



# HEALTHCARE-ASSOCIATED INFECTION PREVENTION AND CONTROL LEARNING AND TEACHING PROCESSES IN EUROPEAN HIGHER EDUCATION INSTITUTIONS – A QUALITATIVE STUDY

## PROCES KSZTAŁCENIA W ZAKRESIE PROFILAKTYKI I KONTROLI ZAKAŻEŃ ZWIĄZANYCH Z OPIEKĄ ZDROWOTNĄ W EUROPEJSKICH INSTYTUCJACH SZKOLNICTWA WYŻSZEGO – BADANIE JAKOŚCIOWE

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### ABSTRACT

**Background.** Healthcare-associated infections (HCAs) affect the lives of patients through prolonged stay in hospital, illness, or even death, incurring significant costs to both healthcare systems and society. Research shows that during a stay in a hospital, approximately 20% to 30% of patients are diagnosed with at least one infection.

### STRESZCZENIE

**Wprowadzenie.** Zakażenia związane z opieką zdrowotną (Healthcare associated infections, HCAI) wpływają na życie pacjentów poprzez przedłużony pobyt w szpitalu, chorobę, a nawet śmierć, powodując znaczne koszty zarówno dla systemów opieki zdrowotnej, jak i społeczeństwa. Badania pokazują, że podczas pobytu w szpitalu u około 20% do 30% pacjentów diagnozuje się co najmniej jedną infekcję.

Openness, fine interpersonal and communication skills as well as adequate opportunities for training courses for healthcare staff contribute to promoting HCAI/HAI prevention.

HCAI/HAI-related education should contribute to widening knowledge and mastering practical skills. It is assumed that lecturers, professional instructors, and coordinators create a significant foundation for professional development and social interactions by applying interactive pedagogical models.

**Objective.** The aim of the study was to identify the perspective of teachers and tutors from 5 European Higher Education Institutions (HEIs) involved in the learning and teaching process of nursing students on healthcare – associated infection prevention and control. Research problems have been identified for the purpose of analysing qualitative research. The research questions considered the perspectives of coordinators of nursing courses/departments, assistants and tutors, and teachers. The research questions were: What are the factors that influence the pedagogical methods used in HAI teaching in HEIs of Nursing Schools? What is the perspective of nursing teachers and tutors regarding the learning and teaching processes of HAI prevention and control in the European Nursing HEIs?

**Methods.** There were separate sets of research questions for different Focus Groups: Teachers (Focus Groups), Invited Assistants and Tutors (Focus Groups), Nursing Course Coordinator, and President of the Pedagogical Board, President of the Scientific Board (Interview).

The interviews were conducted in a presential mode. The qualitative analysis method was applied.

**Results.** Based on the study, 5 categories emerged: HCAI prevention and Control in the Nursing Curriculum, Organisation and structure of HEIs, Pedagogical strategies and methods, Student competencies and Articulation between HEIs and practice settings. For each main category subcategories were defined. The analysis of the participants' opinions demonstrated a need to develop a uniform innovative didactic model in order to improve nursing curricula in terms of infection prevention and control; moreover, it proved significant to ensure that students gain the knowledge and skills indispensable to plan nursing care procedures, to implement and fulfill these procedures and to evaluate the effects of nursing care. The study group in total consisted of 80 participants including 61 women and 19 men.

**Conclusions.** There is a need to develop a new pedagogical model to improve teaching standards and to further integrate the theoretical aspects and the practical skills. The coordinator's position as an entity responsible for the management of the learning/teaching process should be reinforced. Both traditional and innovative teaching methods should be applied, i.e., simulation, evidence-based nursing, case studies and eBooks.

**KEYWORDS:** HCAI/HAI prevention and infection control, learning and teaching process, education, nursing.

Otwarte podejście, wysokie umiejętności interpersonalne i komunikacyjne, a także odpowiednie możliwości szkoleń dla personelu medycznego przyczyniają się do promowania profilaktyki HCAI/HAI. Kształcenie w zakresie HCAI/HAI powinno przyczynić się do poszerzenia wiedzy i opanowania praktycznych umiejętności. Zakłada się, że wykładowcy, profesjonalni instruktorzy, koordynatorzy tworzą istotne podstawy rozwoju zawodowego i interakcji społecznych poprzez stosowanie interaktywnych modeli pedagogicznych.

**Cel.** Celem badania było określenie perspektywy nauczycieli i wykładowców z 5 europejskich instytucji szkolnictwa wyższego zaangażowanych w proces kształcenia studentów pielęgniarstwa w odniesieniu do profilaktyki i kontroli zakażeń związanych z opieką zdrowotną. W celu analizy badań jakościowych zostały określone problemy badawcze. Pytania badawcze uwzględniały perspektywy koordynatorów studiów/kierunku pielęgniarstwa, asystentów i wykładowców, nauczycieli. Pytania badawcze brzmiały: Jakie są czynniki wpływające na metody pedagogiczne stosowane w nauczaniu HAI w uczelniach na kierunku pielęgniarstwo? Jaka jest perspektywa nauczycieli pielęgniarstwa i wykładowców w odniesieniu do procesu kształcenia w zakresie profilaktyki i kontroli HAI w europejskich uczelniach pielęgniarstkich?

**Metody.** Przygotowano oddzielne zestawy pytań badawczych dla różnych grup fokusowych: Nauczyciele (Grupy Fokusowe), Zaproszeni Asystenci i Wykładowcy (Grupy Fokusowe), Koordynator Kierunku Pielęgniarstwo, Przewodniczący Rady Pedagogicznej, Przewodniczący Rady Naukowej (Wywiad). Wywiady przeprowadzono w kontakcie. Zastosowano metodę analizy jakościowej.

**Wyniki.** Na podstawie badania wyłoniono 5 kategorii: Zapobieganie i kontrola HCAI/HAI w programach nauczania na kierunku pielęgniarstwo, Organizacja i struktura uczelni, Strategie i metody pedagogiczne, Kompetencje studentów oraz Komunikacja między uczelniami a miejscem praktyk. Dla każdej głównej kategorii wyłoniono podkategorie. Analiza opinii uczestników wykazała potrzebę opracowania jednolitego innowacyjnego modelu dydaktycznego w celu poprawy programów nauczania na kierunku pielęgniarstwo w zakresie profilaktyki i kontroli zakażeń; ponadto istotną kwestią jest zapewnienie studentom warunków do zdobywania wiedzy i umiejętności niezbędnych do planowania procedur opieki pielęgniarstwiej, wdrażania i wykonywania tych procedur oraz oceny efektów opieki pielęgniarstwiej. Badana grupa liczyła łącznie 80 uczestników, w tym 61 kobiet i 19 mężczyzn.

**Wnioski.** Istnieje potrzeba opracowania nowego modelu pedagogicznego w celu poprawy standardów nauczania i dalszej integracji aspektów teoretycznych i umiejętności praktycznych. Należy wzmocnić pozycję koordynatora jako osoby odpowiedzialnej za zarządzanie procesem uczenia się/nauczania.

Należy stosować zarówno tradycyjne, jak i innowacyjne metody nauczania, tj. symulacje, pielęgniarstwo oparte na dowodach, studia przypadków, e-booki.

**SŁOWA KLUCZOWE:** HCAI/HAI zapobieganie i kontrola zakażeń, proces uczenia się i nauczania, edukacja, pielęgniarstwo.

## Introduction

Healthcare – associated infections (HCAIs) affect the lives of patients through prolonged stay in hospital, illness or even death, incurring significant costs to both healthcare systems and the society. Research shows that during stay in hospital approximately 20% to 30% of patients are diagnosed with at least one infection [1]. The key role in providing support and preventing hospital acquired infections belongs to the management unit of the hospital. Openness, fine interpersonal and communication skills as well as adequate opportunities for training courses for healthcare staff contribute to promoting HCAI/HAI prevention [2].

Nevertheless, it should be borne in mind that HCAI/HAI prevention starts as early as during the educational stage of the future staff. It is vital to properly prepare future nurses for the profession and instill in them good practices in HCAI/HAI prevention at this very stage. Educating students should be directed at their ability to undertake creative professional activities in terms of healthcare [3]. HCAI/HAI-related education should contribute to widening knowledge, mastering practical skills, developing appropriate attitudes, and caring for the safety and quality of patient care [4].

In Higher Education Institutions a holistic approach should be applied. It should encompass teaching processes, learning processes as well as learning outcomes and their evaluation. Such an approach is strictly connected with behavioural, cognitive, social, and humanistic approaches [5].

It stems from the available literature that numerous factors affect the learning process and the effectiveness of education and the contemporary HEIs strive for more active teaching and a learner-focused approach. Teaching in the philosophical and pedagogical context of active learning is person-focused and places a person in the very center. The Person-Centred Practice (PCPF) by McCormack and McCance (2017) “is underpinned by values of respect for persons, individual right to self-determination, mutual respect and understanding” [6]. These teaching principles place nursing students at the center of the educational process, treating them as a group that interacts with lecturers, professional instructors and coordinators. They are the ones to make a contextualised reality closer to students. It is assumed that lecturers, professional instructors, coordinators create a significant foundation for professional development and social interactions by applying interactive models [7]. Higher Education Institutions endeavour to ensure that their students not only achieve learning outcomes in terms of knowledge and skills but also develop social competencies. It shall be noted that while

acquiring knowledge and practical skills, students should also prepare for practice focused on a patient [8]. This process is regulated by European law pursuant to Directive 2005/36 /EC, 2014 [9].

Nursing education across Europe is directed, among others, at a specific domain related to healthcare – associated infection prevention and control. Developing this domain stems from an international concern about the general health of the population, which reflects the quality of healthcare standards and the quality of the national healthcare system. Academic education prepares nursing students to apply the principles and protective measures related to HCAI/HAI regardless of their specialty, providing for knowledge, skills, and competencies update [10–13]. HEIs play an important role in designing curricula and, above all, engaging in active student learning process in nursing education, which takes place in laboratories, during simulation, practical classes and professional traineeship in healthcare institutions [7].

In order to enhance the cooperation for innovation and exchange of good practices in higher education institutions in terms of healthcare - associated infection prevention and control, a European project *InovSafe-Care* was established. Its aim is to develop an innovative approach to infection prevention and control that triggers motivation for learning – in other words to create an active learning environment. This active learning environment may facilitate and encourage engaged, reflexive thinking, boost creativity and support autonomous learning, so that students are capable of coping with current and future challenges and developing a spirit of entrepreneurship. Therefore, in order to accomplish the aim set out in the project, the current context relating to teaching infection prevention and control content in selected European HEIs must be assessed from the perspective of professors/teachers, assistants, and tutors.

## Methods

This qualitative study was based on the analysis of interviews and focus groups. Both data collection techniques were carried out in person. The interviews and focus groups had a list of open-ended questions the project partners elaborated on. The first part encompassed 7 questions for Assistants and Tutors. The second part of the questionnaire contained 9 questions directed at Teachers. The third part of the questionnaire encompassed 8 questions aimed at the Nursing Department Coordinator, and President of The Didactic Board, President of the Scientific Board. The questionnaire interview was translated in to the native languages of the given HEIs.

These questions mainly concentrated on whether students are aware of HAI prevention and control con-

tent, what strategies are used to improve students' competencies, the feedback mechanism between the clinical placements and nursing schools as well as the content of the nursing curricula in relation to HAI. The questions also encompassed equipment, technologies, and entrepreneurship.

The last set of questions focused on educational opportunities provided by the school in the scope of HAI prevention and control, the number of hours devoted to teaching this content as well as skills expected from students on course completion (**Table 1**).

The analysis of data from focus groups and interviews was obtained by means of the phenomenological analysis method. The phenomenological analysis involves the conceptualization of the opinions expressed by the interviewees, the ordering of the opinions by integrating the perceptions followed by the classification of these opinions in an evaluative scheme, and finally the conclusions.

Subsequently, the interviews were entered into records (four groups of researchers) and recorded directly during the interviews (one group of researchers). The researchers reviewed the data. Main categories and subcategories were identified.

Each participant was informed about the aim of the study and participated in it on a voluntary basis, was assured of its anonymity and sensitive data protection, and learned about the interviewers' work experience and their project role. After receiving informed consent from the participants, the interviews were conducted by a team consisting of the main interviewer and one or two assistants experienced in the field of nursing.

The research proposal was approved by the institutional review board (Approval number: 277/20).

**Table 1.** Open-ended questions: focus groups and interview

Focus group – Invited assistants and tutors
1 – Do you think students are aware and well prepared in regard to HAIs prevention and control?
2 – How does the health institution where students undertake their clinical practice facilitate or hinder their intervention in regard to HAIs prevention and control?
3 – What strategies do you use with students in clinical practice to enhance their competencies and skills in the area of HAIs prevention and control? How do you emphasise such opportunities?
4 – Throughout the nursing course, what is the difference between the student's level and consistent mobilisation of knowledge in regard to HAIs prevention and control?
5 – What difficulties do you identify that nursing students feel/evidence? What solutions/strategies do you suggest to implement to improve their teaching and learning process in this domain?
6 – What HAIs-related knowledge and skills should students be able to evidence at the end of the nursing course?
7 – What feedback mechanisms exist between clinical placements and nursing schools? What could be done to improve the collaboration between them in regard to HAIs prevention and control?

Focus group – teachers
1 – What is the emphasis given in your institution's nursing curriculum in the scope of HAIs prevention, and control (e.g. hours, content and strategies)?
2 – What do you think can be implemented in the study plan in the scope of HAIs prevention and control (e.g. hours, content and strategies)?
3 – Is there continuity and articulation between the curricular units that lecture HAIs-related topics (e.g. microbiology, anatomy, and pharmacology)?
3a – Do you think that the nursing students' entrepreneurial skills are stimulated within this thematic scope? If yes, how? If not, how can it be done?
3b – Does your educational institution sufficiently cater to the systematic increase in students and teachers' competencies in HAIs prevention and control?
4 – What equipment, technologies, or teaching materials currently exist in your institution that can enhance HAIs teaching and learning? In your opinion, which should be acquired or implemented?
5 – What is your perception of students' effective learning of these contents, and how do they mobilise them in clinical practice?
6 – What theoretical references do you deem essential to disseminate among students in this thematic scope?
6a – How can we uniformize the teaching process in regard to HAIs prevention and control? What are the potential prospects of changing/adjusting the curriculum on a national scale?
Interviews (nursing department coordinator, president of the didactic board, president of the scientific board)
1 – In the scope of HAIs prevention and control, what educational opportunities are provided by your institution for internal and external employees?
2 – How are HAIs prevention and control emphasized throughout the nursing course?
3 – Regarding your institution's nursing curricula, does the number and typology of hours attributed to this particular topic seem appropriate?
4 – What improvements do you consider to be essential to implement in your institution's nursing curricula to enhance HAIs prevention and control teaching and learning?
5 – What institutional actions can the school continue and/or implement to improve its educational offer in this area?
6 – How are the HAIs-related contents/hours/learning opportunities for students defined in your institution?
7 – Which authorities determine and collaborate in the definition of HAIs-related content in your institution?
8 – What kind of skills should students be able to evidence at the end of the nursing course?

## Participants

In each five European Higher Education Institutions (HEIs) Interviews and Focus groups were conducted. Each university examined three groups: Teachers, Invited Assistants and Tutors and Nursing Course Coordinator, President of the Pedagogical Board, and President of the Scientific Board, which gives a total of 15 studied groups. Escola Superior de Enfermagem de Coimbra, Portugal examined 16 participants.

Instituto Politecnico de Santarém, Portugal examined 20 participants.

Savonia-Ammattikorkeakoulu Oy, Finland examined 13 participants.

Universidad de Salamanca, Spain examined 19 participants.



and Państwowa Wyższa Szkoła Zawodowa im. Hipolita Cegielskiego w Gnieźnie, Poland examined 11 participants.

In total, there were 80 participants involved in the study: 61 women and 19 men.

## Results

Based on the collected responses to interview questions, five main categories emerged, and for each main category twenty-six subcategories were defined.

**Table 2** shows the categories and subcategories.

**Table 2.** List of categories and subcategories emerging from focus group analysis

Categories	Subcategories
HAI Prevention and Control in the Nursing Curriculum	Transversality [of the HAI prevention and control in the curriculum] Articulation between curricular units' programmes and contents Mandatory areas, contents and workload Definition of learning outcomes
Organisation and structure of HEIs	Number of students per learning setting Teachers and mentors training Resources in Training Laboratories Experts in HAI prevention and control Articulation between the lecturers of HEIs
Pedagogical strategies and methods	Encourage reflective thinking Encourage entrepreneurial potential Teaching and learning tools Simulation-based learning Problem-based learning Evidence-based practice Knowledge and performance evaluation Educational interaction
Student competencies	Reflexive and critical thinking Motivation Knowledge transfer Entrepreneurial spirit, creativity and engagement Autonomous learning ability Professional ethical competence
Articulation between HEI and practice settings	Clinical practice orientation Clinical field dynamics Cooperation

## Description of the participants' statements

The first category: *HAI Prevention and Control in Nursing Curriculum*. Four subcategories are defined here (**Table 2**). The following conclusions emerge from this category:

The need for incorporating HAI content in each subject from the first year. Some participants sustain HAI content is discussed in all subjects and a special emphasis is given to it in the final years of study. There is a need for better integration of the theoretical and practical aspects, a stronger emphasis on HAI content during clinical classes, and standardisation of the content for all medical science courses.

Participants admit that in relation to HAI content, there are inconsistencies between the curricula and

what is actually taught. According to them, HAI should have an obligatory mode, not elective; education should focus on changing attitudes, not teaching an overwhelming amount of technical content; in addition, there is a lack of specialists in this field. Teaching HAI is felt to be superfluous at times, there is no deep analysis of the issue and only rudimentary information is provided.

Additionally, the participants agree that there is an insufficient number of hours devoted to studying HAI content (e.g., waste disposal, PPE, patient isolation). Some conclude that increasing the number of hours itself will not remedy the situation, yet it is essential to better prepare classes or devote a separate subject related to HAI content. Also, there is not enough attention given to prevention and no culture of prevention exists. It is felt that teaching HAI content nowadays is more difficult since there are new diseases, and new patients, especially in view of the COVID-19 pandemic.

According to participants, the course is run by various specialists, each of whom might have a slightly different perspective, which is enriching, yet it might be burdensome when the content is slightly different in the didactic context. According to participants, learning outcomes should be defined precisely; the bottom line for each graduate should be the knowledge of protocols.

Participant statements (examples): *»(...) but I think that in fact this training should be done from the beginning, from the first year, in fact. However, I don't see it much, for example, in clinical teaching (...)*»E1

*»Also, to the lack of flexibility we have in the curricula. They had a curriculum changed. It is a battle, a tremendous job, and the only way we can include this type of training is by means of electives. And in the facility, because there is a limit, the students do not take all the optional subjects either. In other words, I agree that we are doing something wrong and that it would not be particularly costly to include it in training»* GF2. I.M.6

The second category *The Organisation and structure of HEIs*. Five subcategories are defined here (**Table 2**).

The participants claim that the student number during classes is too high, teachers are often overloaded with duties and this has a limiting effect in terms of knowledge transfer.

The participants believe there is a need for the whole medical staff to update their knowledge; the staff, on top of good will, knowledge, and skills, need training, yet not everybody has such an opportunity. Participants report there are some lags in knowledge in relation to HAI content in nurses. Online training is a real opportunity, teachers take advantage of in-house training in healthcare institutions yet the mentors themselves might sometimes have insufficient knowledge or attitudes.

Participants' observations concerning resources in laboratories are varied: some claim that their laboratories are equipped to the highest standards, while others suggest these could be improved, more comprehensive, or of better standards (for instance in terms of PPE). There are some, in turn, who claim that the equipment itself does not constitute a problem but the inability to address the content is a setback. All agree that training rooms should be equipped so that they reflect the hospital environment as closely as possible.

The participants discern that the content should be addressed by experts in the field and a coordinator for the subject must be appointed; such a person would ensure the integrity of the content taught.

The participants believe that on the one hand, the HCAI content is frequently repeated in various courses, on the other hand, lecturers have very few opportunities to exchange information on what content was covered. Accordingly, there is insufficient transfer of information among lecturers – there is not enough time for that. Additionally, there are cases where an expert in one field furnishes students with information which that is contradictory to the information provided by another expert in a different subject. Finally, the participants suggest it would be useful to develop uniform resources or slides to be utilised/presented in all subjects to assure that uniform content is taught.

Participant statements (examples): «*The number of classrooms operating simultaneously with several assistant teachers doing the practices (...) hours and hours with the students (...) divided into small groups [an example of how it could be]*» FC4 L 334-335

«*Too many students within a group. The student count should be reduced so that the monitoring on HCAI observance is increased*» IAT (n 1-5)

«*I can't think of any real cooperation*» 6.3.2020T1

The third category: *Pedagogical strategies and methods*. There were eight sub-categories here (table 2).

The participants reckon there is a need to instill the ability of reflexive thinking, yet it is time-consuming.

Entrepreneurship is – in participants' view – a vital issue and skill. Yet the lecturers do not stress its significance in the HCAI context because they themselves were not taught this way.

The participants assure there is a need to use interactive resources; the foundation of it should be video content (video tutorial and recording students) and providing relevant feedback; some participants sustain it is insufficient, there is a need to create more interactive resources, develop games, utilise all senses (colours, mannequins responding to sound) and take advantage of the resources available in the virtual reality.

All participants acknowledge the need to introduce simulation; some of them develop simulation scenarios, while others sustain that simulation classes for HCAI content are imperfect and require better integration with the subject taught. Simulation should be preceded by addressing theoretical content.

Participants discern a need for problem-based learning – initially, theory introduction, case observation or reading is recommended, followed by developing a common solution.

It is felt that access to evidence-based information is crucial.

Evaluating HCAI content is executed during various stages of education, with a special emphasis on evaluation during traineeship, but also during a theoretical module. Some participants claim that evaluation should not consist in indicating mistakes but should revolve around raising awareness. Definitely, HCAI content should be one of the traineeship evaluation criteria.

The participants feel there is a need to better motivate students to work and analyse protocols. Moreover, teachers need to adapt their teaching methods to reach new students.

Participants' statements (examples): «*The time for reflection is fundamental*» B3

«*There is no time for that [reflection]*» B6

«*If we could have a simulator, a mannequin that we would approach and if the person did not wash their hands the mannequin would scream, or give any warning ... I think it would be interesting*» B7

«*Learning is evaluated at different times; it is evaluated when it is approached in theoretical and cognitive terms in the curricular units*» FC4 L 545-546

«*I think that students will learn better, if in their unit (internship) everyone talks openly about protocols (HAI)*» 6.3.2020UH

The fourth category: *Student competencies*. Six subcategories emerged within this category (Table 2).

According to the participants, a student should be able to develop critical thinking, should be able to draw their own conclusions till the end of the studies, and should be able to agree or disagree with proposed solutions. The conclusion is that unless critical thinking is developed in students, professional nursing care will not be possible.

According to participants, motivation can be enhanced by encouraging students to pursue problem solutions individually, by persuading them to deliver their own presentations in relation to HCAI content, and by engaging them.

The participants claim there are problems with knowledge transfer that stem from the fact that HAI content

taught in the first year of studies is not directly interwoven into practice that mobilises this knowledge. The general level of knowledge mobilisation after graduation is satisfactory, knowledge mobilisation is most discernible in a hospital setting but it is very much dependent on the mentor/tutor. Therefore, it would be wise to transfer teaching HAI content into a hospital setting.

Some students are thought to have an innovative creative approach; according to some participants the stress of following HCAI principles results in students being void of innovation and deprived of creativity. Most participants admit they encourage students to become innovative and creative, to become pioneers of change, to critically approach HCAI content, and propose improvements.

In addition, some participants see the need to support autonomous learning; they perceive the lecturer as having a key role in the process. There is also a need to encourage students to pursue knowledge individually.

According to the participants, following HAI guidelines is a matter of professional ethics and responsibility.

Participants' statements (examples): *»If the student looks at a situation and tries to identify what is appropriate in that behaviour in the procedure he visualizes, why is it not suitable»* FT5 L 225-227

*«It will be a person, a professional with critical capacity (...) if we do not develop this as a school, perhaps we are not creating proficient students and professionals»* FT5 L 301-304

*«Are students motivated to try out new ways of working»* 6.3.2020T1

*«The important thing for me is to see the students also reach the 4th year and show that it seems that they have already decided their decision-making in a more correct way»* FT3 L 608-610

The fifth category: *Articulation between HEI and practice settings*. Here three subcategories were defined (Table 2).

During clinical traineeship, students are instructed in relation to HCAI content and therefore develop good practices. Mid-term evaluation allows for a potential intervention, whenever needed. However, facing a hospital setting might constitute a problem, when nursing staff – frequently being the real role model for students – do not thoroughly follow the content delivered by a lecturer during classes.

In a clinical context, not adhering to HAI/HCAI principles by nursing staff causes confusion in students. Hand hygiene is thought to be a classic example – everybody is aware of how vital correct hand hygiene is, yet for various reasons, it is not always obeyed. Hospital work dynamics, and fast pace of work make obeying the HAI/HCAI prerogatives less urgent when collated with life – threatening situations.

The participants feel there are some discrepancies that could be avoided by developing leaflets with guidelines; furthermore, medical staff could be invited to participate in classes. Both lecturers and hospital staff could benefit from elaborating didactic resources jointly. Also, there is a lack of initiatives such as discussions, common courses, and focus groups.

Participants' statements (examples): *«One thing is what we [teachers] show here, but we are not the real models of our students, they come to practice, and the real models are those [nurses] and those who are already doing it differently from what they have learned»* FC3 L 160-163

*«She sees there on the field the wrong way of working, and if she doesn't have any arguments, then she will really easily embrace them»* 6.3.2020T1

*»Currently, the communication between the university and the healthcare institutions is satisfactory. Yet the effectiveness of work can be increased through holding more frequent focus group meetings»* IAT (n 1–5)

## Discussion

The analysis of the data from the focus group responses has shown that the participants notice gaps in the current educational system. There are too few hours devoted to HCAI-related content (e.g., waste disposal, PPE, patient isolation). Some participants discern a need for separating the subject addressing HCAI prevention and control content and ensuring a better preparation of teaching staff running this course.

There are numerous factors that might hinder the incorporation of HCAI-related education. First and foremost, this would be a lack of awareness amongst the teaching staff that the content relating to infection prevention and control should constitute an integral element of the medical sciences and nursing curricula [14].

In 2011 WHO published a manual *Safety Curriculum Guide Multi-professional Edition*, which, among others, contains content relating to infection prevention and control. WHO indicates that “infection prevention must always be imperative for all healthcare professionals and treated as such it constitutes an important element of patients' safety program”. In the InoSafeCare focus groups, it was shown that, according to lecturers and professional instructors, students have insufficient knowledge of microbiology. In the above-mentioned publication, microbiology – which is a pillar of clinical traineeship safety – is an indispensable element of education in Higher Education Institutions. This handbook contains information on the required learning outcomes in terms of knowledge and skills. It might be concluded that the content addressed in this handbook should be a foundation for theoretical, skill labs, simulation, and

clinical classes, as well as designing the curricula for medical courses in relation to the HCAI content in the world.

It is important to incorporate various forms of teaching that can boost the effectiveness of knowledge absorption, i.e., simulation classes, interactive/didactic lectures, small focus groups, discussion panels, or individual case studies. WHO takes particular notice of educating and training representatives of various medical professions, which is a pillar of ensuring safety and high quality of healthcare. If they are to fulfill their roles, it is imperative that they are educated using an innovative approach [14].

American researchers proved in their findings (2020) that psychological safety is a key factor in the process of cooperative learning, which in the long run, enhances patient safety. This study was conducted through a questionnaire and examined statistically the impact of psychological safety on HAI practices. The hospitals that gained 4-5 points on a 5-point Likert scale proved to ensure a high level of psychological safety (approximately 38% of hospitals). The general response rate to the questionnaire was 59% (530 out of 897 participants) [11]. In the InovSafeCare study, the safety factor was not measured within the focus groups and interviews. Undoubtedly, this dimension is significant in the context of forming and acquiring knowledge and skills relating to HAI/HCAI content and might be a starting point for future studies.

In relation to InovSafeCare study results it has been reported that special attention must be given to learning outcomes that need to be precisely defined and protocols that both students and lecturers must be familiar with. According to the InovSafeCare study, it is essential that the teaching staff update their knowledge. The participants declared that they wish to train and upgrade their knowledge; they also observed gaps in HAI/HCAI-related knowledge in nurses.

Aglen (2016) [12] emphasises that modern nursing education is evidence-based; therefore, it is a combination of scientific evidence and clinical knowledge as well as patient's preferences in order to ensure optimal patient care. From a systematic review, it stems that undergraduate nursing students (first cycle) need basic knowledge relating to evidence-based practice, therefore it is necessary to gradually incorporate education based on this method to students in later years of studies. Research has shown that students require time to reflect in order to absorb knowledge and develop positive attitudes toward evidence-based practice [13]. In addition, the groups reported that – based on their own experience – there is a need for having access to the latest evidence-based information about infection control. The fact that lecturers should be more open to

new fields of knowledge has been pinpointed by other authors [15]. A lot of insight can be gained from students as well. The study conducted amongst 500 nursing students at the Medical University of Białystok based on an anonymous questionnaire proved that only every third student ascertained that the content relating to hospital infections and contagious diseases was covered in a satisfactory scope. Almost 50% of the participants thought that students were familiar with the content relating to hospital infections on a satisfactory level. Nursing students declared that the content relating to contagious diseases was covered mainly in epidemiology classes (18%) and parasitology (14%). On the basis of this study, it appears reasonable for nursing students to broaden their knowledge relating to contagious diseases, the reasons for their spread and hospital infection prevention [16].

The majority of the participants sustain that there is a need to apply interactive resources, and video tutorials should become the pillar of education. Some participants reckon current methods are insufficient, and hence there is a need to introduce more interactive resources, design games, appeal to various senses (colours, sound-responding mannequins) as well as use virtual reality.

The fact that this knowledge is insufficient has been proven in our study and confirmed by the study conducted with 322 nursing student participants who completed their first year of professional education. The study was conducted by means of a diagnostic survey method at the end of the academic year (June 2017) in four schools educating nurses located in the south of Poland. Knowledge deficiencies in hygienic hand washing have been shown in nursing students who completed their first year of education. These deficiencies have already been visible during their first professional traineeship. This reinforces the conclusion that hand hygiene is not adequately addressed in the curricula. Additionally, the study has proved a low engagement level of professional educators in terms of controlling hygienic hand washing [17]. Therefore, it is imperative that there be changes in the educational process of nursing students and the importance of hygienic hand wash is increased as a key factor in infection prevention, which is also confirmed by participants of our research (focus groups).

Others also pinpoint that it is important to incorporate in the nursing curricula other teaching methods i.e., group work. It has been reported that the teamwork method in collaboration with students from different countries, e.g., within the Erasmus+ Program involves students and reinforces social relations. It enables students to share experiences, positively affects their edu-



cational process, and facilitates knowledge exchange in the nursing dimension from an international perspective [18].

Indisputably combining theory and practice in the field of nursing, commonly called integrated learning, is another important aspect. This term mostly refers to practical education which encompasses professional traineeship. Applying knowledge in the workplace is vital and considerably affects the quality of education [19]. Integrating theoretical and practical classes supported by various teaching methods should promote the idea of integrating nursing students with the medical traineeship context.

Such a need has also been observed by the lecturers participating in the focus groups. The study participants pay attention to the need of addressing HAI/HCAI issues in all subjects from the first year of study. They also claim there is a need for better integration of the theoretical and practical aspects, placing a stronger emphasis on HCAI-related content during clinical classes and standardising the contents for all medical fields of study. According to the study group, the nursing staff in a hospital setting is a real role model. Nevertheless, this might trigger some obstacles when facing the hospital environment reality where nursing staff do not always set a correct/adequate example for students. For instance, according to the study group, this fact is illustrated by the nursing staff not observing HAI/HCAI provisions, which might cause confusion in students.

According to Dogra et al., [20] nursing curricula do not contain a module that would incorporate practical training in relation to HAI/HCAI content nor do they have evaluation methods of for these skills. Knowledge evaluation in terms of HAI/HCAI content, is a matter of coincidence depending on questions relating to knowledge that are covered in the theoretical dimension, whereas practical skills are not evaluated at all. This situation creates a huge gap in the first years of undergraduate studies, since students presumably do not recognize the importance of the skills relating to HAI/HCAI prevention and control. This leads to non-observance of principles of adequate hand wash and safe waste disposal in students' future clinical practice, which in turn might contribute to HAI infection spread rather than its prevention.

Such findings determine a huge need for introducing an innovative methodology of training and student evaluation in terms of their practical skills in relation to HAI/HCAI prevention and control. Dogra et al. [20] findings have contributed to a statistically significant improvement of in the general point rate of marks of students participating in the program incorporating HAI/HCAI skills, which implies that educational programs have a positive impact on knowledge, attitudes and skills relating to HAI/HCAI. Those findings suggest that trainees had not acquired

sufficient formal knowledge in relation to HAI/HCAI; hence medical schools might need to readapt their assessment method of teaching hand hygiene and incorporate the HAI/HCAI course within their curricula.

The recent increase in HAI/HCAI rates indicates, especially in Covid-19 affected times, that there is an urgent need to improve the system of complementary education and courses for healthcare professionals. Observing practices that reduce the number of hospital infections is a multilayer problem that involves knowledge and attitudes. Educational awareness and frequent revision of prevention principles play a key role in sustaining a high rate of observing those principles. Needless to say, a lot of effort needs to be made in order to improve and perfect the education of healthcare professionals after their graduation so as to enhance HAI/HCAI practices and attitudes. Currently, this area is not given the highest priority, there is a lack of training and evaluation criteria for traineeships and attitudes – which would boost its significance [20].

The majority of participants in our study encourage students to become more innovative and creative and to become pioneers of change and critically reflect on HAI/HCAI content as well as proposing their own solutions. In terms of European HEIs that participated in our study, the opportunity to use the eBook that is also a result of the work of the InovSafeCare research group and can contribute to increasing the effectiveness of teaching HAI/HCAI-related content, is undoubtedly another important aspect facilitating the autonomous study of these issues.

The School of Nursing, Hashemite University, Zarqa introduced an online module into its course on standard infection control precautions. The study was conducted on a group of 256 students pursuing their degree in nursing (undergraduate degree). By means of an online questionnaire that encompassed the HAI/HCAI standards, a preliminary evaluation test was conducted prior to starting the module, and later another one – after the module. It was reported that this method is effective and the organisations supervising Nursing degrees in Jordan have an opportunity to improve their education by incorporating standardised infection control programs into all nursing schools' curricula [21].

In a study concerning 1017 nurses employed at various healthcare institutions, Laskowska et al., [22] have proven that nurses and midwives have very varied and insufficient knowledge of hospital infections, particularly in relation to rudimentary issues on epidemiology and prevention measures [22,23]. In our study the lecturers confirm that students conducting their professional traineeship are instructed in terms of HAI/HCAI. Yet they admit that the content and skills covered by the nursing

staff at the wards differ significantly from what is taught by the lecturers in class. Additionally, they imply that such discrepancies might be avoided through developing leaflets that would provide guidelines or inviting medical staff to join classes. According to the participants, both lecturers and hospital staff would benefit from developing didactic resources jointly. Common initiatives such as discussions, courses and focus groups are missing.

In Great Britain and the Republic of Ireland, a study aimed at analysing medical education in relation to HAI/HCAI content in all medical profile HEIs was conducted. In this study the authors underline – similarly to our focus group conclusions – that a program dedicated to students of medicine within the scope of HCAI prevention and control should be developed and a common pool of resources should be elaborated.

Despite the main restriction of our study – that is the subjectivity in the assessment of individual categories of the educational process by focus group participants – the integrity and accuracy of the participants' responses should not be underestimated. Nevertheless, as it results from the notion of a focus group, all the conclusions and recommendations based on it result from the responses received from group/groups, not individual participants and therefore, there is a possibility of conclusions being restricted in their nature.

On account of the scale of the issue, there is a need to further develop research. Such a prospect might constitute a new challenge for researchers striving to improve education relating to HAI/HCAI prevention and control, which might result in uniformizing the HAI/HCAI-related curricula in all Higher Educational Institutions across Europe in the future.

### Final conclusions and recommendations

The nursing curricula devoted to infection prevention and control in the analysed HEIs are not free from flaws. Therefore, there is an urgent need to develop a common innovative pedagogical model in order to improve the quality of the educational nursing programs in relation to infection prevention and control.

In order for students to achieve the learning outcomes in terms of knowledge, skills, and social competencies in relation to infection prevention and control, there is a need to further integrate the theoretical aspects and the practical skills.

It is indispensable to appoint coordinators from both the university and healthcare centers where traineeships are conducted; such experts would ensure that the content taught is coherent and correct and in line with the skills gained. At the same time, these coordinators would take responsibility for the students achieving the learning outcomes relating to infection prevention and control.

When teaching infection prevention and control in nursing it is crucial to take advantage of both traditional and innovative teaching methods, such as: simulation, evidence-based nursing, case studies, and eBooks. The diversity in the methods applied stimulates students to undertake decisions and employ critical thinking; last but not least, it furnishes them with knowledge and skills indispensable in planning nursing care, implementing and fulfilling these tasks, and assessing the effects of nursing care.

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