

Early Exposure of First-Year Medical Students at the Emergency Department: a cross-sectional study in Greece

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Abstract

Introduction: Early clinical exposure (ECE) aims to close the gap between basic and clinical science and provide unique, long-lasting learning experiences to young medical students. After their training in the simulated environment of a Clinical Skills Center, first year medical students (FYMeS) visited the Emergency Department (ED) of a University Hospital. There they observed the triage process, infection prevention protocols, history taking and communication skills. This study aims to present medical students' perceptions about early clinical exposure in an ED.

Methods: This is a cross-sectional study, employing a mixed-methods research design to explore students' experience. The data collection was based on an online questionnaire. Descriptive statistics were performed on demographic data and the answers to the close-ended questions. Regarding the free-text questions, the data were analyzed using a two-stage thematic analysis procedure.

Results: Two-hundred and fifty students participated in the study. They felt satisfied after their first clinical exposure and mentioned their need for additional visits at the ED. The majority of students agreed that infection prevention was inadequate, especially hand hygiene, while communication and history taking techniques applied were similar to what students had learned in theory. They, also, emphasised the importance of triage and pointed out that a Health Care System with strong Primary Health Care could reduce patient visits in ED and hospital admissions.

Discussion and Conclusion: Apart from the deeper understanding of the ED's function, the students observed the skills being used by professionals on duty, in a proper or improper manner, which solidified their knowledge. Their views on the medical personnel's compliance with guidelines, but also the functional problems of the overcrowded ED, reveal the need for immediate improvement. Overall, this study accentuates the need for early exposure of students in a clinical environment in order to cultivate their clinical skills and professional behavior.

Keywords: *Communication Skills; Early Clinical Exposure; Emergency Department; First-Year Medical Students; Infection Prevention; Medical Education*

Abbreviations

BCS: Basic Clinical Skills; ECE: Early Clinical Exposure; ED: Emergency Department; EM: Emergency Medicine; EMT: Emergency Medical Technician; FYMeS: First-Year Medical Students; HCAs: Health Care-Associated Infections; HH: Hand Hygiene; PHC: Primary Health Care

Introduction

Early clinical exposure (ECE) can be defined as the educational model which mainly includes the introduction of undergraduate medical students to the clinical environment during pre-clinical years of studies, aiming to close the gap between basic and clinical science and provide unique, long-lasting learning experiences to young students. Due to the multiple, well-addressed beneficial aspects of this alternative teaching approach, many medical education providers have reasonably attempted to offer early clinical experiences to freshmen students [1-6].

Integrating ECE in undergraduate medical education means that students have direct patient contact from an early stage of their training. To our belief, offering Basic Clinical Skills' (BCS) teaching early in the medical school curriculum can provide students with an education of great importance and usefulness for their entire career as health care providers.

The first important clinical skill that all healthcare professionals must meticulously apply daily is infection prevention, since Health-Care-Associated Infections (HCAIs) affect millions of patients annually and adequate Hand Hygiene (HH) is considered to be the most effective single measure to prevent HCAIs [7]. However, in a large systematic review regarding HH guidelines in hospital care, an overall median compliance rate of 40% was found [8]. Quality of medical education is one of the major factors influencing compliance with HCAIs prevention procedures [7,9,10]. Although it is highly recommended to introduce HH techniques as early as possible in undergraduate medical teaching, very few studies have explored the effectiveness of HH education modules, all the more so in First-Year Medical Students (FYMeS) [9,11].

Communication and history taking skills are also essential for medical students and physician. Training on these two skills has been a part of the curriculum in most medical schools around the world; it takes place in multiple different ways, including more traditional as well as modern methods assisted by the use of technological advances [12,13]. However, the existing evidence cannot indicate one of them as the most preferable [14]. The assessment of empathy and soft skills, for both medical students and doctors, has been a topic of interest in many surveys during the years [15,16]. The difficulty in maintaining these skills is quite common [15,17,18], affecting the relationship with the patients, patients' satisfaction and their compliance with the suggested treatment [19,20]. Thus, early and continuous training [21] on communication skills throughout the medical career seems to be beneficial [22] and essential.

To respond to the increasing need for early exposure to the clinical environment and generate future clinicians with solid knowledge of BCSs (e.g. infection prevention, history taking skills), a novel course 'Introduction in Clinical Skills and Practice' was introduced in the core curriculum, during the first semester of studies at Medical School of Aristotle University of Thessaloniki. In this course, students were trained in BCSs in the simulated environment of the Clinical Skills and Simulation Center. The ECE was gained through educational visits in Primary Health Care Centers and the Emergency Department (ED) of a University Hospital.

In our study, we endeavored to explore medical students' opinions about their educational visit at the Hospital ED, a place where students and clinicians interact with a large population in a short period of time.

Aim of the Study

The aim of our study was to evaluate the importance of this educational visit at the ED for FYMeS, and to assess, from a students' perspective, the health care professionals' compliance with practice guidelines, regarding HH and communication skills.

Materials and Methods

Design and setting

This is a cross-sectional study, employing a mixed-methods research design to explore students' experience. The FYMeS attending the core course were randomly divided into groups of 10 - 12 students and each of these groups visited the ED at a specific date during the first semester of the academic year of 2019 - 2020 (before the outbreak of COVID-19 pandemic). In each visit, a doctor-instructor introduced the students to key-points of the ED operation and the objectives of their visit. Afterward, they were divided into two subgroups. The first one stayed at the triage area and had to evaluate the process, while the other subgroup observed patients in the waiting and examination rooms. This procedure lasted 30 minutes and, then, a rotation between the subgroups took place, to observe the whole procedure.

Participants

All participants were FYMeS who: 1) attended the core course 'Introduction in clinical skills and practice', 2) participated in the educational visit at the University Hospital ED. Only the students who fulfilled the aforementioned eligibility criteria enrolled in the study.

Data collection

The data collection was based on an online questionnaire (Google form). The questionnaire consisted of four sections. The first section included a brief description of the study's objectives, while the second consisted of demographic data from the participants. The third section included five questions. Three of them pertain to the HH (1. Application of HH before the examination of the patient, 2. Application of HH after the examination of the patient, 3. Application of proper 6-step technique - Ayliffe technique [7]), while the other two questions pertain to the communication skills used in taking a medical history in the ED (1. Use of honorary plural, 2. Proper use of open-ended and closed-ended questions). Each item was assessed on a five-point Likert scale, where a score of 1 denoted "never" and a score of 5 denoted "always". The fourth section included three free-text questions regarding the positive and negative impressions of students' early exposure to the ED and their possible future suggestions.

Data analysis

Descriptive statistics were performed on demographic data and the answers to the five close-ended questions of the questionnaire.

Regarding the free-text questions, the data were analyzed using a two-stage thematic analysis procedure. Three independent investigators with experience on qualitative analysis analyzed and coded the students' answers to get a general perception of the data and its meaning, generate initial codes, and define themes. Then, all members involved in the assessment and interpretation of the initial analysis and identified the relations among the final themes to create the final report. Any discrepancies in the themes and codes were discussed until all researchers obtained consensus. In terms of statistical analysis, a Kolmogorov-Smirnov and a Shapiro-Wilk test were conducted to examine the presence of Gaussian distribution for each variable.

Results

Participants

In terms of engagement, out of the 255 students who attended the core course, 250 met the eligibility criteria and were included in this study. Among the 250 medical students, 128 were female (51.2%); thus, the male-to-female ratio is 0,953.

The quantitative and qualitative findings are presented below, clustered in four themes: Students' reflections on early clinical exposure at the ED; Infection prevention; Communication; and Organization of Health Care System. Illustrative quotes are presented in italics.

Students’ reflections on early clinical exposure at the emergency department

It is highly notable that students declared a great sense of satisfaction after their first exposure in the clinical practice and the hospital setting. The general view of students is underlined in the following quotation: “Personally, I think it was a life experience and we needed to visit such a place from the first semester because we experienced the medical world with realism and away from any attempt to embellish it” (S136).

The students’ remarks emphasized on the fact that in just one hour they were able to get in touch with their future work environment which “was generally an unforgettable first experience” (S96) and pointed out that: “Our visit to the ED brought us closer to the practical part of our studies and will help us in adapting to the hospital setting more easily in the upcoming years” (S99).

Furthermore, students mentioned their longing for additional visits of longer duration in the ED over the next semesters.

“Such visits should be made on a systematic basis so that we become familiar with both the hospital environment and the patients” (S14).

Students did not miss out to report the attitude and behavior of their supervising doctors during the observational visit at the ED. The doctors were very helpful and eager to explain “the procedures that are being followed even though they were under pressure from incidents” (S4) and to guide them in the various departments, as well as to “answer our questions and enhance our interest” (S39).

Infection prevention

Respecting the application of the HH before and after the examination of the patients, only 56 students (23.4%) and 58 students (24.4%), respectively, observed that HH had “always - almost always” been applied. Regarding the use of the proper 6-step technique of HH (Ayliffe technique), only 38 students (15.2%) observed that doctors had “always-almost always” used it (Figure 1).

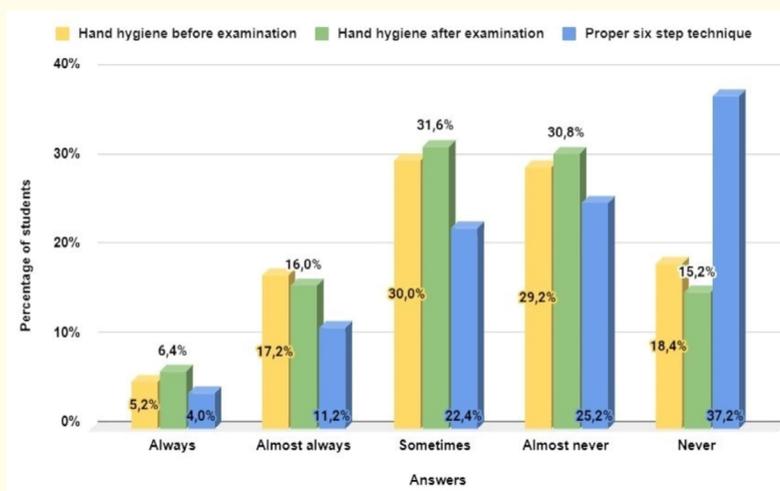


Figure 1: Medical students’ observations of health care personnel at the Emergency Department regarding the frequency of: 1. Application of hand hygiene before examination, 2. Application of hand hygiene after examination, 3. Application of the proper six-step technique.

The students' remarks in the open-ended questions confirmed the aforementioned results. Few students stated that the HH was adequate, mentioning that there were alcoholic antiseptic solutions in many departments and that the doctors changed the disposable gloves in each subsequent patient. Additionally, only a few students reported that the infection prevention was sufficient, having noticed multiple needle disposal boxes, as well as nephroids, where there were no such boxes nearby, yellow, and black waste bags.

However, the majority of the students indicated poor HH and infection prevention conditions. The health care professionals wore disposable gloves rarely and skimp on HH both prior and after examining a patient. A student expressed that: "HH was rarely observed when examining patients and even after examination. The health care personnel often wore the same gloves all the time and came in contact with many patients" (S136).

The students attributed the inadequate HH to the absence of antiseptic solutions in a few rooms of the ED, while several students mentioned that there was an absence of some types of waste bags, "which is contrary to the guidelines for proper waste disposal" (S95).

Improvements indicated by the students include the presence of antiseptic solutions in every room, the hallway, and the reception of the ED; in places that are easily and quickly approached by health care professionals so as not to skip the HH. The continuous training of the ED personnel regarding infection prevention was also proposed to be adopted as a good practice.

Communication and history taking skills

As stated before, communication and history taking skills are listed amongst the most important for both medical students and physicians. In order to cultivate them even more, our students observed the ED physicians and their compliance with rules and methods regarding those skills.

In most cases, students were astounded by the professionalism and kindness that the physicians demonstrated even under extreme pressure circumstances. They stated that each patient was handled with care and the personnel were remaining calm and supportive to patients and their relatives alike: "Health professionals were kind towards patients (they kept their composure even in cases of angry or rude patients)" (S14).

According to the students' observations, interprofessional teams work relentlessly in order to attend to as many people as possible, showing the same interest and establishing a reliable doctor-patient relationship regardless of age or severity of the medical problem.

"Doctors and nurses were very willing to help their patients despite the crowding in the waiting area" (S25).

FYMeS described highly competent professionals using all the techniques noted by their professors in the theoretical part of the course. Plural form was "always - almost always" used by physicians during the history-taking process as stated by 156 students (66.4%). Furthermore, the use of open-ended and closed questions was observed "always - almost always" by 144 students (57.6%) to ensure that the necessary information was being collected and that the time spent with each patient was sufficient for the establishment of a proper relationship with their doctor (Figure 2).

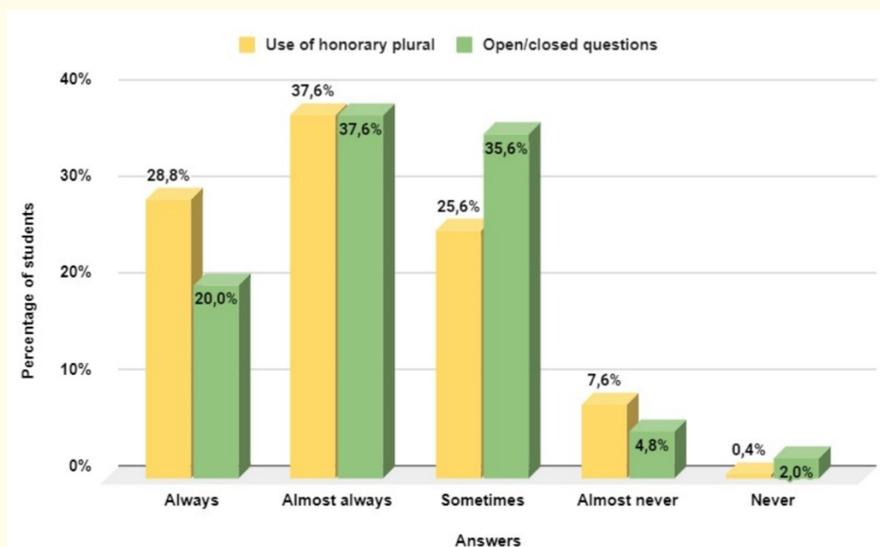


Figure 2: Medical students’ observations of health care personnel at the Emergency Department regarding the frequency of the use of 1. honorary plural, 2. open-/closed- ended questions.

Different communication techniques were used to manage challenging patients or their relatives in order to provide the necessary care without disturbing the rest of the department. The students also mentioned the use of simple language deprived of medical terms which the patients would be unable to understand and they positively evaluated the detailed documentation of all the given information.

“Use of plural form for the most part during the history-taking process, without using any complicated terms, kindness towards the patients, and effort to form a trusting environment” (S161).

In spite of the great communication skills demonstrated by the majority of the personnel, students also observed less adequate performances during the history-taking procedure by the lesser part of the medical team. The use of singular form especially towards the elderly, constant interruption of the patients before they have finished explaining their problem and minimization of time allocated to each patient were some of the most frequently documented issues. The most prominent of all though, was the lack of privacy during this process, as it was performed in front of other patients, or their relatives without the required consent given by the patient: “Doctors didn’t give much importance in the patients’ privacy of sensitive information, since the history was taken in front of other patients or their relatives or medical students without taking the patient’s consent first” (S237).

Organization of the healthcare system

During their visit, the students familiarized themselves with the patient protocol being used and its effectiveness. On their reports, there were a plethora of comments on the improper use of the ED by patients, but also on the immense absence of a well-established Primary Health Care (PHC) system in our country that resulted in inferior services being provided.

The efficiency of the triage and the way it operates in real-life scenarios was fascinating for most of the FYMeS: “I was pleasantly surprised by the fact that each case was evaluated by its severity and the state of the patient and was handled accordingly by the physician in charge” (S230).

On the contrary, the overwhelming crowds of patients and their family members worsened the triage and proved that both the ED’s capacity and personnel were incompetent to handle such large numbers of patients without an impact on the quality of services provided.

Most of the participants were negatively impressed by the overcrowding of patients with problems that could have been treated in PHC. The number of such cases was quite large, as described by the medical students, hence the inevitably long waiting time for the patients: “Some patients visited the ED without having an urging medical problem (e.g. an old man came to the ED to have his blood pressure measured), while they could have gone to a PHC unit. Therefore, the strengthening of PHC is considered necessary, so that such incidents do not consume time, do not bind staff, or materials that are necessary for other patients” (S15).

Statistical analysis

In terms of statistical analysis, descriptive statistics were performed for each variable as a first approach towards the examination of the data’s distribution. Moreover, the Kolmogorov-Smirnov test (KS test) and a Shapiro-Wilk test showed that there is no normal distribution, so the proper measures of distribution are median and IQR. These outcomes show that, according to FYMeS perceptions, there is a poor performance regarding the HH, while contrarily there is a good performance regarding communication and history taking skills.

The results of the application of descriptive statistics can be graphically validated with the following Box-plot for each variable (Figure 3).

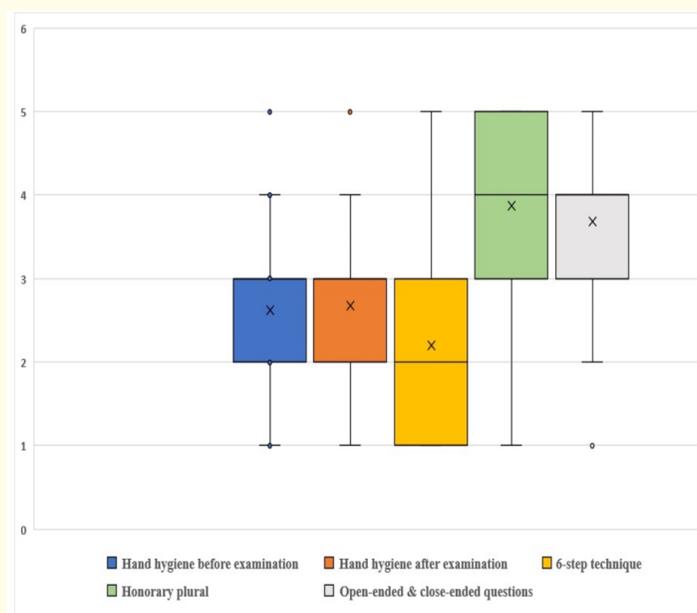


Figure 3: Box-plot of the students’ observations of the medical personnel regarding the: 1. Application of hand hygiene before examination, 2. Application of hand hygiene after examination, 3. Application of the proper 6-step technique, 4. Use of honorary plural, 5. Use of open-ended and close-ended questions; the value of “1” denotes “never”, the value of “2” denotes “almost never”, the value of “3” denotes “sometimes”, the value of “4” denotes “almost always” and the value of “5” denotes “always”.

Discussion

Our study aimed to evaluate medical students' attitudes towards a novel teaching approach for learning BCS, which included their early exposure to the Hospital ED. In general, our Clinical Skills Laboratory has long experience in teaching BCS to clinical-year medical students [23] and trying to bridge the educational gap between simulation and reality [24], but FYMeS at our institution used to have limited ECE. It is important that, through the students' own accounts, this ECE proved to be an extremely useful experience for them; students positively evaluated their educational visit at the ED and asked for more frequent exposure to clinical settings. As our results indicate, freshmen students recognized exemplary behaviors, especially towards communication and history taking skills, but negative role models and deficient practices as well, mainly regarding HH and infection prevention strategies.

Early clinical exposure at the emergency department

It is important to mention that our venture to provide FYMeS with such ECE and BCS training was not clueless. The advantages of early Emergency Medicine (EM) and Emergency Medical Technician (EMT) training are already proven to be numerous and medical education providers have recognized that ED is definitely a valuable setting for educating students, for providing early clinical experiences, and for effectively introducing medical students to BCS and clinical medicine [6,25,26]. That is the reason why more and more medical schools tend to incorporate EM or EMT education at the ED into the first two years of studies, as part of the standard pre-clerkship curriculum, in order to achieve early and repeated training [27].

One remarkable aspect of our qualitative findings is that students expressed high general satisfaction, describing their ECE as "unforgettable experience of high importance", which allowed them to "get in touch with hospital settings" and "achieve better adaptation to their future clinical environment". As current data suggest, this early exposure of pre-clinical medical students to patients at ED setting is considered to be a worthwhile learning experience, well-accepted from both students and patients, and it is also linked to enhanced immediate and lasting students' clinical, communicational and team-building skills, to increased comfort with patients, to a better understanding, observation and critical appraisal of EM concepts and principles (i.e. Triage) in real-life scenarios, and to a smoother transition to the clinical environment [6,25-29].

As part of the course, students also received training in PHC settings. Early exposure to PHC is considered to provide medical students with a great opportunity to improve their non-technical communication and teamwork skills and comprehend the principles of holistic patient management and the magnitude of public health in the community [30-32]. Therefore, we strongly believe that the combination of early exposure to ED and PHC environments for teaching BCS has a highly positive and multifaceted impact on medical students' education and professionalism. Nevertheless, our survey was designed to concentrate on students' perceptions towards their visits at Hospital ED; applying infection prevention techniques and soft communication skills properly in a stressful, noisy, fast-paced environment, where every second may be crucial for patients' life, is definitely considered to be an extremely challenging and educative experience for both students and educators [26,27,33].

Infection prevention

The FYMeS were placed as observers of the correct application of HH and the proper use of the Ayliffe technique. Regarding infection prevention, and particularly HH, our findings showed a general tendency towards low compliance with standard precautions. As the HH application was noted before and after the examination of the patient, the observation after the examination included more than one moment [7].

It is worth mentioning that the results of the free-text analysis further augment this deficient compliance with HH guidelines, as the majority of the students indicated generally poor HH and other inadequate infection prevention conditions. Similar findings have been presented in other studies, in which the mean HH compliance at the ED was also found to be low (22% and 29%) [34,35]. Furthermore, according to a large systematic review of studies on compliance with HH guidelines, the overall compliance rates measured in the studies included ranged from 4% to 100% [8].

At the same time, the factors that may influence compliance rates are extensive, with notable mentions being the heavy workload, knowledge, and training in infection prevention [8,9,35,36]. Especially lack of knowledge of HH guidelines has been identified as a significant barrier to good practices [7]. Therefore, it is considered necessary to promote the teaching of infection prevention (e.g. at medical schools by combining theoretical lectures with ECE starting from the first year of medical school) and to provide the time for the teaching of health care workers 'on the job' to create and maintain awareness for this topic. Promotion of HH over the years has been shown to be a very effective tool to improve compliance in HH [10], a fact that is also demonstrated from our study since students proposed that the continuous training of the ED personnel regarding infection prevention could be a good measure for the improvement of clinical practice. To our belief, apart from students' clinical exposure itself, the theoretical knowledge taught in a simulated environment may be consolidated even more effectively when students are asked to critically evaluate the skills applied by experienced healthcare professionals in real-life scenarios.

Communication and history taking skills

Regarding the communication part, students observed that the staff managed to handle the patients with kindness and respect even under demanding circumstances. The use of plural form, the proper use of open-ended and closed-ended questions and the use of simple language was marked as the most positive aspects. It is worth mentioning that students referred to the time that doctors spent with patients characterizing it as adequate in order to build a trustful relationship.

Communication and history taking skills are being highlighted during medical studies and play a crucial role in the everyday clinical setting [14]. Communication is important in many levels such as doctor-patient communication, interprofessional communication, and communication with patients' families [20,37]. Our students' answers show that there is a range of the communication skills among physicians; these skills gradually fade away and their preservation is based on continuous training throughout their career [18].

The establishment of a good relationship between doctors and patients was also mentioned. This relationship is based on aspects such as empathy, mutual respect, the style of communication adopted by doctors and the time spent with patients [38,39]. Moreover, as mentioned above, ED is an overcrowded, stressful, and time-restricted setting; establishing a relationship with patients is pretty difficult to be achieved. Thus, our students' observation regarding the doctors' ability to attain this, should be carefully assessed. Since students weren't active participants in history taking procedures, they have no clinical experience, and they spent limited time at the ED, it is quite possible to present an ideal view on the topic.

Students, also, pointed out the interruption of patients during the interview. Doctors would adopt a controlling communication style rather than intervene properly and when is needed. It was found that interrupting the patients during the interview is a quite common practice among physicians. In many cases, it happens in the early stages of the interview and usually results in important information missing from the patient's history. Furthermore, this practice gives the patient the idea that what they say may not be important or relevant and makes them more vigilant in sharing more personal information. This is presumably the point where patient-centered inter-

viewing turns to doctor-centered [40]. Last but not least, lack of privacy during the history-taking procedure was pointed out. Patients' privacy and confidentiality is quite often being compromised in the ED due to overcrowding and the way that the department is modulated. As a result, the information that the patients are willing to share might be exposed to unauthorized individuals [41].

Taking all the above into account, giving FYMeS the opportunity to realize, through their personal experience, the importance and the need for a good level of communication skills in the medical profession can instigate an effort for continuous training and daily application of good communication practices.

Organization of the healthcare system

During their visit, students made some insightful observations regarding the ED infrastructure and Triage guidelines implementation, as well as regarding the etiology of patients' pathology when visiting the ED. On the one hand, the good organization was pointed out, but on the other hand, there was a difficulty in the effective management of the big number of cases, most of which could have been tackled in a PHC Unit. Overcrowding at the ED is a worldwide problem mentioned quite often in the literature [42,43]. It affects the health care professionals and is associated with malpractice and increased mortality rates [44,45]. Overcrowding also seems to be associated with low hand hygiene compliance in an ED [35].

In the Hellenic Health Care system, the role of PHC Units is degraded mostly in urban areas [46]. As there is no gatekeeping system, it is not obligatory for patients to see a General Practitioner for first examination and medical instructions; not only in case of a real emergency but almost in simple cases patients used to visit the ED of a hospital. Different strategies have been suggested in order to reinforce the PHC systems around the world; the reinforcement of the PHC system could alleviate the problem of overcrowding at the ED [43,46,47]. As students suggested, if treatment in simple cases could be given from PHC Units, then fewer patients would end up waiting for hours at the ED and thus the ED staff could work under better circumstances and offer even better services.

Strengths and Limitations

It is noteworthy that the results of this study were based on almost all FYMeS. Remarkably, in addition to the personal benefit of students, their observations can be encouraging for health professionals; good practices are highlighted and enhanced. They can also be of significant value for the necessary improvements since insufficient practices are underlined in order to be optimized.

There were some methodological limitations of note. Inherent to the nature of the study, the use of self-reported measures introduces a response bias; some of which was mitigated due to the anonymity of the questionnaire. It is possible that semi-structured interviews may lead to a more lengthy and specific presentation of their attitude. In addition, the short duration of the educational visits may have hampered students from shaping and expressing a solid, well-corroborated point of view. Moreover, the ED setting was far away from their previous medical experience, which was provided in a safe, controlled environment, and this might be the reason why they were not capable of distinguishing between relatively low, low, and absolute lack of HH compliance. In total, FYMeS' viewpoints may be subjective and not well-documented due to lack of previous experience; nevertheless, they can be evaluated as part of an educational process in which students received substantial training in a simulated environment and were afterwards asked to submit a justified assessment on the application of BCSs in real-life scenarios.

Despite a large number of participants, we are aware that our novel teaching approach towards BCSs is pilot implemented at our institution and we cannot ensure that it can be replicated in other institutions with success. Although we strictly followed broad strategies

to maximize generalizability, our results should be interpreted with caution and modifications may be necessary when implementing similar experiences in the curricula of other medical schools.

Future Perspectives

Our study neither documented students' perspectives prior to this course nor evaluated the knowledge gained and the probable behavioral changes. In the future, it would be interesting to investigate the effectiveness of this course, by using a pre-course test and post-course test, comparing the students' results against their perceptions. Monitoring students' perspectives over years and prospectively observing their attitude towards HH/infection prevention and communication with patients, could form the basis of new studies that would lead to particularly useful conclusions. Students' perspectives enhance good practices being applied at the ED and contribute to the reformation of weak aspects aiming at improved patient care services; thus, it would be worthwhile for medical educators to frequently receive students' feedback and meticulously utilize these observations to improve daily medical practice. Alternatively, as other studies indicate [33], it would also be meaningful to record the personal view of the ED staff involved in this educational process.

Conclusion

Evidently, ECE of FYMeS at the ED under supervision has a multifaceted impact on their BCS education. Apart from the deeper understanding of the ED's function, the students observed the skills being used by professionals on duty, in a proper or improper manner, which solidified their knowledge. Their views on the medical personnel's compliance with guidelines regarding HH and communication skills, but also the overcrowding of the ED due to the absence of a solid PHC system reveal the need for immediate improvement. Overall, this study accentuates the need for early exposure of students in a clinical environment in order to cultivate their clinical skills and professional behavior.

Conflicts of Interest

We have no conflicts of interest to declare.

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