2012 4th International Conference on Bioinformatics and Biomedical Technology
IPCBEE vol.29 (2012) © (2012) IACSIT Press, Singapore

Using Biomedical Technology for Improving Internship Program: an Experimental Study

Payman Salamati [1+], Seyed mansour Razavi [2+], Elham Shahgholoi [3]

[1] Sina Trauma and Surgery Research Center, Tehran University of Medical Sciences

[2] Community Medicine Department, Tehran University of Medical Sciences

[3] Pediatric Department, Tehran University of Medical Sciences

Abstract. **Background:** During recent two decades, practical skills training are exposed to remarkable evolutions in medical faculties and it has been led to establish Clinical Skills Learning Centers. **Objective:** Our main objective was to comparing the consequences of skills training process between two groups of medical interns that they were trained in conventional approach (training on bedside and other clinical settings) with an integrated approach (conventional method along with using biomedical technology skills during the same time) .**Methods:** This was an experimental study that was conducted on two groups of medical interns in their pediatric course in Bahrami's Children Hospital. The method of sampling was simple & non- randomized. We used Objective Structured Clinical Examination for assessments and paired and independent t - tests for analysis.**Results:** The discrepancies of scores before and after training was significant between the first and second groups of interns (P<0.001).**Conclusion:** Clinical skills training in Bahrami's Skill Laboratory was effective in promotion of medical intern's pediatric practices.

Keywords: Clinical skills learning center; Objective structured clinical examination; Skill laboratory

1. Introduction

There is growing concern among medical educators that conventional modes of teaching medical students (lecture – based curricula) neither encourage the right qualities in students , nor imparts a life – long respect for learning. Nandi et al , in a medline literature search from 1980 through 1999 found that : Students of the conventional curriculum found learning to be " non – relevant , passive , and boring " (1) .This is more important , especially when , developing the skills and attitudes are considered.Guidelines produced by the General Medical Council of Great Britain have emphasized the importance of the development of the skills and attitudes appropriate for a junior doctor (2).According to change the community needs , we must change the curricula continuously , specially for clinical skills training methods. In this way , Most existing clinical skills centers have developed in response to changing healthcare policy, curricular initiatives and increasing emphasis on the quality of assessments and competencies. There is also increasing recognition that clinicians are no longer able to teach effectively all skills to students in the traditional ways.The potential scope of clinical skills centers is broad and encompasses not only clinical and communication skills but medical informatics, computer assisted learning, multi professional learning and assessment. Skills centers can also promote self directed and lifelong learning methods. The use of a clinical skills centre has potential benefits for staff and students, including the provision of a safe environment in which to learn and practice skills before using them in the real clinical setting. This can reduce anxiety in students and protect

[+] Corresponding author. Tel.: + 982164053306 ; fax: +982188962357
E-mail address: razavy@tums.ac.ir

patients from novice practice. Clinical skills centers provide a setting for structured learning with feedback as well as assessment of competence. The limitations of a skills centre are that it can only provide simulated experiences which are an adjunct to, but can never replace real clinical experience(3) .In skills laboratories , medical students learn clinical skills with using simulated patients, models and mannequins before they use such skills on patients . Students' views about communication, interviewing, physical examination, therapeutic, diagnostic and laboratory skills were investigated and The results indicated that prior training in clinical skills was helpful to the senior clerks and the interns. Statistically significant differences in opinion were noted between the senior clerks and the interns. the interns being more positive about the usefulness of the SKL training compared with learning clinical skills directly on patients (4).Clinical skills units offer exciting and innovative ways of learning about clinical skills. Links between theoretical knowledge and clinical practice are appropriate for both undergraduate and postgraduate training (5).In this study , first we have developed a clinical skill center in Bahrami Children's Hospital affiliated to TUMS , and then compare the consequences of conventional training method solely and conventional accompanied by an integrated skill laboratory based program in the same time. Results can be used for changing the curriculum.

2. Materials and Methods

This is an experimental study that was conducted on medical interns during spending their pediatric course. It's a pilot study for changing the curriculum. The research community were all 86 medical interns who introduced to Bahrami Children's Hospital affiliated to Tehran university of Medical Sciences (TUMS) in Iran.The students were introduced in to the two groups in the spring of the year 2007 (the first group) and autumn of the year 2008 (the second one) for spending their three months pediatric course.Sampling method in this study was simple and non randomized , and on the basis of the obtained findings , considering of mean differences after tuition , final calculated sample size was 11 for every group (totally 22 students) , but since the students were introduced as large groups , all of them were entered to study. (Group 1 = 25 , Group 2 = 19 , missing = 2 and , total number = 86) . In this study , first , we have developed a pediatrics skills training laboratory in the hospital (all educational conditions , were standardized by lesson plans written by faculties) , Then , we have designed needed skills and micro skills according to educational objectives , written in the internship course plan , Thereafter , the students were trained in two groups ,(conventional form and conventional with some defined integrated skills training courses in the skill lab., during the same time) , afterwards , the students that were trained in every group were assessed by OSCE (Objective Structured Clinical Examination) both at the beginning and at the end of the course. ultimately , the results were compared with together.It is worthy of mention that , the objectives , contents , and the number of questions at the beginning and at the end of examinations of two groups were similar and to prevent the awareness of the second group from the first group questions we have left a semester between two groups.Conventional approach in this study means : to learn the clinical and procedural skills directly upon the patients and other clinical settings emphasized lecturing , and integrated approach means : conventional method along with using biomedical technology skills during the same time.Thirteen stations in three cognitive, communicative and practical domains were designed for OSCE , according to objectives of the course .The main considered skills for tuition and examination were as follows :History taking from a simulated parent, identifying the objective problems in a real Thalasemic patient, adjustment of a scale apparatus – Infant anthropometric measurements - Interpretation of a real growth chart,interpretation of selected U/A , arterial blood gas and cerebrospinal fluid results, interpretation of 2 plain radiographies (An infant's chest x ray and an abdominal – x- Ray in a pre mature neonate), diagnosis of a defined case, prescribing for a defined condition,listing the signs and estimating dehydration degree after seeing of a video clip,preparation of a drug for I.V injection and injecting on a mannequin,pediatrics endo tracheal intubation on a mannequin, describe the use of a defined vaccine for a defined case and to place the vaccine to refrigerator, explanation of an infant's cervical mass for a simulated parent and educate the simulated parent for his/her asthmatic child.There were 13 distinct stations with 130 scores (10 scores have been considered for each station) and a long time station for slide projection (40 slides , valuated 20 scores) with a total of 150 scores in the OSCE . There have been allocated 5 minutes of time for each station , 20 minutes for slide projection station and totally 45 minutes for the rest stations and staying in quarantine. Data collection tools

were some checklists and rating scales which were designed by medical staff who were confirmed the validity of the examination tools and their reliability have been also confirmed by performing a pilot study on 10 expert staff who were as observers in the stations . We used paired and independent t tests for data analysis in this study .There was no any executive and ethical problems in this study . Anonymity of participants was guaranteed and the Results of the OSCE have not been considered in formal interns' final evaluation reports.

3. Results

There were 25 interns in the first group (16 females and 9 males). Mean and standard deviation of OSCE scores were 86.42±7.35 before , and 102.87±11.20 after completion of the course. So , mean and standard deviation of OSCE scores discrepancies were 16.45±7.97 during the course. Range of scores was 30.5 (minimum 68 and maximum 98.5) before , and it was 50.5 (minimum 70 and maximum 120.5) at the end of the course. The difference of mean scores were statistically significant between the beginning and the end of the course (P <0.001).Interns of the second group were nineteen individuals (11 females and 8 males). Mean and standard deviation of OSCE scores were 91.09 ±11.07 before , and 120.69±14.84 after the completion of the course. So , mean and standard deviation of OSCE scores discrepancies were 29.60±12.32 during the course. Range of scores was 48.4 (minimum 70.1 and maximum 118.5) before , and it was 51 (minimum 88.5 and maximum 139.5) at the end of the course. The difference of mean scores were statistically significant between the beginning and the end of the course (P <0.001).The difference of mean discrepancies of scores were not statistically significant between the first and the second groups at the beginning of study whereas , this difference at the end of study were significant (P value <0.001) , (Table 1).

Table 1: Mean changes of clinical skills scores in the first and the second groups (conventional and combined method) before and after the course

discrepancies of OSCE scores	**mean**	**SD**
before and after the course in first group (spring of 2007)	16.45	7.97
before and after the course in second group (autumn of 2008)	29.60	12.32
independent t= -4.291 & P value <0.001		

4. Discussion

The necessity of learning skills through "integrated skills training" at an undergraduate level has been supported by several studies (6-9). In this study , we have compared the consequences of skills training process between two groups of medical interns that they were trained in conventional setting (Training on bedside and other clinical settings emphasized lecturing , observing and theoretical approach) or in an integrated program (conventional setting accompanied by use of clinical skills center in the same time) . The results have showed that , the integrated program was more efficient than conventional method. The findings , perhaps are related to involvement of the students in new model more than conventional form.Nandi PL et al , in their study have also shown that , a combination of both the conventional and newer curricula may provide the most effective training for undergraduate medical students (1).In this manner , Lane & Tang found that , " teaching by simulation led to better performance than using a traditional text book approach (10).In our study , the skill laboratory program was effective in learning of different skills , and were compatible with many other studies. Some of the confirmatory studies consist of as follows : Hao J et al , showed that the clinical skills laboratory is a cost-effective venue for teaching clinical skills to medical students and they can learn selected clinical skills in a simulated situation as effectively as in a true patient care encounter, without taxing patient care (6).Weinberg et al , in an article entitled The use of simulation for pediatric training and assessment , have written : simulation has been widely adopted as a training and assessment tool in medical education. Conventional teaching methods may be inadequate to properly train healthcare providers for rare but potentially lethal events in pediatrics such as trauma and respiratory arrest. Recent studies suggest pediatric acute care providers have limited exposure to critically ill patients and also lack the skills to manage them. Weinberg et al have stated , simulation has the potential to fill this educational void and is an effective training tool for pediatric acute care providers(7).In an article , Stevens et al , have created an interactive virtual clinical scenario of a patient with acute abdominal pain to teach

medical students history-taking and communication skills. They concluded that , despite current technological limitations, virtual clinical scenarios could provide students a controllable, secure, and safe learning environment with the opportunity for extensive repetitive practice with feedback without consequence to a real or SP (8).Peeraer et al have compared the skill outcome levels of two different student populations: students who had been trained in basic clinical skills mainly through clinical internships in year 7 with students who had learned these skills through an integrated longitudinal program in a special learning environment in years 1-5 prior to their internship experience. Peeraer has stated that , 200 hours of integrated undergraduate skills training is more effective as a method of learning basic clinical skills (9).It seems that , we should also integrate the defined procedural training courses in skill laboratory along all clinical courses at pre internship time .In this study , we have used OSCE for comparing the outcomes. This method is also used in many other studies(11-13).

In conclusion our experience showed that , the students can learn selected clinical skills in a skill laboratory as effectively as in a true clinical setting, without taxing patient care , but using the manikins can never replace real clinical experience and it should be integrated along conventional courses.It should be better that , we integrate the skill laboratory program in to the conventional curriculum without expanding the total time of the course.

5. Acknowledgement

This manuscript was output of a grant financed by Tehran University of Medical Sciences.We would like to thank all of our colleagues at the Bahrami's hospital and Dr. Soheila Dabiran for their unsparingly helps .

6. References

[1] PL. Nandi , JNF. Chan, CPK. Chan, P. Chan , LPK. Chan. Undergraduate medical education: Comparison of problem – based learning and conventional teaching. HKMJ 2000; 6: 301 – 6

[2] J. Dacre , M. Nicol , D. Holroyd , D. Ingram . The development of a clinical skills centre. J R Coll Physicians Lond. 1996 Jul-Aug;30(4):318-24.

[3] C. Boulay, C. Medway. The clinical skills resource: a review of current practice. Med .Edu 1999; 33: 185-191

[4] M. Das, A. Townsend. The views of senior students and young doctors of their training in a skills laboratory. Med. Edu 1998; 32: 143-49.

[5] J. Blig.Techniques in medical education: the clinical skills unit .Postgraduate J 1995 ,71,730-32

[6] J. Hao, J. Estrada, S. Tropez- sims. The clinical skills laboratory: a cost-effective venue for teaching clinical skills to third-year medical students. Acad Med. 2002 Feb;77(2):152

[7] ER . Weinberg, MA . Auerbach, NB. Shah. The use simulation for pediatric training and assessment. Curr. Opin ped. 2009, Apr;17.

[8] Stevens, J. Hernandez, K. Johnsen, et. al. The use of virtual patients to teach medical students history taking and communication skills . The American Journal of Surgery, Volume 191, Issue 6,2009 , Pages 806-811

[9] G. Peeraer, A.J. Scherpbier, R. Remmen, et.al. Clinical skills Training in skills Lab. compared with skills training health in Internship: comparison of skills development curricula. Ed 2007 , 20(3), 125

[10] DM. Lane,T. Zhihua. Effectiveness of simulation on transfer of statistical concepts. Journal of educational computing research 2000 Vol. 22 , Num. 4 , P : 383 – 396

[11] UM . Rieger, K. Pierer, J. Farhadi,et.al. Effective acquisition of basic surgical echniques through Blended Learning. Chiruq. 2008; Nov 13.

[12] Stevens,J. Hernandez,K. Johnsen,et.al. The use of virtual patients to teach medical students history taking and communication skills. The American Journal of Surgery 2006; 191: 806–811.

[13] JG. Heckmann, F. Knossalla, S. Gollwilzer, et.al. OSCE in the Neurology clerkship. Experiences at the Neurological department of the university hospital Erlangen. Forttschr Neural psychiat. 2009 Jan; 77(1):32-7.