

Assessment Of Basic Practical Skills In An Undergraduate Medical Curriculum

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Introduction: Health educators and accrediting bodies have defined objectives and competencies that medical students need to acquire to become a safe doctor. There is no report in Malaysia, about the ability of medical students to perform some of the basic surgical skills before entering the houseman ship. The aim of this study is to determine whether the teaching/ learning methods of practical skills in our undergraduate program have been effective in imparting the desired level of competencies in these skills.

Methods: A list of basic practical skills that students should be competent has been identified. These skills are taught in a structured way and assessed as part of the composite end- of- semester examination. Practical skills stations form part of an Objective structured practical examination (OSPE).

Results: The results of 244 students who participated in three ends of semester examinations were analyzed. The mean score for the practical skills stations were higher than the mean OSPE (of all 18 stations) and overall score (of the written, practical and clinical examination). However the failure rate in the practical skills stations is higher in most of the stations (7 out of 8 stations) compared to overall failure rates.

Conclusions: In spite of the formal skills training many students failed to demonstrate the desired level of competencies in these stations. Assessment of practical skills as part of overall composite examination may not be effective in ensuring that all students have achieved the required level of competency. Practical skills should be assessed through dedicated formative assessments to make sure that all the students acquire the required competencies.

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Basic practical skills are essential competencies that students should develop during undergraduate medical training. The medical schools should ensure that students have acquired these skills that will enable them to meet the demands of their professional life.

Until recently, traditional medical school curricula have concentrated on imparting knowledge with ability to take history, examine patients and formulate diagnostic hypothesis and the examinations only concentrated on these areas. Though the students were expected to learn the basic practical skills, there were no formal training sessions and they were not assessed on the performance of these practical skills. In most medical schools it is possible for a student to qualify as a doctor, without ever performing an intravenous cannulation and then learn it during houseman ship.¹

There are some concerns that doctors are inadequately prepared for their internship particularly in the areas of practical procedures.² And what the medical students do not learn in medical school may never be addressed thereafter.³ It is suggested that every undergraduate medical curriculum should have a formal training programme for the basic practical skills and the students should be assessed to make sure that they learn these skills.⁴

The study aims to determine whether the teaching/ learning and assessment of basic practical skills in our undergraduate programme has been effective in providing adequate competency to all students.

Methodology

A list of basic practical skills (Table 1), that students should be competent in has been identified. These basic practical skills are demonstrated by the academic staff/ nurses to the students using manikin in the clinical skills unit, during their pre-clinical and clinical years. The students' were given opportunity to practice these skills under the supervision of academic staff/nurses. Later they carry out these skills in the ward in patients under supervision of the interns and registrars.

The students were assessed in these skills during the end of semester examination during year 4 and year 5, as part of Objective Structured Practical Examination (OSPE). During the examination both patients as well as models were used depending upon the skills tested. The students are examined using a structured checklist (Table 2).

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Our University uses composite test format to assess knowledge, skills and attitudes as given in the core curriculum. OSPE with 18 stations is used as one of the assessment tools in the examination for the undergraduate medical students. OSPE assesses student's ability to demonstrate practical skills or to interpret a laboratory investigation, imaging, ECG etc. In every examination a few practical skill stations were included in the OSPE. The marks obtained in OSPE constitute 10% of the total marks. Modified essay questions (MEQ) (20%), Objective structured clinical examination (OSCE) (40%) and in course assessment (done by MCQ, SAQ, OSCE, OSPE and long case) (30%) constitutes the remaining 90%. Overall mark is the total of OSPE, OSCE, MEQ and in course assessment marks. The pass mark is set at 50%.

Statistics for OSPE and Overall marks were generated using SPSS version 11.5 (means, 95%CI means, SD, Pearson's correlation) and Confidence Interval Analysis version 1.1 (95% CI of failure rate) (95% CI calculated using "Confidence Interval Analysis" (cia.exe V1.1) © Professor MJ. Gardner, BMJ 1991)

Results

The results of 244 students who participated in the three examinations were analyzed. The mean OSPE score for the practical skill stations were mostly higher than the mean OSPE (of all 18 stations) and overall mark of the written, practical and clinical examinations (Table.3). Statistical correlation (Pearson correlation) was seen in 5 out of 8 practical stations (Table.4). However, the failure rate in the practical skill stations was higher in most of the stations (7 out of 8 stations) compared to overall failure rate (Table.5). Failure rate in 3 out of 8 practical skill station significantly higher than the overall failure rate (Table.5).

Discussion

One of the objectives of the undergraduate medical curriculum is to provide students with the knowledge, skills and attitudes. Health professionals and educators have defined objectives and competencies that medical students need to acquire to become a safe doctor.

The study shows that the performance of the students in the practical skills stations depends upon whether they have learnt the skill or not. They either perform very well as shown by the higher mean mark for the practical skill stations compared to the mean OSPE score. It is interesting to note that in spite of formal training in basic practical skills, many students in the present study have failed in the practical skill stations during examinations. The failure rate in the practical skill stations is higher in most of the stations compared to overall failure rate.

Assessment of practical skills as part of composite examination, as is being practiced in our system, may not ensure that all students gain competence in these practical skills. A study of final year medical students has shown that not all skills had been mastered to the same degree. Only 10% of students had ever prepared or administered four or more intravenous antibiotics.⁵ Some schools are giving the practical skills as an elective course, where as in others it is part of the curriculum. An elective course in surgical skills has been practiced successfully in Stanford University using plastic models and cadavers. They feel that it has given good opportunity for students to learn by performing procedures under supervision.⁶

General Medical Council in Tomorrow's Doctors⁷ has proposed a core curriculum, which needs to be defined and taught, and it included certain basic practical skills. A well-planned curriculum must provide the students with structured opportunity for practicing the required clinical skills, timely feedback about their mastery of the skills and opportunities for remediation.⁴ The curricular intent needs to be monitored by a rigorous audit of what the students actually achieve.³ The skills training require time and practice, and this training should be monitored and assessed. Medical schools cannot rely on clerkship experiences alone to offer students adequate basic clinical skills training.⁸

Clinical skill laboratory based training and performance based testing will address the need of clinical skill training in undergraduate students. A study

has shown that longitudinal skills training offers the students a superior preparation for clerkship, particularly at schools where there is an elaborate skills training programme.⁹

Clinical skills laboratory has been recommended for medical schools to improve the skills of junior doctors.¹⁰ Plastic manikins and skills laboratory training is only a tool to help students learning and should not substitute the supervised training on patients.¹¹

Conclusions

The study shows that in comparison with the overall performance, generally, students either perform very well or poorly in the practical skills station depending upon whether they have learnt the skill or not. The practical skill stations were able to discriminate the students who have learnt these skills from those who have not as shown by the higher failure rate. However, assessment of practical skills as part of composite examination does not ensure that all students acquire adequate level of competence in these skills. It is recommended that these practical skills be assessed through dedicated formative assessment to ensure that all students are adequately trained. We have to make sure that the students achieve the adequate level of competency in these practical skills before they can proceed further to the next semester.

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Table.1. List of Basic Practical Skills

Venepuncture
Securing IV line
Preparing and setting up IV drip
Arterial blood gas sampling
Administering injection IM
Administering injection IV
Administering injection SC
Central venous cannulation
Urethral catheterization
Airway intubation
Mouth to mouth resuscitation
Nasogastric tube insertion
Forceps application
Wound suturing
Suture removal
Drainage tube removal
BASIC EXAMINATIONS:
Rectal examination
Examination of breasts
Vaginal examination
Pap smear
Otoscopy
Ophthalmoscopy

Table. 2. Examiners' Check list for a Practical Skill Station

Question: Demonstrate an appropriate technique of setting an intravenous line in this mannequin.

Examiners Check list

	Marks Allocated	Marks Awarded
Gets the permission	0.5	
Explains the procedure	0.5	
Wears gloves	0.5	
Chooses an appropriate site	0.5	
Applies tourniquet	1.0	
Cleans the area with antiseptic	0.5	
Holds the canula properly (avoids touching the catheter)	0.5	
Inserts the canula at an appropriate angle (oblique angle & in line with the vein)	0.5	
Inspects the backflow of blood in the chamber	1.0	
Advances the canula for a further distance	1.0	
Withdraws the stillete & advances the canula	0.5	
Fixes the canula	0.5	
Connects the drip	0.5	
Disposes the stillete in appropriate container	0.5	
Disposes the glove in an appropriate container	0.5	
Overall performance	1.0	
Total marks	10	

Table.3. Means and 95%CI (in brackets) for Practical Stations, OSPE (all stations), and Overall score

Practical skill station	Practical skill station (95% CI)	OSPE (95% CI)	OVERALL (95%CI)
Suturing (n=28)	58.5 (50.7-66.2)	62.0 (58.3-65.6)	61.3 (58.7-63.8)
Pap smear (n=34)	71.6 (67.2-76.0)	58.2 (55.7-60.7)	60.9 (59.4-62.5)
Endotracheal intubation (n=34)	71.8 (66.8-76.8)	58.2 (55.7-60.7)	60.9 (59.4-62.5)
Bladder catheterization (n=53)	62.6 (57.4-67.7)	53.8 (51.8-55.9)	58.8 (57.7-59.9)
Rectal examination (n=28)	57.1 (50.4-63.7)	52.0(47.3-56.7)	59.7 (55.8-63.6)
Intravenous canulation (n=28)	57.1 (50.4-63.7)	52.0 (47.3-56.7)	59.7 (55.8-63.6)
Forceps application (n=28)	55.2 (48.8-61.6)	52.0(47.3-56.7)	59.7 (55.8-63.6)
Surgical knot (n=53)	64.2 (58.6-69.7)	57.8 (55.4-60.2)	59.0 (57.8-60.3)

(n= no of students)

Note: The mean score for practical skills stations are mostly higher than OSPE (all stations), OSCE, and OVERALL marks.

Table 4. Correlation of Marks for Practical Skill Stations and OSPE (overall)

Practical skill stations	Mean (SD)	Pearson's correlation r (p value) OSPE marks
Suturing	58.5 (16.5)	0.447 (0.048)*
Pap smear	71.6 (12.6)	0.530 (0.001)*
ET intubation	71.8 (14.3)	0.337 (0.051)*
Bladder catheterization	62.5 (17.7)	0.424 (0.003)*
Rectal examination	68.9 (14.4)	0.259 (0.193)
IV canulation	57.0 (16.9)	0.419 (0.030)*
Forceps application	55.2 (16.2)	0.311 (0.115)
Surgical knot	64.1 (20.2)	0.432 (0.001)*

* Statistically significant correlation is seen in 5 out of 8 practical stations.

Table 5. Failure Rate in Practical Skill Stations in Comparison with Overall Failure Rate

Practical skill station	Failure rate in practical skill station % (95%CI)	Overall failure rate % (95%CI)
Suturing	35 (15.4-59.2)	5 (0.1-24.9)
Pap smear	2.9 (0.08- 15.3)	2.9 (0.08-15.3)
ET intubation	11.4 (3.3-27.4)	2.9 (0.08-15.3)
Bladder catheterization	21.3 (9.4-32.0)*	0 (0-6.7)
Rectal exam	3.7 (0.09-19.0)	0 (0.12.8)
IV canulation	25.9 (11.1- 46.3)	0 (0-12.8)
Forceps application	29.6 (13.8-50.2)*	0 (0-12.8)
Surgical knot	20.8 (10.8-34.1)*	1.9 (0.04-10.1)

* Failure rate in practical skill station significantly higher than overall failure rate.