Setting up the first clinical skills laboratory in Greece: Results from one-year evaluation.

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ABSTRACT: Introduction: Following contemporary trends in medical education, the Medical School of the Aristotle University of Thessaloniki initiate the development of the first Clinical Skills Laboratory (CSL) in a Greek setting.

Aim: To investigate the feasibility of CSL’s implementation and its response to the students needs and expectations.

Population: All students (132) who completed CSL training, during the academic year 2005-2006.

Method: Students’ training took place on a weekly basis. After the completion of all parts, an anonymous questionnaire was distributed to the students in order to evaluate the CSL.

Results: All aspects covered were considered very important by the students. Results showed that 76.8% of the students were satisfied with the training method, 73.5% with the training material and 74.3% with the trainers. In general, 86% of the students stated that they would attend a similar CSL again and 87% of them that the CSL met their expectations. CSL itself and the overall management scored 9.13 and 9.02 respectively in a 0-10 grade scale.

Conclusion: The evaluation highlighted the necessity of incorporating CSL as an integral part of the undergraduate medical curriculum.

Key Words: Clinical skills laboratory, Evaluation, Medical education.

1. INTRODUCTION

Nowadays, clinical experience of students is changing and opportunities for acquiring skills are reducing. Reduced length of stay by patients has resulted in fewer opportunities for student learning. Additionally, teachers have an increased clinical workload and fewer teaching resources. Besides, deficiencies in undergraduate programmes and the lack of systematic training have been recognised as leading to inadequate skill performance by the students.

As a result, junior doctors are expected to perform skills for which they have not been adequately trained. This reduces the quality of clinical practice and increases possibilities for medical mistakes.

Within that framework, the establishment of clinical skills learning facilities has taken place. Clinical skills learning facilities were introduced to provide an environment in which students could receive training in clinical skills in a systematic way, using effective educational strategies, tailored to their own individual needs.

In such facilities students are being trained in a systematic and safe way, in a full spectrum of clinical skills, under simulation circumstances, before their exposure to real patients.

In order to upgrade the level of undergraduate medical education, the Medical School of Aristotle University of Thessaloniki has embarked into an intense effort to innovate its traditional and overloaded with factual knowledge curriculum. Recognizing the need of students’ exposure to clinical practice in an early step the Medical School proceeded to the development of the Clinical Skills Laboratory (CSL).
1.1. The Clinical Skills Lab of the Medical School of Aristotle University of Thessaloniki

CSL aims to support the acquisition, maintenance and enhancement of clinical skills by medical students.

Setting and Resources

The CSL was set up at the outpatient clinics of AHEPA university general hospital of Thessaloniki, during non working hours. This setting was chosen in order to adapt the simulation procedures to the «real world» and to enhance the sense of a «clinical environment».

Staff

An interdisciplinary team of trainers consisting of doctors and nurses were the teaching staff of CSL. All teaching staff participated in a voluntary basis. Also, students who had completed their training in CSL took part in the educational procedure either as assistants or as standardized patients.

Course content

Basic training consisted of 2 two-hour introductory seminars, 9 two-hour regular training in clinical skills, in small groups as well as 2 self-directed practising under supervision, tailored to the individual needs of each student. Sessions last at least 2 hours.

Training topics were: control of infections, taking and writing of patient’s history, communication skills, introduction to clinical examination, vital signs, electrocardiogram (ECG) technique and basic interpretation, venepuncture, urinary bladder catheterization, injection techniques, local anesthesia and wound suturing. Every laboratory took place according to a «Course Plan». Teaching in the CSL followed the five simple steps, used by the American College of Surgeons for the Advance Trauma Life Support: 1) Conceptualization, 2) Visualization, 3) Verbalization, 4) Practice, 5) Correction and Reinforcement.

After a brief theoretical presentation practical training was following. Non-invasive clinical skills, like vital signs, were practiced on fellow students. Invasive practical procedures, like venepuncture, were practiced on models and simulators.

Resources

There was a range of models, manikins, diagnostic and therapeutic equipment available. Soft tissue strap-on pad for training in venepuncture or low cost pad, ideal for demonstrating training and practising core skills in local anesthesia and wound closure were two main examples. It was part of the philosophy of the course

![Figure 1 - Section 1: Evaluation of the content.](image-url)
that skills training should be as realistic as possible.

At the beginning of the semester, each student received a DVD study guide containing notes, presentations and relevant videos for each skill taught.

Examinations
Final examination consisted of a multiple choice test and an Objective Structured Clinical Examination (OSCE). OSCE included 8 different stations, lasting 5 minutes each, where a standardized clinical skill was tested at the presence of an examiner. Checklists were used in order to grade students’ performance.

1.2. Aim of the study
The aim of this study was to examine the extent to which CSL meets students’ needs and expectations by evaluating the content, the trainers and the training methods and materials, immediately after its first implementation.

2. POPULATION AND METHODS
The study population consisted of 147 students who attended the CSL during the academic year 2005-06. Those who participated at the final exams (n=132, 89.8% of the total) were asked to fill-in an anonymous questionnaire at the end of the CSL training course.

2.1. The questionnaire
A three section questionnaire was constructed and tested for its clarity, preciseness and relativity in a pilot study. The first section assessed the perceived importance of the 9 training subjects using a 2-grade scale where 1: irreplaceable, 2: can be skipped. The second section assessed the training method, the training material and the trainers using a 5-point Likert scale (1: very little, 2: little, 3: somewhat, 4: to a great extend, 5: definitely). Finally, the last section consisted of four general questions assessing general satisfaction with CSL.

2.2. Statistical analysis
For the descriptive analysis of the data, means, standard deviations and percentages were computed and relevant graphs were produced. In order to assess the internal consistency of the questionnaire α-Cronbach coefficients were computed for its different sections and parts. The software «statistical package for social sciences (SPSS)», edition 11.5 was used.

3. RESULTS
Results show high reliability for the second section (α-Cronbach’s =0.915).

3.1. Demographic characteristics
All 132 students who participated at the final exams (89% of all students attending the CSL) filled-in the questionnaire (responsiveness 100%). Males were 47.7% of the students and females 52.3%. The mean age was 21.4 (SD=2) years. Regarding their level of studies 10.8% of the students were attending the 2nd, 42.3% the 3rd, 15.4% the 4th, 16.2% the 5th and finally, 14.6% the 6th year of studies.

3.2. Section 1: Evaluation of the content
The students’ responses in section 1 are shown in Figure 1. All nine skills were considered as very important by the students. The skills on urinary bladder catheterization, injections, venepuncture and local anesthesia - wound suturing were evaluated by nearly all students as irreplaceable (from 97.7% to 100%). The lower acceptance (yet with the high percentage of 80.8%) was recorded at the seminar on taking and writing the medical history of patients.

3.3. Section 2: Evaluation of training method, training materials and trainers
Students’ answers at the second section of the questionnaire are shown in Table 1 and Figure 2.

Training Method
The students evaluated with high scores the explanation and interpretation of the objectives and other concepts under study, as well as the links between theory and practice, but only 24.6% of them considered definitely as adequate the duration of practice. In average, 33.2% of the students stated that were totally content with the training method, 41.1% to a great extend, 21.9% somewhat, 3.3% little and 0.5% very little.

Training materials
Training materials and mainly their quality, adequacy and correspondence to the content of the subject and the level of the students have been also evaluated. Overall, 33.6% of the students were totally content with training methods, 39.9% to a great extend, 22.5% somewhat, 3.9% little and 0.1% very little.
Table 1 - Section 2. Evaluation of the training method, training materials and trainers.

<table>
<thead>
<tr>
<th>Training method</th>
<th>N</th>
<th>Mean¹</th>
<th>Standard deviation</th>
<th>1 very little n(%)</th>
<th>2 little n(%)</th>
<th>3 somewhat n(%)</th>
<th>4 to a great extend n(%)</th>
<th>5 definitely n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. The objectives of the CSL were clearly defined</td>
<td>130</td>
<td>4,30</td>
<td>0,655</td>
<td>0(0)</td>
<td>0(0)</td>
<td>14(10,8)</td>
<td>63(48,5)</td>
<td>53(40,8)</td>
</tr>
<tr>
<td>2. Concepts and techniques were clearly explained</td>
<td>129</td>
<td>4,23</td>
<td>0,724</td>
<td>0(0)</td>
<td>1(0,8)</td>
<td>19(14,7)</td>
<td>58(45)</td>
<td>51(39,5)</td>
</tr>
<tr>
<td>3. The relation of theoretical tutoring and clinical practice was adequate</td>
<td>129</td>
<td>4,05</td>
<td>0,821</td>
<td>0(0)</td>
<td>5(3,9)</td>
<td>27(20,9)</td>
<td>53(41,1)</td>
<td>44(34,1)</td>
</tr>
<tr>
<td>4. Duration of practice was adequate</td>
<td>130</td>
<td>3,74</td>
<td>0,953</td>
<td>2(1,5)</td>
<td>8(6,2)</td>
<td>44(33,8)</td>
<td>44(33,8)</td>
<td>32(24,6)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Training materials</th>
<th>N</th>
<th>Mean¹</th>
<th>Standard deviation</th>
<th>1 very little n(%)</th>
<th>2 little n(%)</th>
<th>3 somewhat n(%)</th>
<th>4 to a great extend n(%)</th>
<th>5 definitely n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Visual means (video, photos) were adequate</td>
<td>129</td>
<td>4,17</td>
<td>0,751</td>
<td>0(0)</td>
<td>1(0,8)</td>
<td>24(18,6)</td>
<td>56(43,4)</td>
<td>48(37,2)</td>
</tr>
<tr>
<td>6. Equipment and disposable material were adequate</td>
<td>130</td>
<td>3,85</td>
<td>0,836</td>
<td>0(0)</td>
<td>5(3,8)</td>
<td>41(31,5)</td>
<td>52(40)</td>
<td>32(24,6)</td>
</tr>
<tr>
<td>7. Models and manikins were in good condition</td>
<td>130</td>
<td>3,85</td>
<td>0,83</td>
<td>0(0)</td>
<td>5(3,8)</td>
<td>41(31,5)</td>
<td>53(40,8)</td>
<td>31(23,8)</td>
</tr>
<tr>
<td>8. The study guide (manuscript and CD ROM) met the needs of preclinical students</td>
<td>130</td>
<td>4,15</td>
<td>0,789</td>
<td>0(0)</td>
<td>2(1,5)</td>
<td>26(20)</td>
<td>53(40,8)</td>
<td>49(37,7)</td>
</tr>
<tr>
<td>9. The content of the study guide corresponded to the oral presentations during the session</td>
<td>130</td>
<td>4,19</td>
<td>0,872</td>
<td>1(0,8)</td>
<td>4(3,1)</td>
<td>21(16,2)</td>
<td>47(36,2)</td>
<td>57(43,8)</td>
</tr>
<tr>
<td>10. I could use the study guide as a reference in the future</td>
<td>130</td>
<td>3,98</td>
<td>0,96</td>
<td>0(0)</td>
<td>13(10)</td>
<td>22(16,9)</td>
<td>50(38,5)</td>
<td>45(34,6)</td>
</tr>
</tbody>
</table>

The trainers ...

<table>
<thead>
<tr>
<th>Training materials</th>
<th>N</th>
<th>Mean¹</th>
<th>Standard deviation</th>
<th>1 very little n(%)</th>
<th>2 little n(%)</th>
<th>3 somewhat n(%)</th>
<th>4 to a great extend n(%)</th>
<th>5 definitely n(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. were adequately prepared</td>
<td>130</td>
<td>4,53</td>
<td>0,587</td>
<td>0(0)</td>
<td>0(0)</td>
<td>6(4,6)</td>
<td>49(37,7)</td>
<td>75(57,7)</td>
</tr>
<tr>
<td>12. had communicability</td>
<td>130</td>
<td>4,44</td>
<td>0,635</td>
<td>0(0)</td>
<td>0(0)</td>
<td>10(7,7)</td>
<td>53(40,8)</td>
<td>67(51,5)</td>
</tr>
<tr>
<td>13. responded adequately to questions of the students</td>
<td>130</td>
<td>4,48</td>
<td>0,65</td>
<td>0(0)</td>
<td>1(0,8)</td>
<td>8(6,2)</td>
<td>49(37,7)</td>
<td>72(55,4)</td>
</tr>
<tr>
<td>14. were polite and willing</td>
<td>130</td>
<td>4,67</td>
<td>0,504</td>
<td>0(0)</td>
<td>0(0)</td>
<td>2(1,5)</td>
<td>39(30)</td>
<td>89(68,5)</td>
</tr>
<tr>
<td>15. collaborated well with each other</td>
<td>130</td>
<td>4,52</td>
<td>0,65</td>
<td>0(0)</td>
<td>1(0,8)</td>
<td>7(5,4)</td>
<td>38(29,2)</td>
<td>84(64,6)</td>
</tr>
<tr>
<td>16. I would attend again a similar CSL contacted by the same trainers</td>
<td>130</td>
<td>4,52</td>
<td>0,65</td>
<td>0(0)</td>
<td>1(0,8)</td>
<td>8(6,2)</td>
<td>44(33,8)</td>
<td>77(59,2)</td>
</tr>
</tbody>
</table>
Trainers

The trainers were evaluated for their level of preparation, communication skills and responsiveness to students’ questions, politeness, and willingness to collaborate.

More than half of the students (59.5%) were definitely content, 34.9% to a great extent, 5.3% somewhat, 0.4% little, whereas nobody stated to be very little content with the trainers.

Section 3: General evaluation

The extensive majority of students (87%) thought that the CSL met their expectations. Moreover, 86% of the students stated that they were definitely or to a great extent content with the CSL and would attend again a similar course. The overall management and the CSL in total were evaluated with 9.02 (SD 0.94) and 9.13 (SD 0.76) respectively in a 10-grade scale.

4. DISCUSSION

CSLs were developed as a result of the reduced effectiveness of the traditional educational systems to train medical students on clinical skills. However, experience showed that the organization of such a laboratory is a demanding process that requires careful planning, organization and support. In order for a CSL to be considered successful, it has to be flexible and an integral part of a wider educational procedure.

The evaluation by both the trainers and the trainees is necessary and comprises an important element for the development and progress of a CSL. Evaluation is a very important procedure that aims to guarantee that education responds to students’ needs, identify areas where teaching needs to be improved, provide feedback and empower to trainers and investigate the value of a subject in undergraduate curricula, in order to lead to an overall curriculum improvement. Since the 80s there is an abundance of evidence that has highlighted the importance of the involvement of students in the evaluation of the training procedure.

The General Medical Council of U.K. at «Tomorrows’ Doctors» describes thoroughly the clinical skills that have to be developed in undergraduate medical education. The selection of the training objects in every CSL has to be the result of an internal evaluation of every Medical School and thus meet its specific needs. In the Aristotle University Medical School CSL the selection was based on the outcomes of a study on 6-year medical students which revealed their inability of performance on basic clinical skills.

All skills included in the CSL were evaluated as necessary and not replaceable. Taking the medical history of patients was perceived as relatively less important compared to the laboratories that involve comprehensively practical skills such as venepuncture, injections, urinary bladder catheterization, local anesthesia and wound suturing. This is in agreement with the majority of the CSLs running nowadays. Our CSL runs on an elective basis and can be attended...
by students independently of their year of study. As a result, many of them have already been taught history taking and thus considered it as less necessary, in contrast to subjects that had been absent from their formal training. This is confirmed by the groups-analysis of our data, which showed that preclinical students considered the seminar on taking medical history more important than students during their clinical training.

What needs to be underlined at this point is that CSL aims to the enhancement, not the substitution, of traditional clinical training. CSL introduces the students to basic clinical skills in a protected environment, so as to provide them knowledge and self-confidence. In this way, it ensures that they will gain maximum benefits in their future training.

The internationally accepted sequence of five main steps24 in clinical skills training was followed, including: the initial mobilization of the trainees, the demonstration of the clinical skills without explanations, then with explanation of every followed step, discussion, oral description by the students and finally practice under supervision.

The duration of each session (2 hours) does not seem to be sufficient for the accomplishment of some tasks. The low score regarding the time of the practical training highlights the great need of students for practical application of theoretical knowledge, as well as the need of more protected time on practical training. Individual study and program revision is expected to overcome this limitation.

The training materials (audiovisual means, models, study guide) were positively evaluated by three quarters of the students. Specifically, the visual means noted the higher score. This reveals the need of students for the incorporation of new technologies (video, photos) in the educational procedure. The audiovisual technology gives the opportunity to demonstrate the appropriate use of each clinical skill and makes it easily understood. Moreover, audiovisual technology is widely used internationally25,26,27,28,29 as it provides the potential to expose the students to a variety of different cases in a relatively short time and with clearly focused educational aims30.

Training models and manikins have already been previously described in detail31. The proportion of models per students ranges from 1 per 2 students (in local anesthesia and wound suturing tasks) to 1 per 6 students (in the urinary bladder catheterization tasks). The adequacy and the condition of the models were positively evaluated by 64.6% of the students. This result reflects the imperative need of a continuous financing to cover the increased needs which are involved in the function of a CSL.

Trainers were evaluated positively by the great majority of the students. This result highlights the importance of staff selection, as findings from other studies also confirm32,33,34. The young age of the trainers32, the interdisciplinary collaboration between doctors and nurses33, the systematic training and updating of the trainers and the constant evaluation and self-evaluation of the trainers during the procedures34, were the main characteristics applied in the CSL implementation in the School of Medicine of the Aristotle University of Thessaloniki.

The fact that the students would attend again a similar course emphasizes the importance given to the CSL and endorses the evidence for its introduction in the core curriculum of the undergraduate medical curriculum of the Medical School.

5. LIMITATIONS OF THE STUDY

This particular study was conducted in only one Medical School and its results can not be generalised. The questionnaire was handed out to students after the completion of the labs and seminars and the responses are possibly to some extent influenced by a recall bias.

The evaluation of the CSL by the trainers was not included as it was out of the aims of this study. Its analysis would lead to a better overall evaluation of the CSL.

6. CONCLUSIONS

The one year experience of the CSL in the Medical School of the Aristotle University demonstrated the necessity for its integration in undergraduate medical curriculum. This CSL was the first one to be implemented in Greece, and therefore the gained experience can be used to further expand the integration of clinical skills.

Overall, the CSL received positive evaluation by the students and trainers. This allowed us to identify the limitations and design the future implementations.
Σχεδιασμός και λειτουργία του πρώτου εργαστηρίου κλινικών δεξιοτήτων στην Ελλάδα: Αξιολόγηση ενός χρόνου λειτουργίας.

Εμμανουήλ Σμυρνάκης, Όλγα Νικητίδου, Αλίκη Ξωχέλλη, Αρετή Τριανταφύλλου, Γεσθημανή Μηντζώρη, Ευαγγελία Τσίγκα, Νικόλαος Ντόμπρος, Αλέξης Μπένος

Εργαστήριο Κλινικών Δεξιοτήτων, Ιατρική Σχολή, Αριστοτέλειο Πανεπιστήμιο Θεσσαλονίκης, Ελλάδα

ΠΕΡΙΛΗΨΗ: Εισαγωγή: Η Ιατρική Σχολή του Αριστοτέλειου Πανεπιστημίου Θεσσαλονίκης, ακολουθώντας τις νέες τάσεις στην ιατρική εκπαίδευση, προχώρησε στην ανάπτυξη και λειτουργία του πρώτου Εργαστηρίου Κλινικών Δεξιοτήτων (ΕΚΔ) στην Ελλάδα.

Σκοπός: Η διερεύνηση της δυνατότητας της εισαγωγής του ΕΚΔ, προκειμένου να απαντήσει στις ανάγκες και στις προσδοκίες των φοιτητών Ιατρικής.

Πληθυσμός: Όλοι οι φοιτητές (132) που ολοκλήρωσαν την εκπαίδευσή τους στο ΕΚΔ την ιατρική εκπ. 2005-06.

Μέθοδος: Οι φοιτητές εκπαιδεύτηκαν σε εβδομαδιαία βάση. Μετά την ολοκλήρωση των εργαστηρίων, ένα ανώνυμο ερωτηματολόγιο διανεμήθηκε στους φοιτητές, προκειμένου να αξιολογήσουν το ΕΚΔ.

Αποτελέσματα: Όλα τα αντικείμενα θεωρήθηκαν πολύ σημαντικά από τους φοιτητές. Σύμφωνα με τα αποτελέσματα της αξιολόγησης, 76,8% των φοιτητών ήταν απόλυτα ικανοποιημένοι με την εκπαιδευτική μέθοδο, 73,5% με το εκπαιδευτικό υλικό και 74,3% με τους εκπαιδευτές. Το 86% των φοιτητών δήλωσε ότι θα παρακολούθησαν μελλοντικά ένα ανάλογο εργαστήριο και 87% πως το εργαστήριο ήταν ανάλογο των προσδοκιών τους. Η συνολική οργάνωση και το ΕΚΔ στο σύνολό αξιολογήθηκαν με 9,02 και 9,13 αντίστοιχα, με βάση 10βαθμίδα κλίμακα.

Συμπεράσματα: Η αξιολόγηση των φοιτητών δείχνει την αναγκαιότητα της λειτουργίας του ΕΚΔ ως αναπόσπαστο τμήμα του προπτυχιακού προγράμματος σπουδών.

Λέξεις Κλειδιά: Εργαστήριο κλινικών δεξιοτήτων, Αξιολόγηση, Ιατρική εκπαίδευση.

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