107)			PhD in nursing (n = 15)		
	Presence of step <sup>a</sup> (Yes)	Direct contact hours M (SD)	Presence of step <sup>a</sup> (Yes)	Direct contact hours M (SD)	Presence of step <sup>a</sup> (Yes)	Direct contact hours M (SD)	Presence of step <sup>a</sup> (Yes)	Direct contact hours M (SD)	
Step 0 - Cultivate a spirit of inquiry within an EBP culture and environment	87	17.04 (25.72)	57	8.98 (10.55)	3	0 (0)			
Step 1 - Ask the burning clinical question in the format that will yield the most relevant and best evidence (i.e. PICOT format)	80	10.87 (18.60)	65	9.43 (11.89)	4	0.42 (1.0)			
Step 2 - Search for and collect the most relevant and best evidence to answer the clinical question (e.g. searching for systematic reviews, including meta-analyses)	88	13.89 (20.44)	62	15.13 (22.76)	5	12 (7.21)			
Step 3 - Critically appraise the evidence that has been collected for its validity, reliability, and applicability, then synthesize that evidence	93	15.54 (17.58)	59	15.34 (19.46)	7	9.6 (9.40)			
Step 4 - Integrate the evidence (A) with one's clinical expertise and the patient's preferences and values to implement a clinical decision (B)	51	18.83 (26.49)	39	14.00 (20.16)	4	4 (1.41)			
Step 5 - Evaluate outcomes of the practice decision or change based on evidence	36	9.68 (10.24)	32	12.44 (16.01)	4	4 (1.41)			
Step 6 - Disseminate the outcomes of the EBP decision or change	51	12.76 (20.77)	32	18.42 (22.97)	6	8.5 (8.54)			
M (SD) per step		19.50 (22.29)		18.08 (19.94)		7.43 (0)			
Σ M hours for all steps		136.48 (156.05)		126.59 (139.61)		52 (0)			

Note: n = number of answers, M = mean, SD = standard deviation.

<sup>a</sup> Presence of step in study program.



**Table 5**  
Qualitative content analysis for names of EBP subjects in master's nursing programs (N = 71).

	Themes
Content categories of EBP as a stand-alone subject	
Evidence-based nursing (n = 4)	Evidence-based practice in nursing and healthcare—Subjects with clear topics in evidence-based nursing and health care
Evidence-based practice (n = 6)	
Evidence practice in clinical work (n = 5)	
Critical reading and systematic review (n = 3)	
Research methods (n = 10)	Research methods in nursing and health care— Subjects aimed at developing research knowledge at the master's level
Research and evidence-based practice/nursing (n = 2)	
Medical statistics (n = 1)	
Master's thesis (n = 1)	
Process in healthcare (n = 3)	Basic subjects to understand the needs of the profession—Subjects aimed at raising the awareness for evidence in clinical work
Clinical subjects (n = 7)	
Content categories for EBP content which is part of another subject	
Research methods content (n = 11)	Subjects for developing research knowledge
Deep research knowledge (n = 6)	
Master's thesis (n = 5)	Subjects for developing scientific literacy
Writing research papers (n = 6)	
Clinical subjects with EBP content (n = 25)	Use of EBP through different nursing viewpoints
Steps of EBP (n = 8)	
Nursing development (n = 4)	
Nursing and needs of society (n = 7)	
Content categories of master's program names	
Nursing (general) (n = 3)	Master in nursing as a science and profession
Research and nursing (n = 5)	
Evidence-based nursing (n = 2)	
Advanced clinical master in nursing (n = 29)	
Public health master (n = 5)	Public health master
Health and social science master (n = 11)	
Population care-based master (n = 7)	
Management in health and social care (n = 5)	
Nursing and midwifery (n = 1)	Inter-professional master

Note: n – number of subjects with comparable content.

publications in the field (84.60%). Open descriptive coding of the names of subjects was used to analyse 40 subject titles; subsequently, ten content categories and three themes were developed for stand-alone EBP subjects (Table 5).

In 62 (72.1%) master's programs, EBP content is part of another subject (n = 72) and is covered, on average, in 110.70 (SD = 243.29) hours, those hours are distributed among 2.35 (SD = 1.71) subjects. With open descriptive coding, eight content categories and three themes were developed (Table 5). In terms of the names of nursing master's programs, a wide variety was established. We analysed 71 names of subjects, and developed nine content categories and three common themes for EBP content which is part of another subject (Table 5).

### 3.3.2. EBP description and content in master's nursing programs

The average number of contact hours for each of the seven steps of EBP in nursing was 18.08, the sum of hours for all steps was 123.59 (Table 4). Most hours are used to teach step 6, followed by steps 3, 2 and 4. The highest average number of hours taught was in the Czech Republic (M = 41.64; SD = 15.10), and the lowest in Spain (M = 4.47; SD = 2.03). Data were not obtained for Greece, Poland, and Slovenia. Programs worth 120 ECTS have, on average, more hours taught per EBP step (M = 25.83; SD = 21.17) compared to programs worth 60 ECTS (M = 3.88; SD = 1.43) (F = 6.244; p = 0.025).

### 3.3. PhD in nursing

Faculties in four countries (the Czech Republic, Italy, Poland, Slovenia) replied to items on PhD programs. Among them, they offer 15 doctoral study programs. Six (37.5%) of them are three-year programs worth 180 ECTS, and nine (56.3%) are four-year programs worth 240 ECTS (Table 2).

### 3.3.1. Courses on EBP—doctoral nursing programs

Only six faculties (37.5%) from the Czech Republic and Slovenia have subjects or modules on “EBP in Nursing or Health Care” as part of their doctoral study programs (EBP/PhD). The average number of subjects/modules was 1.6 (SD = 0.51). EBP/PhD subjects are the same in the first and second years. Two study programs from Slovenia and three from the Czech Republic contain an obligatory EBP/PhD subject. The average number of contact hours for an EBP/PhD subject was 34 (SD = 40), individual student workload was 154 h (SD = 129), there were no online learning hours, and the average number of ECTS awarded was 8 (SD = 4.5). Educators were nurses with a doctoral degree and publications in the field (100%). In doctoral programs (n = 7) which cover EBP content as part of another subject, EBP received an average of only 13 (SD = 18) hours.

Participating faculties have five different names for doctoral nursing programs. Two common themes were developed for the names of these programs: 1) PhD in Nursing as a Science and a Profession, 2) PhD in Healthcare Sciences. Content analysis was conducted for the names of subjects which faculties indicated as being EBP/PhD. Only two names were established: Evidence-Based Nursing (n = 2), and Evidence-Based Practice in Nursing (n = 1).

### 3.3.2. EBP description and content in doctoral nursing programs

On average, seven steps of EBP in nursing are covered in 7.43 h (SD = 4.1). Faculties do not pay attention to step 0, all other steps have a low number of hours, lower than in master's and bachelor's cycles (Table 4). The sample was too small to enable explorative statistics.

## 4. Discussion

To our knowledge, this is the first study developed in Europe revealing updated data on EBP teaching in three cycles of nursing curricula. Our results show that EBP teaching varies between and within

countries, but in the majority of participating countries, EBP is integrated in different ways into bachelor's and master's study programs. EBP content is mainly included as part of subjects that incorporate only some of its concepts, or as a stand-alone course. Similar results were found in Asia at the baccalaureate level (Hung et al., 2015; Song et al., 2019), while in Australia, 71% of education providers offer combined subjects on research and EBP with major emphasis on research concepts and methodologies (Malik et al., 2015).

At the bachelor's level, two types of subjects which include EBP content in other subjects exist: those aimed at emphasizing that clinical work has to be evidence based, and those aimed at developing research knowledge. The first group teaches EBP through clinical practice subjects, facilitating the development of EBP skills, and includes nursing theory subjects that focus on the critical reflection of EBP conceptualization. The second group of subjects incorporates EBP into specific research courses, as a natural adaptation of this content to traditional curricula. Modern curricula should not focus only on how to conduct research but also on how to apply evidence (Melnyk and Fineout-Overholt, 2019).

Stand-alone EBP courses are the second option to teach EBP. Only 30% of bachelor's nursing programs offer stand-alone EBP courses, grouped as follows: 1) clear EBP topics, 2) a mixture of research and EBP, and 3) the basic subjects aimed at understanding the needs of the profession. Stand-alone EBP courses have been effective in improving the knowledge, skills, attitudes, competences, and future use of EBP among nursing students (Kim et al., 2019) and increase EBP competency among undergraduate nursing students (Ruzafa-Martínez et al., 2016), which could represent a good starting point.

In baccalaureate programs, more than half of EBP subjects are obligatory and taught in the second or third years. Other researchers explain this with the need for students to learn basic epidemiology and statistics before taking a specific EBP course (Kyriakoulis et al., 2016; Kim et al., 2019). Stand-alone EBP course might be appropriate after taking up nursing research in the third or fourth years of the undergraduate nursing program (Kim et al., 2019). On average, students have 50 contact hours, 50 h of workload, and spend 6 h learning online, all worth approximately 4 ECTS. Based on a 20-h EBP course, Kim et al. (2019) saw an improvement in knowledge, skills, attitudes and competences.

On average, faculties report that bachelor nursing students receive almost 137 direct contact hours on the seven EBP steps by Melnyk and Fineout-Overholt (2019). It is surprising that programs worth 180 ECTS have more hours covering the seven steps compared to programs worth 240 ECTS. We could not explain this. Steps to which the most hours are allocated are step 0, 3, and 4. A systematic review found that EBP contents at the bachelor's level focus on how to deepen students' understanding of the second and third stages of EBP; students also learn how to judge the strength of evidence, discriminate between single studies and reviews, and learn to evaluate and develop clinical guidelines (Aglen, 2016). However, our results pointed out that, congruent with expert recommendations (Melnyk and Fineout-Overholt, 2019), time at this level is also devoted to introducing basic concepts and discussing the importance of EBP.

Courses at bachelor's and also master's levels are taught by nurses with a PhD or a master's degree and publications in this field, making them competent to teach EBP. Having educators who master EBP is crucial to adopting EBP into nursing curricula (Orta et al., 2016).

There is a paucity of empirical evidence supporting the best strategies of developing EBP skills and/or research knowledge translation skills for master's nursing students (Hickman et al., 2018). There is no consensus on the best educational methodology for teaching EBP in master's programs. In the EEUU, a 13-week face-to-face EBP course in the second year (Kesten et al., 2019) and a 16-week online course in the first year (Rojjanasrirat and Rice, 2017) resulted in an improvement in master's nursing students EBP competency. We found two types of master's study programs: a one-year and two-year program. The names

of the master's study programs have three different focuses (nursing, public health, inter-profession). Only 30 study programs have stand-alone EBP subjects with different focuses (EBP, research knowledge, awareness of the need for EBP). A total of 59 subjects had some content in EBP and were part of other subjects. These focus on research knowledge, development of scientific literacy, and use of EBP through different nursing viewpoints. Most study programs have one subject in EBP, and only 19% of subjects are obligatory. On average, subjects are worth 5 ECTS, variety between countries in the study is huge. On average, master's nursing students receive almost 127 direct contact hours on the seven steps of EBP by Melnyk and Fineout-Overholt (2019). Steps to which the most time is allocated at the master's level are 6, 2 and 4. Emphasis has frequently been put on searching for, reading, and appraising literature, leading to an improvement in nurses' knowledge after a master's EBP course (Chang and Levin, 2014). However, a recent systematic review noted that educative interventions should provide nurses with sufficient competences for implementing every step of EBP, with special focus on the implementation of evidence in patient care (Rojjanasrirat and Rice, 2017).

Again, a high variability in our study was seen between countries in the third cycle, where 15 PhD study programs were analysed. Only six faculties had subjects or modules of "Evidence-Based Practice in Nursing or Health Care", five of them were obligatory and worth an average of 8 ECTS. The names of PhD study programs also differ between "PhD in Nursing as a Science and a Profession", and "PhD in Healthcare Sciences". The names of the subject EBP are clear and have the same content. The few examples of EBP teaching at the PhD level in literature show the incorporation of EBP teaching into a Doctor of Nursing Practice degree threaded across all courses in the EEUU, including two specific EBP methods and technique courses (Singleton, 2017; Moore and Watters, 2013 cite).

On average, the seven steps of EBP in nursing only get 7 h over a PhD program. Faculties emphasize steps 2, 3 and 6. For all steps, the number of hours was low, lower than at the master's and bachelor's levels. The observed lack of EBP content at postgraduate level may be a lost opportunity to increase the production and synthesis of robust evidence or studies about EBP implementation in nursing. The American Association of Colleges of Nursing (2015) acknowledged the importance of EBP knowledge and skills obtained as part of doctoral curricula, and pointed out that doctoral programs must deliver a curriculum which strengthens students' beliefs and mentors them to transform their beliefs into action through EBP implementation.

#### 4.1. Limitation

Differences between European nursing curricula limited the transfer of our results to other countries. Data were collected by a contact person at each faculty or through an official website, so the accuracy of responses could be affected by the degree of knowledge on the nursing program. The evidence for teaching EBP at the master's and doctoral levels was very poor. Our study did not include an in-depth analysis of the actual content and aims of EBP subjects, except for the seven steps of EBP (Melnyk and Fineout-Overholt, 2019). Instead, we focused on how the subjects were incorporated into the study programs. Thus we cannot claim that having an EBP subject available actually means that students gain the knowledge and competences to implement EBP.

#### 4.2. Implication for nursing education

Our results show that we are far from the WHO recommendation which states that "nursing students need to achieve a basic understanding of EBP and its purpose through education and training, along with an understanding of their role in EBP" (Jylhä et al., 2017). One of our findings begs the question of which EBP competences students achieve with a 240 ECTS bachelor's program and a 60 ECTS master's program, because fewer hours of EBP education were identified in those

programs compared to a 180 ECTS bachelor's program and a 120 ECTS master's program. This certainly requires additional explanation. Further descriptive, observational and explorative studies are needed to better understand the presence, characteristics and content of EBP courses, especially in master's and PhD cycles. In addition, we recommend conducting comparative studies between countries and education cycles to determine the effectiveness of different teaching models using robust designs and tools.

The disparity of results between countries underlines the necessity of establishing EBP teaching guidelines to harmonize nursing curricula across Europe. What is more, EBP competences and learning outcomes adjusted to the three cycles of higher education should be set up. EBP nursing experts should work to develop a common European competency framework to guide nurse educators, managers and EBP stakeholders in the development of contents and teaching strategies that incorporate EBP knowledge, skills and attitudes into education programs. The challenge is to achieve a consensus regarding the minimum competences and learning outcomes required for bachelor's, master's and doctoral degrees across countries.

## 5. Conclusion

This study contributes to a better understanding of EBP teaching in the three cycles of higher education as part of European nursing curricula which vary between countries. In a minority of cases, EBP is taught as a stand-alone subject in bachelor's and master's cycles; EBP content is mainly integrated into other subjects. An important study finding is that EBP teaching is not yet sufficiently integrated into nursing curricula. For more efficient integration, guidelines on the standardization of teaching approaches and content have to be developed in all three cycles of higher education. Further research is needed on the implementation of EBP teaching at the master's and doctoral levels of nursing curricula. Provision of these strategies will enable the nursing profession to integrate the best empirical evidence into nursing practice.

## Authors' contributions

All authors were involved in the article.

- Brigita Skela-Savič (BSS): study concept/design, sample development, final version of questionnaires development, data analysis, drafting of manuscript (all parts), final review.
- Maria Ruzafa-Martínez (MRM): study concept/design, sample development, final version of questionnaires development, drafting of manuscript (all parts), final review
- Urban Bole (UB): Literature review, drafting of manuscript, final review
- Darja Jarosova (DJ): data collection, tools' development, drafting manuscript, final review
- Jakub Dolezel (JD): data collection, tools' development, drafting manuscript, final review
- Stefano Finotto (SF): data collection, tools' development, drafting manuscript, final review
- Daniela Mecugni (DM): data collection, tools' development, drafting manuscript, final review
- Evridiki Patelarou (EP): study concept/design, data collection, tools' development, drafting manuscript (all parts), final review
- Athina Patelarou (AP): data collection, tools' development, drafting manuscript, final review
- Mariusz Panczyk (MP): data collection, tools' development, drafting manuscript, final review
- Joanna Gotlib (JG): data collection, tools' development, drafting manuscript, final review
- Antonio Jesús Ramos-Morcillo (AJRM): data collection, tools' development, drafting manuscript, final review

## Disclaimer

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## Ethical approval

Ethical approval was not required since all data were categorized as public. The anonymity and confidentiality of data were ensured. We followed the directions of Stiles et al. (2011) for appropriate ethical use of administrative data for research purposes. That is, ensuring that the data and their limits are well understood so that the interpretation of findings is adequately informed.

## Declaration of competing interest

The authors report no conflicts of interest.

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