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ORIGINAL ARTICLE

CLINICAL EXPERIENCE OF MEDICAL STUDENTS AT UNIVERSITY SAINS MALAYSIA

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Experience of acute medical, surgical conditions, and clinical procedures of undergraduate students were assessed via a questionnaire survey during the final week of the 1993/1998 programme at the School of Medical Sciences, Univestiti Sains Malaysia. Individual performances were assessed by a scoring system. One hundred and twenty four students responded, (response rate 97%). More than 90% had seen myocardial infarction, cerebrovascular accident, pneumonia, respiratory distress, gastroenteritis, coma, and snake bite. Less than 33% had witnessed acute psychosis, diabetic ketoacidosis, acute hepatic failure, status epilepticus, near drowning, hypertensive encephalopathy, acute haemolysis or child abuse.

Acute surgical/obstetrics cases, seen by >90% students, included fracture of long bones, head injury, acute abdominal pain, malpresentation and foetal distress. Less than 33% had observed epistaxis, sudden loss of vision, peritonitis or burns. Among operations only herniorrhaphy, Caesarian section, internal fixation of fracture and cataract extraction were seen by >80% students. The main deficits in clinical procedures are in rectal and vaginal examinations, urine collection and microscopic examinations. The performance of individual students, assessed by a scoring system, showed 15 students had unacceptably low scores (<149/230, 50%), 37 had good scores (>181.4/230, 70%) and 5 had superior scores (197.6/230, 80%).

Key words : *undergraduate students, clinical experience Universiti Sains Malaysia*

Introduction

The School of Medical Sciences at University of Science Malaysia in Kelantan, Malaysia has a problem based integrated curriculum (1,2). The teaching of basic science and clinical subjects is integrated in a 5-year course. There is a spiral learning process (3), facilitated by exposure to topics on numerous occasions, and early clinical contact which enables students to test their knowledge in a range of clinical scenarios. In the first year, the integration is based on organ systems with emphasis on normal structure and function. Problem based learning and clinical teaching are introduced in the second year of the programme. During the second and third years students learn about the various human organ systems in blocks, during which they have lectures and clinical teaching. In the fourth and fifth years students undertake rotational clinical postings in all clinical disciplines. They clerk patients admitted to the wards under supervision and also do night calls.

The curriculum for undergraduate medical students at the School of Medical Sciences, Universiti Sains Malaysia emphasises the need for medical students to become familiar with the presentation, diagnosis and management of common acute medical and surgical conditions. Each discipline has formulated a list of conditions that should be seen by students, and of practical

procedures that they should observe/carry out during their training and record in department log books. In recent years there has been concern regarding the clinical experience of graduating medical students (4). In a questionnaire survey conducted in selected medical schools in the United Kingdom (UK) the amount of clinical experience gained by medical students, who started their training in 1981, 1986 and 1991, had progressively declined. Some of these changes were attributed to modifications in health care delivery patterns following reorganisation of the National Health Service.

The main aim of this study was to assess the students' actual experience of acute medical and surgical conditions, and of performing defined procedures. A subsidiary aim was to compare our findings with those in the United Kingdom, recognising that patterns of acute disease in the two countries are not identical.

Methods

A questionnaire survey was conducted on the first day of the final week of the 1993/1998 five year undergraduate training programme at the School of Medical Sciences, Universiti Sains Malaysia. Questionnaires were distributed following a routine weekly seminar attended by all fifth year students. Consent was verbal and students who did not wish to participate were asked to leave the questionnaire blank. Students were not given a time limit for answering the questions.

The questionnaire contained questions about the students' exposure to a wide range of acute medical and surgical conditions and surgical operations, and whether they had observed/performed certain procedures. Enquiry was made about 27 acute medical conditions (internal medicine, paediatrics and psychiatry) and 15 surgical conditions (general surgery, orthopaedics, ophthalmology, obstetrics and otorhinolaryngology). The list of acute medical conditions was adapted from a questionnaire used in a similar study in the United Kingdom (5). However "hypothermia" was removed, as it is an uncommon problem in Malaysia,

Table 1: Number (%) of students who had seen acute medical conditions

Acute medical conditions	Never	Once	More than once	Not answered
Myocardial infarction	4 (3.3)	17 (14.2)	96 (80.0)	3 (2.5)
Cerebrovascular accident (Stroke)	5 (4.2)	6 (5.0)	104 (86.7)	5 (4.2)
Acute poisoning	29 (24.2)	31 (25.8)	55 (45.8)	5 (4.2)
Acute left ventricular failure	13 (10.8)	12 (10.0)	87 (72.5)	8 (6.7)
Pneumonia	2 (1.7)	6 (5.0)	106 (88.3)	6 (5.0)
Acute upper GIT bleeding	26 (21.7)	22 (18.3)	67 (55.8)	5 (4.2)
Meningitis/encephalitis	9 (7.5)	14 (11.7)	91 (75.8)	6 (5.0)
Pneumothorax	23 (19.2)	28 (23.3)	61 (50.8)	8 (6.7)
Acute psychosis	45 (37.5)	24 (20.0)	46 (38.3)	5 (4.2)
Respiratory failure/distress	4 (3.3)	20 (16.7)	90 (75.0)	6 (5.0)
Diabetic ketoacidosis	42 (35.0)	40 (33.3)	34 (28.3)	4 (3.3)
Febrile convulsion	10 (8.3)	11 (9.2)	94 (78.3)	5 (4.2)
Hypoglycaemia	23 (19.2)	30 (25.0)	62 (51.7)	5 (4.2)
Status asthmaticus	20 (16.7)	30 (25.0)	64 (53.3)	6 (5.0)
Acute renal failure	16 (13.3)	28 (23.3)	68 (56.7)	8 (6.7)
Acute hepatic failure	48 (40.0)	29 (24.2)	34 (28.3)	9 (7.5)
Subarachnoid haemorrhage	31 (25.8)	36 (30.0)	43 (35.8)	10 (8.3)
Status epilepticus	43 (35.8)	29 (24.2)	40 (33.3)	8 (6.7)
Near drowning	66 (55.0)	27 (22.5)	24 (20.0)	3 (2.5)
Acute gastroenteritis with dehydration	4 (3.3)	15 (12.5)	96 (80.0)	5 (4.2)
Upper airway obstruction (Stridor)	25 (20.8)	31 (25.8)	59 (49.2)	5 (4.2)
Comatous patient	5 (4.2)	16 (13.3)	95 (79.2)	4 (3.3)
Shock	12 (10.0)	27 (22.5)	76 (63.3)	5 (4.2)
Hypertensive encephalopathy	49 (40.8)	38 (31.7)	27 (22.5)	6 (5.0)
Acute haemolysis	60 (50.0)	21 (17.5)	31 (25.8)	8 (6.7)
Snake bite	7 (5.8)	26 (21.7)	84 (70.0)	3 (2.5)
Child abuse	47 (39.2)	30 (25.0)	37 (30.8)	6 (5.0)

and "acute glaucoma" was transferred to the list of acute surgical conditions. Nine additional acute medical conditions selected from those listed in log books were added to the questionnaire. The list of acute surgical conditions was based on those included in the departmental log books. Except for "hemicolectomy" and "craniotomy" the surgical operations recommended were similar to those contained in the UK questionnaire (5). Students were considered to have seen a condition if they had been concerned in the assessment/management of an affected patient immediately after admission to hospital. There were 26 practical questions about procedures that students were expected to have observed or performed, including 20 practical procedures listed in the UK questionnaire (5). Students' exposure to each acute medical and surgical condition was also assessed using a scoring system (5): 1, never seen; 2, seen once; 3, seen more than once; practical procedures were graded as 1, never seen; 2, seen; 3, done with supervision; 4, done alone. Presence at surgical operations was omitted from total score computations. Questions that were not answered were given the minimum score of 1. Thus the minimum scores were 27 for medical conditions, 15 for surgical conditions, 26 for practical procedures, - 68 in total, and the maximum scores were 81 for medical conditions, 45 for surgical conditions, 104 for practical procedures - 230 in total. For computation the minimum mark was 0% and the maximum mark 100%.

Statistical analysis of frequencies was performed using the EPI6.0 (Centers for Disease Control, Atlanta) software for personal computers.

Results

Questions were completed by 124 students (response rate 97%) in less than 30 minutes. Acute medical conditions that were each seen by >90% of students included myocardial infarction, cerebrovascular accident, pneumonia, respiratory distress/failure, acute gastroenteritis with dehydration, coma, and snake bite (table 1).

Some conditions (eg, myocardial infarction, cerebrovascular accident, pneumonia, acute gastroenteritis with dehydration) had been seen on two or more occasions by most students, whereas others (eg, acute psychosis, diabetic ketoacidosis, acute hepatic failure, status epilepticus, near drowning, hypertensive encephalopathy, acute haemolysis and child abuse) had not been seen by one third or more of the students.

Acute surgical cases, seen by >90% of students, included fracture of long bones, head injury, acute abdominal pain, malpresentation and foetal distress (table 2).

Some conditions (eg, fracture of long bones, head injury, acute abdominal pain malpresentation and foetal distress) were seen on two or more occasions by most students, whereas others (eg, epistaxis, sudden loss of vision, peritonitis, burns) had not been seen by one third or more of the students.

Among operations (table 3) only

Table 2: Number of students (%) who had seen acute surgical conditions

Acute surgical conditions	Never	Once	More than once	Not answered
Myocardial infarction	4 (3.3)	17 (14.2)	96 (80.0)	3 (2.5)
Epistaxis	37 (30.8)	38 (31.7)	35 (29.2)	10 (8.3)
Sudden loss of vision	51 (42.5)	28 (23.3)	31 (25.8)	10 (8.3)
Acute glaucoma	29 (24.2)	26 (21.7)	60 (50.0)	5 (4.2)
Fracture of long bones	2 (1.7)	11 (9.2)	103 (85.8)	4 (3.3)
Head injury	1 (0.8)	8 (6.7)	110 (91.7)	1 (0.8)
Peritonitis	41 (34.2)	28 (23.3)	42 (35.0)	9 (7.5)
Acute abdominal pain	5 (4.2)	7 (5.8)	103 (85.8)	5 (4.2)
Intestinal obstruction	15 (12.5)	21 (17.5)	79 (65.8)	5 (4.2)
Burns	65 (54.2)	35 (29.2)	14 (11.7)	6 (5.0)
Antepartum haemorrhage	20 (16.7)	14 (11.7)	78 (65.0)	8 (6.7)
Postpartum haemorrhage	19 (15.8)	26 (21.7)	70 (58.3)	5 (4.2)
Pre-eclampsia/Eclampsia	9 (7.5)	15 (12.5)	92 (76.7)	4 (3.3)
Abnormal presentation of labour	5 (4.2)	7 (5.8)	103 (85.8)	5 (4.2)
Foetal distress	3 (2.5)	8 (6.7)	106 (88.3)	3 (2.5)
Obstructed labour	22 (18.3)	26 (21.7)	70 (58.3)	2 (1.7)

herniorrhaphy, Caesarian section, internal fixation of fracture and cataract extraction were seen by 80% or more of the students. By contrast, one third or more students has never seen prostatectomy, mastectomy, gastrectomy, hemicolectomy, amputation, skin grafting, mastoidectomy or craniotomy.

Table 4 shows the experience gained by students in practical procedures. While more than 90% of students had done venepuncture, urine testing with dipstick, setting up an intravenous drip, electrocardiogram, suturing and intramuscular injections, one third or more had not carried out a rectal examination, vaginal examination with speculum, bladder catheterisation (male patient), subcutaneous injection, Mantoux test, microscopic examination of urine, urine collection or peripheral blood smear.

The performance of individual students, assessed by a scoring system, showed a mean (SD) score of 170.7 (19.1). Fifteen students had unacceptably low scores (<149/230, 50%), 37 had good scores (>181.4/230, 70%) and 5 had superior scores (197.6/230, 80%).

The figure shows the 'performances' of the students overall, and in each component of the assessment.

Discussion

The results of this questionnaire survey show that most students gained broad clinical experience during their five years undergraduate medical training. However a third or more had not seen certain common medical conditions including acute psychosis, diabetic ketoacidosis, status epilepticus, near drowning, hypertensive encephalopathy and child abuse. Reduced clinical experience in these areas may reflect a paucity of clinical cases or perhaps missed opportunities to learning from such patients. With the possible exceptions of diabetic ketoacidosis and child abuse necessitating hospital admissions, the other conditions are common in Northern Malaysia and ought to have been seen. While most students had seen acute surgical conditions a third or more students had not encountered such conditions as epistaxis, sudden loss of vision, acute glaucoma, peritonitis or burns. Again hospital admissions for these conditions is not rare in this society. Generally most students had not seen the surgical operations listed, except for herniorrhaphy, Caesarian section, appendicectomy, internal fixation and cataract extraction. As witnessing surgical operations is regarded as optional experience in undergraduate training, it was not mandatory for students to have seen these operations. Moreover certain operations, like gastrectomy are less common nowadays because of the extensive use of H_2-blocking agents for the treatment of peptic and duodenal ulcers. In contrast changes in medical practice and improved availability of treatment have increased the number of internal fixation and cataract operations, with enhanced opportunities to witness such procedures.

A large proportion of students had not gained experience in common clinical or technical

Table 3: Number (%) of students who had seen surgical operations

Surgical operations	Never seen	Seen once	Seen 2-4 times	Seen >4 times	Not answered
Herniarrhaphy	13 (10.8)	46 (38.3)	53 (44.2)	5 (4.2)	3 (2.5)
Caesarian section	1 (0.8)	14 (11.7)	78 (65.0)	27 (22.5)	0 (0)
Cholecystectomy	28 (23.3)	43 (35.8)	43 (35.8)	4 (3.3)	2 (1.7)
Appendicectomy	27 (22.5)	45 (37.5)	46 (38.3)	2 (1.7)	0 (0)
Prostatectomy	94 (78.3)	18 (15.0)	5 (4.2)	0 (0)	3 (2.5)
Mastectomy	66 (55.0)	37 (30.8)	15 (12.5)	1 (0.8)	1 (0.8)
Thyroidectomy	33 (27.5)	41 (34.2)	42 (35.0)	3 (2.5)	1 (0.8)
Gastrectomy	98 (81.7)	19 (15.8)	2 (1.7)	0 (0)	1 (0.8)
Hemicolectomy	85 (70.8)	22 (18.3)	9 (7.5)	1 (0.8)	3 (2.5)
Internal fixation of fracture	16 (13.3)	30 (25.0)	62 (51.7)	12 (10.0)	0 (0)
Amputation	83 (69.2)	27 (22.5)	7 (5.8)	1 (0.8)	2 (1.7)
Cataract extraction	3 (2.5)	32 (26.7)	71 (59.2)	14 (11.7)	0 (0)
Skin grafting	43 (35.8)	34 (28.3)	37 (30.8)	6 (5.0)	0 (0)
Mastoidectomy	88 (73.3)	25 (20.8)	6 (5.0)	1 (0.8)	0 (0)
Craniotomy	52 (43.3)	48 (40.0)	19 (15.8)	0 (0)	1 (0.8)

procedures including rectal examination, vaginal examination with speculum, subcutaneous injection, Mantoux test, microscopic examination of urine, urine collection and peripheral blood smear. It is disturbing that teaching and practice in rectal and vaginal examinations was missed as these aspects of physical examination should have been performed by every student. In this survey some students had done more complex procedures such as repair of episiotomy, pleural fluid aspiration, bag and mask ventilation and exchange transfusion while failing to gain experience in more simple and common procedures.

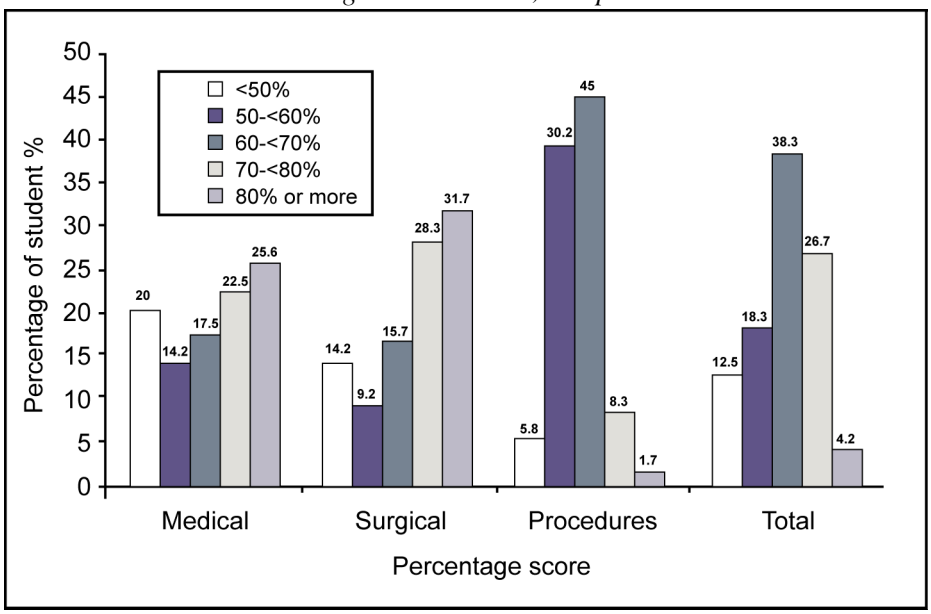
When compared with the clinical experiences of medical students in the United Kingdom study (5) a smaller proportion of our students had seen upper gastro-intestinal bleeding, acute psychosis and diabetic ketoacidosis. However more had had the opportunity to see acute glaucoma, respiratory failure, febrile convulsions and acute renal failure. Our medical students witnessed fewer surgical operations than those in the UK, except for internal fixation of fractures and cataract extraction. A larger proportion of our students also had not done a rectal or vaginal examination, which are unsiderred essential components for the physical examination of certain patients. However our students had more experience in ECG recording, the giving of intramuscular injections and repair of episiotomy.

The distribution of scores for the various components of the survey, and the overall 'performance' of students is of interest. Even though most students scored above 50% in acute medical conditions 20% did poorly (scores <50%) for reasons that require further investigation. There was perhaps more opportunity to gain experience in acute surgical conditions. Only 14.2% of students scored below 50% and 60% of students scored 70% or above. Although most students obtained reasonable scores for acute medical and surgical conditions a significant proportion (20% medical and 14.2%

Table 4: Students'(%) experience of practical procedures

Practical procedures	Never seen	Seen	Done with Supervision	Done alone	Blank
Rectal examination	1 (0.8)	45 (37.5)	44 (36.7)	29 (24.2)	1 (0.8)
Vaginal examination with speculum	2 (1.7)	77 (64.2)	36 (30.0)	4 (3.3)	1 (0.8)
Urine collection	1 (0.8)	42 (35.0)	32 (26.7)	44 (36.7)	1 (0.8)
Urine testing with dipstick	0 (0)	1 (0.8)	5 (4.2)	113 (94.2)	1 (0.8)
Microscopic exam of urine	7 (5.8)	55 (45.8)	42 (35.0)	14 (11.7)	2 (1.7)
Bladder catheterisation (male patient)	2 (1.7)	39 (32.5)	44 (36.7)	34 (28.3)	1 (0.8)
Bladder catheterisation (female patient)	1 (0.8)	11 (9.2)	49 (40.8)	58 (48.3)	1(0.8)
Venepuncture	1 (0.8)	2 (1.7)	7 (5.8)	110 (91.7)	0 (0)
Setting up intravenous drip	0 (0)	0 (0)	5 (4.2)	115 (95.8)	0 (0)
Arterial puncture	3 (2.5)	27 (22.5)	27 (22.5)	62 (51.7)	1 (0.8)
Intramuscular injection	0 (0)	2 (1.7)	33 (27.5)	85 (70.8)	0 (0)
Subcutaneous injection	4 (3.3)	65(54.2)	17 (14.2)	33 (27.5)	1 (0.8)
Mantoux test	10 (8.3)	82 (68.3)	16 (13.3)	12 (10.0)	0 (0)
Ring block (Local anaesthetic)	14 (11.7)	57 (47.5)	36 (30.0)	12 (10.0)	1 (0.8)
Suturing in casualty	1 (0.8)	8 (6.7)	65 (54.2)	46 (38.3)	0 (0)
Repair of episiotomy	1 (0.8)	56 (46.7)	50 (41.7)	13 (10.8)	0 (0)
External cardiac massage	18 (15.0)	56 (46.7)	39 (32.5)	6 (5.0)	1 (0.8)
Bag and mask ventilation	3 (2.5)	36 (30.0)	70 (58.3)	10 (8.3)	1 (0.8)
Endotracheal intubation	0 (0)	13 (10.8)	102 (85.0)	5 (4.2)	0 (0)
Lumbar puncture	0 (0)	118 (98.3)	1 (0.8)	0 (0)	1 (0.8)
Pleural fluid aspiration	7 (5.8)	105 (87.5)	6 (5.0)	0 (0)	2 (1.7)
Peripheral blood smear	3 (2.5)	49 (40.8)	44 (36.7)	23 (19.2)	1 (0.8)
Bone marrow aspiration	31 (25.8)	87 (72.5)	1 (0.8)	0 (0)	1 (0.8)
Peritoneal dialysis	4 (3.3)	110 (91.7)	4 (3.3)	0 (0)	2 (1.7)
Exchange transfusion	27 (22.5)	72 (60.0)	17 (14.2)	2 (1.7)	2 (1.7)
Electrocardiography (ECG)	0 (0)	0 (0)	2 (1.7)	118 (98.3)	0 (0)

Figure 1: Proportion (%) of students in relation to scores obtained for acute medical and surgical conditions, and procedures.



Twenty percent, 14.2%, 5.8% and 12.5% of students obtained unacceptably low scores (<50%) for acute medical and surgical , procedures and total scores respectively. Twenty five percent, 31.7%, 1.7% and 4.2% of students obtained very good scores (≥80%) for acute medical and surgical, procedures and total scores respectively.

surgical) obtained low scores (<50%) for these conditions. Most students gained experience in practical procedures required for their training during their clinical rotations with only 5.8% students scoring less than 50%. Overall the total scores indicated that most students gained a broad experience in acute medical and surgical conditions and practical procedures with only 12.5% students scoring less than 50%. More reassuring was the high scores (>70%) scored by some 20% of the students. The range of scores emphasises the wide spectrum of attainment in these areas.

In conclusion most students gained a broad experience in acute medical and surgical conditions, though a large proportion had seen relatively few surgical operations. While most students had witnessed/undertaken most of the recommended practical procedures there were unacceptable gaps in clinical examination attainments. These results will provide a baseline for future comparisons. The limited 'exposure' gained by the 12% of students with unacceptability low scores leaves little scope for complacency on the part of students as well as faculty.

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References

1. Roslani AMM. The School of Medical Sciences at Universiti Sains Malaysia, ACU Bulletin of Current Documentation 1981; **50**:17-19
2. Barrows HS, Tamblyn RM. Problem-Based Learning: An Approach to Medical Education. Springer, New York 1980
3. Das M, Lanphear JH, Rogayah J. Faculty evaluation of educational strategies in medical schools. Medical Teacher 1994 ; **16**: 355-361
4. McManus IC, Richards P, Winder BC. Clinical experience of UK medical students. Lancet 1998; **351**: 802-803
5. McManus IC, Richards P, Winder BC, Sproston KA, Vincent CA. The changing clinical experience of British medical students. Lancet 1993; **341**: 941-944