

Received: 04 November 2023 / Accepted: 31 January 2024 / Published online: 28 February 2024

DOI 10.34689/SH.2024.26.1.026

UDC 614.253.52

COMPARATIVE ANALYSIS OF KNOWLEDGE, ATTITUDES, AND BEHAVIOR IN EVIDENCE-BASED NURSING PRACTICE AMONG ACADEMIC AND APPLIED BACHELOR'S DEGREE STUDENTS

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Summary

Introduction. The education of nurses in evidence-based practice (EBP) represents a continuous endeavor, commencing during their undergraduate education and persisting throughout their professional nursing trajectories. The evaluation of the sufficiency and efficacy of imparting evidence-based nursing (EBN) practice within the academic undergraduate curriculum commenced in the Republic of Kazakhstan in 2019, as a component of the ProInCa initiative ("Promoting the Innovation Capacity of Higher Education in Nursing during Health Services' Transition"), supported by Erasmus+. Four years subsequent to the integration of EBN practice courses within colleges and medical universities, it becomes imperative to undertake a comprehensive assessment to gauge the present state concerning the efficacy of this discipline.

The **objective** of this study is to assess and juxtapose the efficacy of educational programs pertaining to EBN practice across applied and academic bachelor of nursing levels, with the aim of further refining the management of this discipline.

Materials and methods: An anonymous online questionnaire was administered utilizing the instrument titled "Assessment of teaching and learning evidence-based practice by assessing domains of knowledge, attitudes, and behavior". Prior to and following the completion of the EBN practice course in September 2023, one hundred and sixty-three second-year students from the Higher Medical College and «Danalyk» college in Astana and one hundred and forty-five nurses who underwent professional development training at the NJSC "Semey Medical University" were surveyed. The statistical significance of the findings was evaluated using the Student's paired T-test.

Results. In the "Knowledge" domain, academic bachelor's degree students exhibited a lesser comprehension of the significance of knowledge and skills in EBN for daily practice (16.16 ± 2.07 vs. 19.1 ± 1.84 ; $p=0.001$), whereas applied bachelor's degree students consistently maintained a high level both pre- and post-study (21.76 ± 2.87 vs. 21.94 ± 3.36 ; $p=0.001$). Furthermore, notable differences in attitude were observed between the compared groups, with undergraduate students expressing more skepticism regarding EBN as a practical approach. Despite this skepticism, undergraduate students displayed enhanced confidence in applying EBN knowledge and skills in their daily practice (20.66 ± 6.87 vs. 23.28 ± 5.58 ; $p=0.001$), alongside an increased readiness to implement EBN in their present and future professional endeavors (34.05 ± 4.69 vs. 36.2 ± 3.75 ; $p=0.001$).

Conclusions. Thus, students of applied and academic bachelor's degrees demonstrated an improvement in knowledge after completing the course on EBP, expressed their willingness to apply it in their professional activities, however, the perception of nursing as an art with a great emphasis on their own experience and individual approach to the patient remains.

Keywords: *evidence-based nursing practice, nurse, nursing, educational curriculum.*

Резюме

СРАВНИТЕЛЬНЫЙ АНАЛИЗ ДОМЕНОВ ЗНАНИЯ, ОТНОШЕНИЯ И ПОВЕДЕНИЯ В ОБЛАСТИ ДОКАЗАТЕЛЬНОЙ СЕСТРИНСКОЙ ПРАКТИКИ СРЕДИ СТУДЕНТОВ АКАДЕМИЧЕСКОГО И ПРИКЛАДНОГО БАКАЛАВРИАТА

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Введение. Обучение медсестер доказательной практике — это постоянный процесс, который начинается еще во время учебы в бакалавриате и продолжается на протяжении всей их сестринской карьеры. Изучение адекватности и эффективности преподавания доказательной сестринской практики на уровне академического бакалавриата началось в Республике Казахстан в 2019 году в рамках проекта ProInCa (“Promoting the Innovation Capacity of Higher Education in Nursing during Health Services’ Transition”) при поддержке Erasmus+. Спустя 4 года с момента внедрения курса доказательной сестринской практики в колледжах и медицинских вузах назрела необходимость мониторинга текущей ситуации по эффективности ведения указанной дисциплины.

Цель исследования: Оценить и сравнить эффективность образовательных программ по доказательной сестринской практике на уровнях прикладного и академического бакалавриата сестринского дела для дальнейшей оптимизации ведения дисциплины.

Материалы и методы исследования. Проведено анонимное онлайн-анкетирование с применением опросника «Оценка преподавания и обучения доказательной практике путем оценки доменов знаний, отношения и поведения». Сто шестьдесят три студента второго года обучения Высшего медицинского колледжа и колледжа «Даналык» г. Астана, и сто сорок пять медицинских сестер, проходивших цикл повышения квалификации в НАО «Медицинский университет Семей» были опрошены до и после прохождения курса по доказательной сестринской практике (ДСП) в сентябре 2023 года. Для оценки уровня статистической значимости применялся парный Т-критерий Стьюдента.

Результаты. В области "Знания" студенты академического бакалавриата продемонстрировали более низкое понимание значимости знаний и навыков в ДСП в повседневной практике ($16,16 \pm 2,07$ против $19,1 \pm 1,84$; $p=0,001$), в то время как студенты прикладного бакалавриата поддерживали стабильно высокий уровень как до, так и после обучения ($21,76 \pm 2,87$ против $21,94 \pm 3,36$; $p=0,001$). Значительные различия в области «Отношения» также были очевидны между сравниваемыми группами, причем студенты академического бакалавриата проявляли больший скептицизм по отношению к ДСП как практическому подходу. Несмотря на этот скептицизм, студенты академического бакалавриата продемонстрировали большую уверенность в применении знаний и навыков ДСП в повседневной практике ($20,66 \pm 6,87$ против $23,28 \pm 5,58$; $p=0,001$), наряду с повышенной готовностью внедрять ДСП в свою текущую и будущую работу ($34,05 \pm 4,69$ против $36,2 \pm 3,75$; $p=0,001$).

Выводы. Таким образом, студенты прикладного и академического бакалавриата продемонстрировали улучшение знаний после пройденного курса по доказательной практике, выразили свою готовность применять ее в своей профессиональной деятельности, однако по-прежнему сохраняется восприятие сестринского дела как искусства с большим акцентом на собственный опыт и индивидуальный подход к пациенту.

Ключевые слова: доказательная сестринская практика, медицинская сестра, сестринское дело, образовательная программа.

Түйіндеме

**АКАДЕМИЯЛЫҚ ЖӘНЕ ҚОЛДАНБАЛЫ БАКАЛАВРИАТ СТУДЕНТТЕРІ
АРАСЫНДАҒЫ ДӘЛЕЛДІ МЕЙІРБИКЕЛІК ПРАКТИКАДАҒЫ БІЛІМ,
КӨЗҚАРАС ЖӘНЕ МІНЕЗ-ҚҰЛЫҚ ДОМЕНДЕРІН САЛЫСТЫРМАЛЫ ТАЛДАУ****Перизат А. Каражигитова¹,****Лаура Т. Касым^{1*}, <https://orcid.org/0000-0003-4448-6455>,****Асия А. Кусаинова², <https://orcid.org/0000-0002-5738-0804>,****Жулдыз Т. Жетмекова², <https://orcid.org/0000-0001-8510-7023>****Дана К. Кожакметова², <https://orcid.org/0000-0002-8367-1461>****Айнур С. Ботабаева²,****Алмас А. Кусаинов¹, <https://orcid.org/0000-0003-1003-1735>****Дарья А. Жунисова²,****Гульмира А. Дербисалина¹, <https://orcid.org/0000-0003-3704-5061>**¹ «Астана медицина университеті» КеАҚ, Астана қ., Қазақстан Республикасы;² «Семей медицина университеті» КеАҚ, Семей қ., Қазақстан Республикасы.

Кіріспе. Медбикелерді дәлелді тәжірибеге үйрету-бұл бакалавриатта оқып жүргенде басталатын және олардың мейірбикелік мансабында жалғасатын тұрақты процесс. Академиялық бакалавриат деңгейінде дәлелді мейіргерлік практиканы (ДМП) оқытудың барабарлығы мен тиімділігін зерттеу Қазақстан Республикасында 2019 жылы Erasmus+ қолдауымен ProInCa ("Promoting the Innovation Capacity of Higher Education in Nursing during Health Services' Transition") жобасы шеңберінде басталды. Колледждер мен медициналық жоғары оқу орындарында дәлелді мейірбикелік практика курсы енгізілген сәттен бастап 4 жылдан кейін аталған пәнді жүргізудің тиімділігі бойынша ағымдағы ахуалды мониторингілеу қажеттілігі туындады.

Зерттеудің мақсаты: пәнді одан әрі оңтайландыру үшін мейірбике ісінің қолданбалы және академиялық бакалавриат деңгейлеріндегі ДМП бойынша білім беру бағдарламаларының тиімділігін бағалау және салыстыру.

Зерттеу материалдары мен әдістері. "Білім, көзқарас және мінез-құлық домендерін бағалау арқылы дәлелді тәжірибені оқыту мен оқытуды бағалау" сауалнамасын қолдана отырып, анонимді онлайн-сауалнама жүргізілді. Астана қ. "Даналық" колледжі мен Жоғары Медициналық колледжінің екінші курсының жүз алпыс үш студенті және "Семей медицина университеті" КеАҚ-да біліктілікті арттыру циклынан өткен жүз қырық бес медбикеден 2023 жылдың қыркүйегінде ДМП курсына дейін және одан кейін сұхбат алынды. Статистикалық маңыздылық деңгейін бағалау үшін студенттің жұптасқан Т-критерийі қолданылды.

Нәтижелер. "Білім" саласында академиялық бакалавриат студенттері күнделікті тәжірибеде ДМП білім мен дағдылардың маңыздылығы туралы төмен түсінік көрсетті ($16,16 \pm 2,07$ қарсы $19,1 \pm 1,84$; $p = 0,001$), ал қолданбалы бакалавриат студенттері оқуға дейін де, одан кейін де тұрақты жоғары деңгейде болды ($21,76 \pm 2,87$ қарсы $21,94 \pm 3,36$; $p = 0,001$). "Қарым-қатынас" саласындағы айтарлықтай айырмашылықтар салыстырмалы топтар арасында да айқын болды, академиялық бакалавриат студенттері ДМП практикалық тәсіл ретінде үлкен күмәнмен қарады. Осы скептицизмге қарамастан, академиялық бакалавриат студенттері ДМП білімі мен дағдыларын күнделікті тәжірибеде қолдануға үлкен сенімділік танытты ($20,66 \pm 6,87$ қарсы $23,28 \pm 5,58$; $p = 0,001$), сонымен қатар ДМП өзінің қазіргі және болашақ жұмысына енгізуге жоғары дайындық ($34,05 \pm 4,69$ қарсы $36,2 \pm 3,75$; $p = 0,001$).

Қорытындылар. Осылайша, қолданбалы және академиялық бакалавриат студенттері дәлелді практика курсынан кейін білімнің жақсарғанын көрсетті, оны кәсіби қызметінде қолдануға дайын екендіктерін білдірді, дегенмен мейірбике ісін өнер ретінде қабылдау әлі де өз тәжірибесіне және пациентке жеке көзқарасқа баса назар аудара отырып сақталады.

Түйінді сөздер: дәлелді мейіргер, мейіргер ісі, білім беру бағдарламасы.

Bibliographic citation:

Karazhigitova P.A., Kassym L.T., Kussainova A.A., Zhetmekova Zh.T., Kozhakhmetova D.K., Botabayeva A.S., Kussainov A.A., Zhunissova D.A., Derbissalina G.A. Comparative analysis of knowledge, attitudes, and behavior in evidence-based nursing practice among academic and applied bachelor's degree students // *Nauka i Zdravookhranenie [Science & Healthcare]*. 2024, (Vol.26) 1, pp. 221-231. DOI 10.34689/SH.2024.26.1.026

Каражигитова П.А., Касым Л.Т., Кусаинова А.А., Жетмекова Ж.Т., Кожакметова Д.К., Ботабаева А.С., Кусаинов А.А., Жунисова Д.А., Дербисалина Г.А. Сравнительный анализ доменов знания, отношения и поведения в области доказательной сестринской практики среди студентов академического и прикладного бакалавриата // *Наука и Здравоохранение*. 2024. 1(Т.26). С. 221-231. DOI 10.34689/SH.2024.26.1.026

Каражигитова П.А., Касым Л.Т., Кусаинова А.А., Жетмекова Ж.Т., Кожакметова Д.К., Ботабаева А.С., Кусаинов А.А., Жунисова Д.А., Дербисалина Г.А. Академиялық және қолданбалы бакалавриат студенттері арасындағы дәлелді мейірбикелік практикадағы білім, көзқарас және мінез-құлық домендерін салыстырмалы талдау // *Ғылым және Денсаулық сақтау*. 2024. 1 (Т.26). Б. 221-231. DOI 10.34689/SH.2024.26.1.026

Introduction

The integration of evidence-based principles and practices (EBP) within the realm of healthcare delivery is progressively recognized as pivotal in ensuring the provision of exemplary medical services. Within this paradigm, nurses are tasked with acquiring a comprehensive repertoire of knowledge, understanding, and skills requisite for the purposeful pursuit of pertinent information, which consequently informs their clinical decision-making processes. This imperative aligns with prevalent nursing training standards, wherein adherence to evidence-based methodologies constitutes a fundamental component [1,21]. Illustratively, the guidelines endorsed by the Australian Council for Nursing and Midwifery in 2006 underscore the expectation that registered nurses operate within an evidence-based framework. Such directives epitomize the overarching recognition of EBP as an indispensable cornerstone within contemporary nursing standards, epitomizing an ongoing commitment to optimizing healthcare outcomes through informed and judicious clinical approaches [4].

To promote the adoption of EBP among nurses within medical institutions, it is imperative to instill pertinent concepts and skills at the nascent phases of their professional trajectory [24,5]. Presently, the majority of studies primarily scrutinize the perspectives of licensed nurses concerning the utilization of evidence-based data, while the stance of student cohorts on this matter remains inadequately elucidated [28,2]. In 2010, *Ryan EJ* undertook an extensive literature review to elucidate medical students' attitudes toward the foundational tenets of EBP and their practical implementation. During the data retrieval process, the author identified 181 pertinent articles, with only 9 of them addressing the subject of students' attitudes toward evidence-based nursing practice. The investigation revealed a prevailing inclination among students toward embracing scientific research within evidence-based practice, albeit beset by a dearth of support mechanisms and accessible avenues in this domain [25]. An examination involving 612 senior nursing students from Jordan showcased a favorable disposition towards EBP. Predominantly, respondents expressed the belief that dedication to the study of scientific research augments their professional standing and enhances clinical proficiency in patient care [12]. In a study conducted by *Bjorkstrom et al.*, findings indicated that students demonstrating interest in particular domains of advancement and research within the nursing discipline exhibited significantly more favorable attitudes. Moreover, these students expressed heightened expectations regarding the frequent utilization of scientific knowledge in the nursing domain [3]. A survey encompassing nursing students from two American (USA) universities elucidated an evolving nexus among experience, knowledge, attitude, and anticipated future utilization of EBP within their respective specialties. The investigators inferred that medical students who are proficiently trained in clinical settings and exhibit heightened confidence in clinical decision-making are predisposed to engage in EBP, both presently and prospectively [6]. *Forssman et al.* undertook a prospective investigation within the purview of a substantial national grant known as LANE (Longitudinal Analysis of Nursing Education),

encompassing 1,319 participants. The study aimed to examine the inclination of nursing graduates towards incorporating research into clinical practice both upon graduation and following a year of professional engagement. Findings revealed that 34% of the surveyed medical students expressed an intention to integrate research into more than half or nearly every work shift in their forthcoming clinical practice [11]. These findings substantiate the necessity for the formulation of forthcoming initiatives directed towards fostering students' inclination to incorporate research into their daily professional endeavors. Emphasis should be placed on bolstering students' confidence in their capabilities and furnishing requisite support for research endeavors. In this regard, *Florin et al.* underscore the significance of devising a comprehensive program geared towards enhancing students' self-assurance in their own competencies [10]. In numerous investigations, a predominant factor impeding the adherence of nursing students to evidence-based practice is the incongruity between the theoretical curriculum and its practical implementation. Upon commencing clinical practice, students frequently encounter restricted avenues for the application of their scientific acumen, compounded by negative perceptions from seasoned nursing professionals [13,7,19]. Drawing from these insights, *Brown et al.* advocate for a shift towards prioritizing the instruction of fundamental principles of evidence-based medicine within practical and clinical contexts, diverging from conventional didactic methodologies prevalent in university programs [11]. It is posited that effective mentoring by certified personnel in this domain could facilitate a more favorable transition from studenthood to seasoned nursing professionalism, thereby mitigating the chasm between theoretical knowledge and practical application [14, 18].

Consequently, the stance of nursing students towards research may vary, yet through appropriate educational strategies and support, they can be guided towards cultivating a more affirmative outlook and achieving successful integration of evidence-based nursing practice.

The **purpose of our study** was a comparative analysis of the effectiveness of educational programs on evidence-based nursing practice at the levels of applied and academic bachelor of nursing for further optimization of the discipline.

Materials and methods

General characteristics of research materials and methods

The research employed a quasi-experimental design. The sample for the applied bachelor of Nursing consisted of 163 second-year students from the Higher Medical College and «Danalyk» college in Astana, while the sample for the academic bachelor's degree comprised 145 nurses who completed an advanced training cycle at the NJSC "Semey Medical University" (SMU). The survey was conducted online twice: before and after training in the discipline "Evidence-based nursing".

The survey utilized the "Assessing teaching and learning of evidence-based practice through assessment of knowledge, attitudes, and behavior" questionnaire [16]. This instrument was adapted to the nursing context, translated into Russian and Kazakh, and previously validated in related studies. Structured into four domains, the tool

evaluates knowledge (EBP-K), attitudes towards evidence-based practice (EBP-A), personal application and utilization of evidence-based practice (EBP-P), and future intentions regarding evidence-based practice (EBP-F). Comprising 26 questions, responses were graded on a 5-point Likert scale. Specifically, the EBP-K section contained 5 points (ranging from 5 to 30 points), while both the EBP-A and EBP-P sections encompassed 6 points each (with scores ranging from 6 to 36 for each section). The EBP-F section consisted of 9 points (ranging from 9 to 54 points). The final score was calculated as the sum of points accrued in each sub-item. Participants were allotted a maximum of 20 minutes to complete the questionnaire.

The educational program in the discipline of Evidence-Based Nursing (EBN) for students pursuing an applied bachelor's degree consisted of 2 credits, equivalent to 180 hours. This program was structured into classroom instruction spanning 15 hours, complemented by practical application sessions totaling 150 hours. Upon the conclusion of the module, students underwent examination certification.

Conversely, the curriculum tailored for students enrolled in the academic bachelor's degree program comprised 5 credits, equivalent to 150 academic hours. The thematic outline of this program encompassed foundational principles, conceptual frameworks, and ethical standards pertinent to EBN, alongside the acquisition of skills in literature review and critical analysis. Emphasis was placed on navigating scholarly articles, evidence-based practice guidelines, and clinical nursing protocols pertaining to disease management and prevention.

Ethical approval

Before the start of the study, ethical approval was received from the Local Bioethical Committee of the NJSC "Astana Medical University" (Protocol #10 dated December 22, 2022).

All participants of the study were informed about the objectives of the study and signed an informed consent to participate before conducting the survey.

Statistical data processing

The statistical processing of the obtained data was conducted utilizing the statistical software IBM SPSS Statistics 26.0. Standard techniques of descriptive and analytical statistics were employed for the statistical analysis of the research findings. Specifically, to assess disparities in mean scores across individual questionnaire items as well as their aggregate (domains) between two distinct samples, the Student's T-test for independent samples was applied, incorporating the Welch correction when assumptions regarding equal variances were not met. The null hypothesis was discarded in favor of the alternative hypothesis when the level of statistical significance (p) fell below the predetermined critical threshold (<0.05).

Research results

Sample Characteristics

The initial cohort of participants in the investigation comprised 182 individuals enrolled in applied bachelor's degree programs. Among them, 12 respondents exhibited errors and omissions in questionnaire completion, while an additional 7 individuals declined to undergo repeat

questioning. Consequently, the initial subset of participants in our study encompassed 163 second-year students from Higher Medical College ($n=55$) and «Danalyk» college in Astana city ($n=108$). A significant majority of survey respondents were female, constituting 94% of the sample ($n=154$), thereby underscoring the enduring prevalence of females among medical college attendees. The mean age of participants within this subset was 18.44 ± 0.81 years. Notably, all respondents expressed a preference for completing the questionnaire in the Kazakh language.

A total of 163 students pursuing an academic bachelor's degree in the field of "Nursing" at the NJSC "SMU" in Semey participated in the questionnaire administered prior to undertaking the course "Evidence-based nursing". Subsequently, 19 individuals were excluded from the initial sample due to various reasons: questionnaire completion errors, including missed responses or incomplete submissions ($n=9$); failure to complete the repeated questionnaire ($n=7$); and incomplete fulfillment of the curriculum requirements ($n=2$). Consequently, the second subset of participants in our study comprised 145 students. Predominantly, the demographic composition of this subgroup was characterized by a predominance of female participants ($n=143$). The mean age of these undergraduate students was 44.31 ± 10.81 years. Noteworthy is the distribution of previous educational backgrounds within this cohort, with 12 individuals possessing secondary vocational education (TaPE) and the remaining 133 holding applied bachelor's degrees. Furthermore, a substantial majority of the surveyed students ($n=136$) were employed in urban settings, while 7 were engaged in rural occupations, and 2 were on maternity leave. Regarding language preference, nearly two-thirds of the sample opted to complete the questionnaire in Kazakh (66.89%; $n=97$).

Comparative analysis of the survey results among students of applied and academic undergraduate nursing

The main objective of our study was to compare the results of a survey between students of applied ($n=163$) and academic ($n=145$) bachelor's degrees both before and after passing the discipline "Evidence-based nursing".

Table 1 shows the results of the survey on individual issues and the domain of the Knowledge section. The average values of responses in this block before and after passing the discipline are statistically significantly lower for students of the academic bachelor's degree. In the same category of participants, we see a more pronounced increase in points in the "Knowledge" block after quasi-intervention.

Table 2 shows the differences in the responses of the participants of the compared groups in the "Attitude" block. We should immediately note that the students of the academic bachelor's degree, as an older and professionally experienced group of participants, showed greater skepticism towards EBN as an approach in everyday work practice. However, the same category of participants showed a drastic change in attitude towards EBN after passing the discipline, which resulted in a significant decrease in the overall score in the domain. Nevertheless, both groups of respondents, after completing a cycle of classes on EBN, agreed that the evidence-based approach does not contradict the humanistic values of nursing in any way.

Table 1.

Comparative characteristics of the values of the answers to the questions and domain of the block "Knowledge" before and after passing the discipline "EBP" among students of applied and academic bachelor's degree.

Order of questions in the questionnaire	Contents of the question	"Before" indicator (M±SD)		T-test	p-value	"After" average (M±SD)		T-test	p-value
		ApB	AcB			ApB	AcB		
1	"EBN requires the use of critical assessment skills to ensure the quality of all research papers received"	4,38±0,76	3,21±0,63	14,822*	<0,001	4,41±0,76	3,91±0,76	5,993*	<0,001
2	"The skill of effective search/easy access to bibliographic databases and evidence sources is important for the practice of EBN"	4,3±0,79	3,5±0,71	9,327	<0,001	4,35±0,83	3,74±0,69	7,012*	<0,001
3	"Critically assessed data should be appropriately applied to the patient using clinical judgment and experience"	4,26±0,97	3,34±0,61	10,049*	<0,001	4,4±0,84	3,57±0,78	9,03	<0,001
4	"The process of EBN requires appropriate definition and formulation of clinical issues"	4,44±0,75	3,75±1,04	6,604*	<0,001	4,38±0,88	3,81±0,68	6,356	<0,001
5	"The practice of EBN increases confidence that the care offered is effective"	4,38±0,79	2,36±0,72	23,236	<0,001	4,4±0,79	4,07±0,72	3806	<0,001
	The general indicator of the domain "Knowledge"	21,76±2,87	16,16±2,07	19,816*	<0,001	21,94±3,36	19,1±1,84	9,345	<0,001

EBN - evidence-based nursing

*Student's T-criterion in the Welch modification

Table 2.

Comparative characteristics of the values of the answers to the questions and domain of the "Attitude" block before and after passing the discipline "EBP" among students of applied and academic bachelor's degree.

Order of questions in the questionnaire	Contents of the question	"Before" indicator (M±SD)		T-test	p-value	"After" average (M±SD)		T-test	p-value
		ApB	AcB			ApB	AcB		
1	"I have no reason to accept EBN because it's just a hobby (or a fashion) that will pass with time"	3,66±1,18	4,62±0,84	-8,305*	<0,001	3,3±1,19	3,19±2,58	0,477	0,634
2	"EBN - is nursing based on the principle of a "recipe book" that ignores clinical experience"	3,83±1,17	4,56±0,95	-6,047*	<0,001	3,22±1,28	3,25±0,66	-0,24*	0,81
3	"EBN requires the use of critical evaluation skills to ensure the quality of all research papers produced"	3,84±1,19	4,49±1,09	-5,121*	<0,001	3,72±1,29	3,39±0,65	2,83*	0,005
4	"EBN Practice Ignores the Art of Nursing"	3,6±1,29	4,79±0,56	-10,697*	<0,001	3,1±1,28	3,3±0,63	-	1,763*
5	"Previous work experience is more important than research results when choosing the best care for a patient"	3,93±1,09	4,87±0,41	-10,277*	<0,001	3,62±1,22	4,18±0,81	-4,79*	<0,001
	The general indicator of the domain "Attitude"	18,85±4,65	23,33±2,73	-10,446*	<0,001	16,96±4,63	17,32±3,04	-	0,423

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*Student's T-criterion in the Welch modification

The analysis of the differences between the results of individual responses and the general domain of the "Application" section is shown in table 3. And again, students of the academic bachelor's degree, as representatives of the older generation of the nursing community, demonstrate a great willingness to use the knowledge and skills acquired within the framework of

the discipline in their daily practice. At the same time, this intention turned out to be more pronounced in comparison with the answers of the applied bachelor's degree both before and after the classes. However, undergraduate students experienced difficulties in the daily use of some resources, in particular the Cochrane Library and CINAHL.

Table 3.

Comparative characteristics of the values of the answers to the questions and domain of the block "Application" before and after passing the discipline "EBP" among students of applied and academic bachelor's degree.

Order of questions in the questionnaire	Contents of the question	"Before" indicator (M±SD)		T-test	p-value	"After" average (M±SD)		T-test	p-value
		ApB	AcB			ApB	AcB		
1	How often do you get access to nursing evidence from a textbook?	2,59± 1,21	3,36± 1,37	-5,218	<0,001	2,48± 1,22	3,57± 1,19	-7,9	<0,001
2	How often do you get access to nursing evidence in general?	2,71± 1,22	3,69± 1,34	-6,699	<0,001	2,66± 1,21	4,03± 1,06	-10,649*	<0,001
3	How often do you want to access medical data online (CINAHL, Medline and Cochrane reviews)?	2,5± 1,36	3,61± 1,36	-7,187	<0,001	2,55± 1,25	3,94± 1,10	-10,419*	<0,001
4	How often do you access nursing evidence from original research?	2,52± 1,26	3,06± 1,46	-3,374*	<0,001	2,59± 1,29	3,57± 1,21	-6,884	<0,001
5	How often do you access nursing evidence from the Cochrane database?	2,47± 1,22	2,93± 1,48	-3,872	<0,001	3,32± 1,29	3,32± 1,31	-5,906	<0,001
6	How often do you access nursing evidence from the CINAHL database?	2,52± 1,26	1,54± 1,56	4,519	<0,001	2,59± 1,29	1,74± 1,26	4,959	<0,001
7	How often do you access evidence-based data from secondary sources such as the Journal of EBN journal, DARE (Database of Effects Reviews), CATs (Critically Acclaimed Topics)?	2,18± 1,24	2,47± 1,49	-1,811	0,071	2,37± 1,19	3,08± 1,38	-4,864	<0,001
	The general indicator of the domain "Application"	16,99 ±6,65	20,66 ±6,87	-4,75	<0,001	17,55 ±7,39	23,28 ±5,58	-7,769*	<0,001

EBN - evidence-based nursing

*Student's T-criterion in the Welch modification

Table 4 reflects the differences in the confidence of the surveyed students regarding the application of the evidence-based approach in the future. As expected, the students of the academic bachelor's degree again showed a high degree of readiness to use the acquired skills and

knowledge in their work in the future. The participants of this group expressed great support for the principles of EBP, the ease of mastering the discipline, as well as the intention to implement EBP as the best approach in their daily practice.

Table 4.

Comparative characteristics of the values of the answers to the questions and domain of the block "Future use of the evidence-based approach" before and after passing the discipline "EBP" among students of applied and academic bachelor's degrees.

Order of questions in the questionnaire	Contents of the questions	"Before" indicator (M±SD)		T-test	p-value	"After" average (M±SD)		T-test	p-value
		ApB	AcB			ApB	AcB		
1	How useful, in your opinion, is EBN in your future practice as a nurse?	3,71±1,09	3,89±0,78	-1,672*	0,096	3,88±1,15	4,17±0,687	-2,643*	0,009
2	Compared to the last six months, how ready are you to practice EBN as a nurse in the future?	3,33±0,84	3,54±0,94	-2,03*	0,043	3,42±0,88	3,92±0,86	-4,838*	<0,001
3	How do you personally assess the benefits of EBN practice?	3,69±1,05	3,88±0,77	-1,853*	0,065	3,89±1,08	4,08±0,81	-1,733*	0,084
4	EBN should be an integral part of the student learning curriculum?	3,88±1,04	4,15±2,61	-5,057*	<0,001	3,91±1,13	4,22±0,82	-2,745*	0,006
5	Compared to the last six months, how much do you support lifelong learning using EBN practices?	3,24±1,42	3,88±0,74	-5,36	<0,001	3,66±1,31	4,17±0,74	-4,269*	<0,001
6	How much do you support the principles of EBN compared to the last six months?	3,2±1,35	3,88±0,84	-5,36*	<0,001	3,7±1,31	4,1±0,79	-3,266	<0,001
7	How much do you agree that EBN is an everyday part of your education?	3,87±1,08	3,65±0,83	2,037*	0,043	3,88±1,1	3,93±0,90	-0,364	0,716
8	To what extent has the practice of EBN changed the approaches to your education?	3,23±1,00	3,68±0,83	-4,23	<0,001	3,44±1,06	3,86±0,77	-3,953	<0,001
9	How easy or difficult was it for you to practice EBN as a nursing student in the last six months?	3,08±0,85	3,51±0,86	-4,361*	<0,001	3,32±1,06	3,77±0,79	-4,222	<0,001
	The general indicator of the domain " Future use of the evidence-based approach "	30,17±5,81	34,05±4,69	-6,488	<0,001	31,98±6,69	36,2±3,75	-6,93	<0,001

EBN - evidence-based nursing

*Student's T-criterion in the Welch modification

Discussion

The objective of our quasi-experimental study was to assess and compare the efficacy of educational programs in evidence-based nursing practice at the applied and baccalaureate nursing levels, aiming to enhance the delivery of the discipline. The research involved both applied (n=163) and academic (n=145) undergraduate students specializing in "Nursing".

The focus of the study was on evaluating domains such as knowledge, attitude, personal utilization, and anticipated future use of EBP. We employed the questionnaire

"Assessing teaching and learning of evidence-based practice through assessment of knowledge, attitudes, and behavior" for this purpose [16]. Originally developed and validated in 2003 by researchers from the University of Hong Kong, China, this tool was designed for assessing the teaching and learning of EBP within an undergraduate medical program. The questionnaire was constructed through a comprehensive literature review conducted by international and national experts, and it underwent testing in focus groups comprised of 5th-year students [20]. In the English-language literature, multiple studies have utilized

this questionnaire to gauge the effectiveness of Evidence-Based Practice classes among students across various medical specialties in universities and schools worldwide [29,27].

As an illustration, the questionnaire underwent testing at the Chinese Military Medical Institute, where 215 medical students participated in the survey. The educational intervention involved a 20-hour evidence-based medicine course, formally integrated into the university medical program and combining lectures with practical training. The study's outcomes revealed a statistically significant difference between the "Before" and "After" assessments of the questionnaire. Consequently, researchers concluded that the integration of Evidence-Based Medicine (EBM) into the medical curriculum enhanced the quality of EBM knowledge among medical students [20]. In another investigation, a questionnaire was employed to compare two strategies for advancing evidence-based medical education among undergraduate students at National Taiwan University, utilizing a randomized controlled trial design. The study targeted 94 final-year undergraduate medical students randomly assigned to two groups. The main group (n=47) participated in weekly practical conferences featuring real clinical cases, while the control group (n=47) received weekly didactic lectures on the EBM course. Both groups demonstrated significant improvement in post-intervention scores, but participants in the intervention group exhibited higher scores in domains such as Knowledge ($57.8 \pm 72.9\%$ vs. $29.1 \pm 39.1\%$; $P < 0.01$) and "Practice" ($28.5 \pm 25.5\%$ vs. $14.1 \pm 18.7\%$; $P < 0.001$) compared to the control group. This underscores that an integrated approach to EBM study, emphasizing practical application, can enhance the educational process's quality in universities [8]. In an additional study, researchers utilized the Johnston Questionnaire as a foundation for constructing a novel instrument to evaluate learning outcomes in Evidence-Based Medicine (EBM) for clinical graduate students. A pilot study involving 30 practicing postgraduate students was conducted in China, followed by validation on a larger sample of 633 postgraduate students specializing in clinical medicine and dentistry. Consequently, a new questionnaire was developed and recommended for adoption by Chinese medical educators in the design of their EBM courses and curricula [15]. Furthermore, the contemporary acknowledgment of the significance of an evidence-based approach extends beyond conventional clinical practice to encompass alternative medicine. Illustrated by a 2023 study, the Johnston Questionnaire played a role in assessing the performance of a new journal club among chiropractic students and trainees at the University of Zurich. This study, involving 5th and 6th-year chiropractic students, implemented a journal club based on the conceptual frameworks of "community of practice" and "team-oriented learning." The results underscored the positive impact of the journal club on EBM knowledge, attitudes, and behavior among chiropractic students and trainees throughout an academic semester. The researchers demonstrated the practicability and acceptability of integrating chiropractic educational research through their created journal club [23]. Consequently, the Johnston Questionnaire remains a pertinent and user-

friendly tool essential for assessing students' proficiency in knowledge, attitudes, and understanding of EBM principles.

In 2020, a pilot study employing the Johnston Questionnaire was conducted in Kazakhstan. This study assesses the effectiveness of evidence-based learning materials for undergraduate nursing students in Kazakhstan, developed as part of the ProInCa project under the Erasmus+ program. The quasi-experimental study involved first-year nursing students in four Kazakhstani medical universities and one high medical college, using a translated questionnaire by Johnston, et al. to measure knowledge, attitudes, and behavior related to EBP. Before using the developed materials, the initial survey revealed moderate scores across domains, with means ranging from 2.5 to 3.59 on a five-point scale. After implementing the materials, significant improvements were observed in knowledge (EBP-K), attitudes (EBP-A), and future use of evidence-based practice (EBP-F), with statistically significant differences ($p < 0.0001$). However, the domain of personal application and use of evidence-based practice (EBP-P) showed minor changes. The discussion suggests that the materials enhanced students' understanding of evidence-based nursing principles but highlighted challenges related to clinical experience and English language proficiency in accessing and applying evidence. The study recommends future research to observe the progress of graduate students in knowledge, attitude, and behavior after using appropriate educational materials [17].

Our study facilitated a comprehensive examination of the effectiveness of educational programs for both applied and academic bachelor levels. Within our sample, we compared survey results before and after completion of the EBN discipline. In the "Knowledge" domain, academic bachelor students exhibited a lower comprehension of the significance of knowledge and skills in EBN in everyday practice, while applied bachelor students maintained a consistently high level both pre- and post-instruction.

Significant disparities in the Attitude domain were also evident between the compared groups, with academic bachelor students displaying greater skepticism towards EBN as a practical approach. Despite this skepticism, academic bachelor students demonstrated greater confidence in applying EBN knowledge and skills in everyday practice, along with a heightened willingness to implement EBN in their current and future work. These variations might be attributed to differences in the capacity to integrate EBN into daily professional practice.

In contemporary healthcare, the integration of EBP into clinical practice is imperative for delivering high-quality, patient-centered care. However, our study reveals significant challenges associated with incorporating evidence-based practices into the routine education of both academic and applied undergraduate students. A noteworthy temporal gap between foundational EBP courses and clinical disciplines exacerbates this issue, as the application of acquired knowledge and skills in real clinical settings becomes challenging [9].

Typically, the teaching of fundamental EBP principles occurs during the early years of educational programs, cultivating critical evaluation and evidence synthesis skills [30,26]. However, in later years, translating these acquired skills into authentic clinical scenarios proves challenging

due to students' unstable knowledge base and a lack of comprehension regarding practical application. The disjointed nature of medical education, characterized by substantial intervals between core courses and clinical rotations, impedes the cultivation of a holistic approach to evidence-based decision-making [22].

Conclusions

Effective integration of EBP principles into clinical disciplines necessitates a seamless and continuous transition. A more cohesive curriculum is warranted, facilitating the practical application of theoretical knowledge across the educational continuum. Strategies such as case-based training, simulation exercises, and early exposure to clinical scenarios during foundational courses can be instrumental. Horizontal integration initiatives, encouraging interdisciplinary collaboration, underscore the importance of a collaborative decision-making approach.

Furthermore, creating an environment that fosters critical evaluation and application of evidence in complex clinical situations can ease the transition from theory to practice. The model of vertical integration, emphasizing a consistent and gradual accumulation of experience and knowledge, is crucial. A multi-level curriculum structure, including an EBP course not only in junior undergraduate years but also as a mandatory component for seniors, signifies an advanced level of study. This approach ensures a continuous and comprehensive acquisition of knowledge, with each level serving as a building block for subsequent stages.

Conflict of Interest. The authors declare that they have no conflict of interest.

Contribution of authors. All authors were equally involved in the writing of this article.

Funding: No funding was provided.

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