

# Medical students in their final six months of training: progress in self-perceived clinical competence, and relationship between experience and confidence in practical skills

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## ABSTRACT

**Introduction:** We evaluated the progress in the self-perceived competence of medical students in a range of common clinical, practical and personal skills, in their final six months of training.

**Methods:** The study was conducted on 65 final-year medical students undertaking their senior clerkship training at International Medical University, Malaysia. Questionnaire surveys were conducted at the beginning and the end of the six-month period, with 44 items covering clinical, practical, personal skills and readiness to work. Correlations were performed for experience and self-perceived competence, with the respective skills.

**Results:** 64 students returned the first survey and 63 returned the second survey. When the two survey results were compared, significant increases were found in self-perceived competence for the majority of the skills examined. The items with no significant improvement were divided into those which the students were already proficient in before senior clerkship, and those in which experience and confidence remained poor at the end of training. There were significant, but moderate, correlations between the experience and confidence of all common practical skills (correlation coefficients: 0.348-0.522, p-value is less than 0.001 for all items). At the end of training, students were, in general, more prepared to work as house officers (mean rating in the first survey: 3.05, second survey: 3.97, p-value is less than 0.001).

**Conclusion:** Significant progresses in clinical experience and confidence can be observed in the final stages of medical training. The findings of inadequate improvements in some skills call for dedicated training sessions and strengthening of on-site supervision.

**Keywords:** clinical competence, clinical skills, medical education, undergraduate education

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## INTRODUCTION

Clinical competence, alongside humanistic qualities, is the attribute expected of every practising doctor.<sup>(1)</sup> There are many skills in which their proficiency constitutes clinical competence; for example, the ability to recognise and prioritise clinical problems, the appropriate exercising of clinical judgment, and technical ability in practical procedures. To a large extent, clinical competence is acquired after qualification, from actual experience in managing patients throughout the career of a doctor.<sup>(2)</sup> The development of clinical competence for a medical student is relatively limited and variable, due to the lack of constant and direct exposure to patients. However, progressive improvement in clinical skills is expected of every medical student throughout the undergraduate term, to a level that is considered adequate as a houseman upon graduation. The pressure of major examinations, in which some clinical skills are assessed directly, might facilitate their development. Similarly, the pressure of the impending qualification might provide additional impetus to the acquisition of clinical skills, as feelings of inadequacy and the lack of experience in basic skills are significant sources of stress for many junior doctors.<sup>(3)</sup> It is important for a medical school to examine the progress in clinical competence of medical students near the point of exit, as this provides good indications, both in their abilities as housemen and on the effectiveness of the curriculum, during the final stages of their training. In addition, exploring the relationship between the

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**TABLE I. The eight IMU exit outcomes.**

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1. The application of basic science in the practice of medicine.
  2. Clinical skills.
  3. Communication skills.
  4. Community and family issues in healthcare.
  5. Health promotion and disease prevention.
  6. Professionalism, ethics and personal development.
  7. Self-directed life-long learning and information management.
  8. Critical thinking and research.
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students' exposure to, and confidence on, a range of practical skills might reveal specific strengths and deficiencies in their acquisition of these skills. The identification of these relationships could help improve the effectiveness of our curriculum.

For International Medical University (IMU), Malaysia, assessment of clinical competence in the final six months of undergraduate training is highly relevant for two reasons. First, the final summative clinical examinations of the medical course, where clinical skills are assessed directly via objective structured clinical examination (OSCE) stations, take place after four-and-a-half years of training, six months before completion of the MBBS programme. Next, the final six months of training, which follows this major examination, is designed to maximise the opportunity for the acquisition of clinical skills under the senior clerkship programme. In this programme, students act as shadow housemen, with emphasis on direct participation in patient management, through which actual clinical experience is acquired, with supervision from the faculty members who are actively involved in clinical services. The development of professionalism and other important personal attributes, like team spirit and self evaluation, are also facilitated by the collaboration with colleagues, allied healthcare professionals, patients and relatives. The acquisition of clinical competencies at IMU is guided by eight major exit criteria (Table I). In April 2003, a separate clinical school, attached to a 300-bed district hospital, was established solely for senior clerkship, in the hope that training in this setting offers more opportunities for direct patient contact.

During senior clerkship, logbooks are used as a major tool for recording and assessment. The items recorded include the number and types of cases seen, practical procedures witnessed or performed, continuing medical education (CME) sessions, and community activities. Students are rated on common clinical skills by their supervisors, with an overall grading on clinical competence for each posting. The logbook forms the

basis of continuous assessment, which the students must pass to be eligible for the exit assessment at the end of the semester. Alongside ward-based training, students acquire some of their clinical skills via portfolio development. Portfolios are extended write-ups of case histories, with reflections during patient encounters recorded as learning issues grouped under the eight outcomes. They provide the students a means of focused learning to complement their general exposure to clinical work, and facilitate the development of certain generic skills that are not specifically addressed in ward-based learning, including self-reflection, critical thinking and professionalism. The students are required to produce 14 portfolios in the semester, including three for each four-week posting (Internal Medicine, Paediatrics, Surgery, and Obstetrics & Gynaecology), and one for each two-week posting (Orthopaedics and Psychiatry).

The final versions of the portfolios are submitted as examination documents in the exit assessment. In this assessment, portfolios are globally graded, followed by a 30-minute, portfolio-based viva. The areas assessed in this viva are guided by the eight exit criteria of the university, including diagnostic and management skills in acute and chronic conditions, principles of health promotion, professionalism and evidence-based medicine. Viva questions are developed from the cases written in the portfolios of each candidate. The global rating awarded after the viva represents the combined rating of the quality of the portfolio and the viva performance. The students are conferred their medical degrees from IMU after passing the exit assessment.

The competency profile of IMU students near the point of exit, delineated according to the eight IMU exit criteria has been reported previously.<sup>(4)</sup> Using the same survey tool, we present the changes in self-perceived competence and experiences in a range of clinical, practical and personal skills for medical students of IMU during their final six months of training. Specifically, we examined the following for our medical students in senior clerkship: (i) Change in self-perceived competence in some common clinical and practical skills; (ii) Change in experience in performing common practical procedures; (iii) Correlation between prior experience and confidence in practical skills; (iv) Change in personal skills, as reflected by their ability to handle common generic tasks; (v) Perception on the most daunting aspects of work as a doctor; and (vi) Change in their readiness to start working as house officers. We postulate that this period of training results in significant improvements in self-perceived competence and experience of major clinical skills and readiness to work as junior doctors. In addition, we

postulate that the students' prior experience in performing practical procedures correlates strongly to their confidence in executing these procedures. By identifying the pattern and the efficiency of our students in their development of clinical competence, this report aims to provide some indications on the strengths and deficiencies of the training programme in senior clerkship, and in our medical curriculum in general.

## METHODS

Anonymous questionnaire surveys were conducted twice during the six months of senior clerkship from August 2005 to February 2006 on a cohort of final-year medical students of IMU, Malaysia. The students were posted to Clinical School Batu Pahat for the entire senior clerkship. The first survey was conducted during the third week of the semester, while a repeat survey (using the identical questionnaire) was conducted during the second last week of the semester.

The questionnaire comprised the following parts:

- i. Clinical skills (confidence): self-perceived competence in performing common clinical tasks (Likert scale, seven items).
- ii. Practical skills (experience): estimated experience in performing common practical procedures throughout the students' undergraduate training (Likert scale, 14 items).
- iii. Practical skills (confidence): self-perceived competence in performing common practical procedures (Likert scale, 14 items).
- iv. Personal skills: self-perceived competence in handling common generic tasks requiring the use of important personal skills, like professionalism, independence and time management (Dichotomous response: "comfortable", "uncomfortable", seven items).
- v. The most daunting aspect anticipated on being a house officer (multiple-choice, one item).
- vi. The response to a job offer as house officer (Likert scale, one item).

For criteria i, ii, iii and vi, the response on the Likert scale is taken as the score. For criterion iv, a score of two is given when the response is "comfortable", while a score of one is given when the response is "uncomfortable". Due to the overlapping nature of the personal skills required to handle the generic tasks listed under this criterion, the total score of all seven items for each respondent is analysed.

This questionnaire has undergone assessment of content validity and internal reliability since its inception in November 2004. Content validity was first determined by a panel of seven academician-clinicians from different disciplines (Internal Medicine, Surgery,

Paediatric Surgery, Obstetrics and Gynaecology (two members), Orthopaedics and Paediatrics), all of whom were also supervisors to the students in Senior Clerkship. The first version of 44 items, grouped under the major exit criteria of the university, was drafted out by the first author, who was also a member of the panel. The items in the questionnaire were assessed by other members of the panel, based on their importance and relevance at the undergraduate level. Four items were reworded following the evaluation. The expected standards of each item under clinical skills and practical skills were also determined by the panel through general consensus. The questionnaire was piloted in January 2005 on a cohort of medical students in Senior Clerkship. 42 out of a total of 51 students (82%) completed the pilot survey. Following the survey, three items on practical skills and four major items on Evidence-based Medicine were incorporated into the new version of the questionnaire. The amended survey was run on a subsequent cohort of 50 students (from a total of 65) in July 2005. The combined findings from the first and second versions of the survey have been reported.<sup>(4)</sup> This report was also submitted to the Professional Education Advisory Committee (PEAC) of the university in August 2005 for further assessment. The PEAC comprised five experts in Medical Education from the partner universities overseas and one representative from Malaysia. Following this assessment, four items were discarded as they were considered either confusing or less relevant at the undergraduate level; an additional item on practical skill (obtaining ECG) was included; Likert scale for the seven items under clinical skills was re-defined; and a linear scale replaced the Likert scale for the item on work-readiness. Internal reliability of the remaining items with ordinal responses ( $n = 33$ ), determined using Cronbach's alpha, was 0.92 (95% CI for intraclass correlation coefficient, 0.88–0.95). There was no significant change in Cronbach's alpha following the deletion of any item, suggesting that all the items were of similar importance. The latest version of the questionnaire with 44 items was used in this study.

Data was collated, analysed and charted using the Statistical Package for Social Sciences version 11.0 (SPSS Inc, Chicago, IL, USA). An additional chart was constructed using Microsoft Excel version XP. Internal reliability analysis for the present surveys was performed for items (i to iv) and (vi), and expressed as Cronbach's alpha with 95% confidence interval (CI) for intraclass correlation coefficient. The scores for the two surveys were analysed using Mann-Whitney U Test. The association between prior experience and self-perceived competence of each practical procedure

**Table II. Self-perceived competence on clinical skills.**

Items	Survey early or late in semester	No. of respondents	Mean rating	SD	Percentage with rating $\geq 3$	p-value
Recognising sick patients	early	64	3.89	0.620	100	0.007*
	late	63	4.19	0.592	100	
Functioning as a team member in assessing and managing sick patients	early	64	3.53	0.666	95	< 0.001*
	late	63	3.95	0.607	100	
Taking a history and performing examination for new admissions	early	64	3.98	0.724	97	0.954
	late	63	4.02	0.609	100	
Answering questions from patients/relatives on admission	early	64	3.53	0.616	95	0.144
	late	63	3.73	0.627	100	
Counselling patients/relatives on common diseases	early	64	3.75	0.713	98	0.006*
	late	63	4.08	0.604	100	
Prioritising cases to be seen	early	64	3.45	0.733	92	0.002*
	late	63	3.86	0.737	97	
Dealing with difficult patients/relatives	early	63	2.84	0.827	73	0.023
	late	63	3.21	0.722	86	

\* statistically significant

was indicated quantitatively with Spearman's rank correlation coefficient ( $r$ ). The significance level was set at 0.01 for all items.

## RESULTS

Out of a total of 65 students in the cohort, 64 (98%) returned the first survey and 63 (97%) returned the second survey. Reliability analysis of 43 relevant items in the survey showed Cronbach's alpha of 0.93 (95% CI for intraclass correlation coefficient, 0.91–0.95). Some questionnaire responses were incomplete, giving rise to missing data, as indicated by the variable number of responses for each item, shown in the tables and figures below.

### (i) Self-perceived competence on common clinical tasks

Seven clinical skills were listed, on which the students were asked to rate themselves on a five-point Likert scale, with statements indicating ascending levels of competence, as follows:

1. Grossly inadequate.
2. Know the approach in theory, not confident at all in real situations.
3. Only confident in making certain decisions, need seniors to be readily available or on constant standby.
4. Reasonably confident, but need seniors who are contactable for consultation.
5. Very confident, can be relied on without supervision.

We expected our students at the end of their training to be at least at level three for all items in this

category. The results in both rounds of survey are listed in Table II. There was a significant improvement in the confidence of the students in recognising and managing sick patients as a team member, counselling on common diseases and prioritising cases to be seen. There was a trend towards increased confidence in dealing with difficult patients or relatives. However, no significant improvement was observed in history taking and examination of new patients (clerking), and answering questions from patients or relatives on admission. Most students rated themselves three or higher in all items, even in the first round of the survey, except in dealing with difficult patients or relatives. For this item, about one-quarter of the students considered themselves as totally inadequate in practice. However, at the end of six months, there was a substantial improvement in the number of students who self-rated three or above for this skill.

### (ii) Prior experience in practical procedures: estimated number performed

14 common practical procedures were listed. The numbers were grouped into a five-point scale, as shown below, which reflected the spread of the expected frequencies for undergraduate students.

1. None
2. One to five times
3. Five to ten times
4. Ten to twenty times
5. More than twenty times

With the exception of paediatric procedures, our students at this stage of training were expected

**Table III. Experience on practical skills: estimated number performed.**

Items	Survey early or late in semester	No. of respondents	Mean rating	SD	Percentage with rating $\geq 2$	p-value
Taking part in adult resuscitation	early	63	1.97	0.474	87	0.004*
	late	63	2.29	0.682	95	
Taking part in paediatric/neonatal resuscitation	early	63	1.14	0.353	14	< 0.001*
	late	63	1.46	0.534	44	
Intravenous cannula insertion in adults	early	64	2.88	0.984	100	< 0.001*
	late	62	4.16	0.961	100	
Intravenous cannula insertion in children/neonates	early	63	1.35	0.626	29	< 0.001*
	late	62	2.21	0.908	81	
Blood taking in adults	early	64	4.33	0.892	100	0.036
	late	62	4.68	0.566	100	
Blood taking in children/neonates	early	64	1.63	0.864	45	<0.001*
	late	62	2.55	0.986	92	
Assisting in operations	early	64	1.95	1.045	61	0.288
	late	62	2.05	0.895	73	
Administering intravenous medications	early	64	2.08	0.822	80	<0.001*
	late	62	2.87	1.079	95	
Administering intramuscular medications	early	64	2.64	1.104	89	0.009*
	late	62	3.16	1.119	98	
Administering per rectal medications	early	62	1.52	0.805	35	0.014
	late	62	1.92	1.045	58	
Obtaining an electrocardiograph (ECG)	early	63	3.35	1.109	100	0.033
	late	63	3.78	1.114	100	
Conducting vaginal delivery	early	63	1.48	0.715	36	< 0.001*
	late	63	2.79	0.513	100	
Inserting urinary catheter (male or female)	early	63	2.21	0.786	87	0.002*
	late	63	2.65	0.845	100	
Suturing (any minor or major surgery)	early	63	1.79	0.826	60	0.002*
	late	63	2.16	0.677	87	

\* statistically significant

to have at least performed one to five times (level two) of all procedures listed. The responses in both rounds of survey are shown in Table III. There was a significant increase in the experiences of the students for the majority of the procedures in six months. Items with no significant improvements observed were divided into two categories: those with good prior exposure (e.g. cannulation and blood-taking in adults, ECG), as evident from their high ratings in the first survey, and those with the low prior exposure, like assisting in operations and administering per rectal medications. One-quarter of the students reported still not having any experience in assisting operations at the end of their senior clerkship.

### (iii) Self-perceived competence on common practical procedures and ward routines

Ten practical skills and four ward routines were listed, on which the students were asked to rate themselves on a five-point Likert scale with statements indicating ascending levels of competence, as follows:

1. Do not have a clue.
2. Know in theory but not confident at all in practice.
3. Know in theory, can perform some parts in practice independently, and needs supervision to be readily available.
4. Know in theory, confident in practice, need contactable sources of supervision.
5. Know in theory, competent in practice without any supervision.

Our students at this stage of training were expected to be competent at level three or above for all items, with the exception of paediatric procedures (expected level: two). The responses from both rounds of surveys are illustrated Table IV. From this survey, there were significant improvements at the end of six months for six out of 15 items, which included resuscitation, paediatric procedures, and ward routines like prescribing and ordering radiological investigations. Except for assisting in operations, most students, at the end of their training, rated three or above for all items.

**Table IV. Self-perceived competence on practical skills and ward routines.**

Items	Survey early or late in semester	No. of respondents	Mean rating	SD	Percentage with rating $\geq 3$	p-value
Initiating resuscitation in hospital	early	63	2.87	0.635	77	<0.001*
	late	63	3.30	0.710	90	
Intravenous cannula insertion in adults	early	64	4.00	0.756	98	0.017
	late	63	4.32	0.668	100	
Intravenous cannula insertion in children	early	64	2.75	0.854	66	<0.001*
	late	63	3.37	0.789	89	
Blood taking in adults	early	63	4.38	0.705	100	0.055
	late	62	4.63	0.520	100	
Blood taking in children	early	63	3.06	0.998	71	<0.001*
	late	63	3.70	0.835	94	
Assisting in operations	early	64	2.88	0.951	63	0.081
	late	62	3.16	0.793	84	
Obtaining an ECG	early	63	4.49	0.693	100	0.659
	late	63	4.57	0.588	100	
Administering intravenous medications	early	64	3.97	0.872	94	0.021
	late	63	4.29	0.869	94	
Administering intramuscular medications	early	64	4.08	0.822	97	0.041
	late	63	4.37	0.725	98	
Administering per rectal medications	early	64	3.77	0.850	95	0.052
	late	63	4.05	0.869	95	
Prescribing intravenous fluid	early	64	2.94	0.852	78	<0.001*
	late	63	3.57	0.689	95	
Prescribing common medications in format	early	64	3.53	0.890	88	0.002*
	late	63	4.00	0.672	100	
Selecting appropriate blood containers and labelling	early	64	3.84	0.781	97	0.182
	late	63	4.03	0.782	98	
Ordering radiological investigations (e.g., chest radiographs, CT)	early	64	3.63	0.787	92	0.004*
	late	63	4.05	0.705	100	

\* statistically significant

**(iv) Correlations between prior experience and self-perceived competence in practical skills**

11 practical procedures that appeared on both (ii) and (iii) were analysed for their correlations. The results are shown in Table V. There was no significant difference between the correlations of the first and the second surveys for all the items, thus only the overall correlations were shown. We found moderate correlations between actual experience and self-perceived competence in all common practical skills assessed, with  $r$  ranging from 0.348 to 0.522 ( $p < 0.001$  for all items).

**(v) Personal skills**

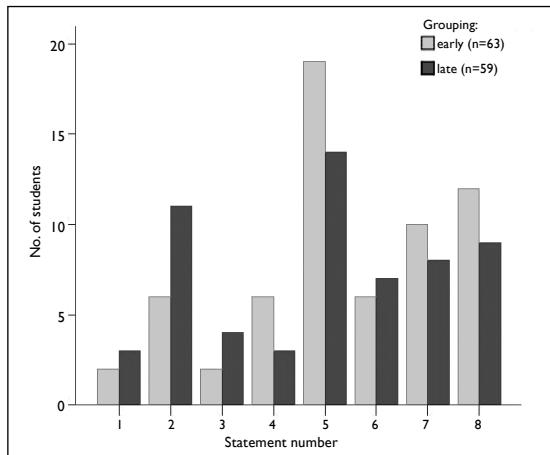
Students were asked to indicate whether they were comfortable or uncomfortable with a list of generic tasks. The responses are illustrated in Fig. 1. Although the majority of the students were comfortable with most generic tasks at the start of senior clerkship, further improvement in personal skills as a whole was observed at the end of the six-month training (median sum score: first survey:

**Table V. Associations between experience and confidence in common practical skills.**

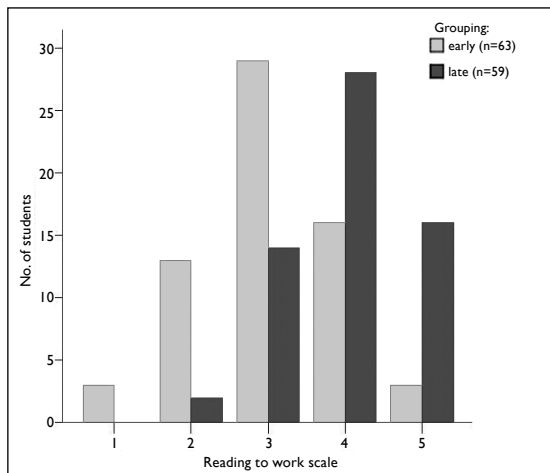
Practical skills	Correlation (r)	p-value
Resuscitation (adult)	0.348	< 0.001
Resuscitation (child)	0.350	< 0.001
Intravenous cannulation (adult)	0.427	< 0.001
Intravenous cannulation (child)	0.464	< 0.001
Blood taking (adult)	0.507	< 0.001
Blood taking (child)	0.503	< 0.001
Assisting in operations	0.522	< 0.001
Obtaining an ECG	0.437	< 0.001
Administering intravenous medications	0.388	< 0.001
Administering intramuscular medications	0.456	< 0.001
Administering per rectal medications	0.393	< 0.001

12, second survey: 13,  $p < 0.001$ ). In both rounds of survey, "Coping with unexpected, additional tasks" and "Managing time on and off work" were perceived as the most difficult tasks. At the end of





**Fig. 2** Bar chart shows which statements the students found to be the most daunting aspect of being a house officer.



**Fig. 3** Bar chart shows the "readiness to work" responses to a job offer as a house officer, ranging from 1 (far from ready) to 5 (looking forward to it).

were merely more apprehensive on the prospect of working, we compared their sum scores in clinical, practical and personal skills against the rest of the cohort. We found that although the experience in performing practical procedures did not differ between the two groups ( $p = 0.586$ ), the group with lower readiness to work were less confident in their clinical skills ( $p = 0.007$ ), practical skills ( $p = 0.003$ ) and personal skills ( $p = 0.013$ ).

## DISCUSSION

Our surveys showed that there is, in general, a significant increase in the confidence and experience of the students in clinical skills during their final six months of training at IMU. Among the clinical skills assessed, the greatest improvements were seen in the increase in confidence in "managing sick patients as part of a team" and in "prioritising cases". This is encouraging, as comparatively, these two skills probably demand greater urgency for competence for a newly-qualified

doctor. From the distribution of the ratings, various reasons could be put forward for the lack of significant improvements in some clinical skills. For history-taking and physical examination, the mean scores for both surveys were very similar at around four, with most students having attained the expected level of confidence (score three) early in their senior clerkship. This suggests that having acquired and consolidated this skill since the preclinical phase, there might be no further improvement possible at the final stages of the undergraduate level. Instead, actual clinical experience, with the pressure of clinical responsibilities and time, might be needed to further improve history-taking and examination skills. On the other hand, the overall confidence was lower in answering questions on admission and dealing with difficult patients, with no significant improvements at the end of senior clerkship. These findings reveal the difficulty for students in taking an active role in patient care, even in senior clerkship. This possibly relates to their fear of committing errors, or disrupting the doctor-patient relationship balance maintained by doctors, who are looked upon as those already proficient in such skills. In addition, patients perceived to be difficult are usually handled by senior doctors in an atmosphere inhibitory to the presence of medical students, let alone the undertaking of teaching-learning activities. While highlighting the difficulties in acquiring those skills as a student, the findings do not obviate the need to improve the current training programme targeting the acquisition of these skills. A recommendation would be to incorporate into this programme, role-playing sessions simulating real-life situations, where various difficult issues related to the doctor-patient relationship might arise, with supervision and guidance from faculty members. The value of such sessions has been shown, even for "softer" skills like interpersonal skills.<sup>(5)</sup> These sessions would serve to better prepare the students when facing similar situations in their working lives in the future.

There is currently a lack of agreed standards at the undergraduate level in terms of target proficiencies in practical skills. The difficulties in setting specific standards might be related to the wide variations in the settings where students acquire practical experience,<sup>(6)</sup> as well as to the lack of evidence that competency levels of a student is predictive of clinical competence as a doctor.<sup>(7,8)</sup> In addition, it has been shown that explicit requirements in practical skills set by an institution are frequently not matched by the delivery of teaching.<sup>(9)</sup> More worryingly, a substantial proportion of newly-qualified interns perceived their own proficiency in basic procedures to be inadequate.<sup>(10)</sup> Even for resident doctors with some experience, there



is a large variation in their proficiency in practical procedures,<sup>(11)</sup> with persistent deficits in certain skills, even at the stage of postgraduate training.<sup>(12)</sup> Limited opportunities for practice during undergraduate training has been cited as the main reason for the lack of proficiency in certain skills for interns.<sup>(10)</sup> IMU is at risk of this problem with an increasing number of students posted to clinical schools, without a proportionate increase in the opportunities for acquiring clinical skills in the hospitals. There is hence a need to specify the expectations for our students in terms of practical skills, and to provide suitable and adequate teaching within, and out of, the ward environments to match the expectations. With no established yardstick to measure against, in terms of student competencies in practical procedures, we have set our expectations pragmatically, from our experiences of what an average student in IMU could realistically achieve within their undergraduate training. These objectives were based on our study on previous cohorts of students,<sup>(4)</sup> taking into account the opportunities in different clinics and hospitals that the students are attached to in their clinical years.

Substantial improvement were observed in the proficiency of the students in many practical skills, as shown in Table III, particularly for skills that were less often performed prior to this semester, such as conducting vaginal deliveries, suturing, and paediatric procedures. Similar increases in the confidence of the students were observed, as shown in Table IV, with the greatest improvements seen also in procedures with less prior exposures. The overall experience of IMU students in practical skills compares favourably with that of other medical schools.<sup>(3)</sup> However, no significant improvements in experience or confidence were seen in some skills. From the distribution of the ratings, these skills could similarly be divided into two categories: those in which students are already competent in early in the semester (like cannulation and bloodtaking in adults, ECG and handling blood containers) and those in which students in general remain insufficiently confident in at the end of their training (like assisting in operations).

In this survey, one-quarter of the students reported to have only assisted in operations five times or fewer in their training. This would be inadequate preparation for their surgical house jobs, as many different operations are performed daily in a hospital, each with different sets of instruments and routines. For the same reason, it is not feasible to supplement the students' on-site experience with dedicated teaching sessions to cover the range of the operating procedures. This finding warrants a relook at several aspects of the programme. These include the need for the optimal allocation of surgical theatre time for the

students, the selection of the types of operations for the students to participate in, the clinical involvement of the supervisors in senior clerkship, and consequent, the extent and the quality of on-site teaching and supervision during theatre sessions. In view of the difficulties for the students to assist in all types of operations within their final six months of training, priority should be placed on basic, commonly-performed or emergency procedures in general surgery, orthopaedics, obstetrics and gynaecology, in which the assistance of housemen might be expected more than for other types of operations.

Significant correlations were observed between the experience and self-perceived competence for all common practical skills. However, the correlations between the items are at best moderate, suggesting that an increase in the students' experience might not be accompanied by the same degree of increase in their confidence. Several reasons are possible for this finding. First, increased experience on a practical procedure is likely to be accompanied by a higher number of unsuccessful attempts. For students who are generally novices in practical skills, failed attempts could have a major negative impact on their confidence. In addition, the circumstances and pressure under which they perform the procedures, the reactions from the patients or relatives, and the individual characteristics of the students could all determine the level of confidence. Nevertheless, it has been shown that despite their significant associations, neither experience nor confidence at the undergraduate level seems to predict true competence, as measured by the actual performance during assessments.<sup>(7)</sup> Within the limited time in undergraduate training, it might not be realistic to expect the true proficiencies of a student to surface in all common practical skills. Perhaps then, the aim of the teachers at the undergraduate level would be to facilitate the development of confidence, which should correlate strongly with the amount of clinical experience acquired by students within the period of their training. To achieve this, improving the quality of on-site supervision and feedback could prove crucial.<sup>(13-15)</sup>

Apart from clinical skills, a general improvement has been observed in personal skills during the final six months of training at IMU, as illustrated in Fig. 2. The findings demonstrate the value of a clinical programme run at a separate site utilising a district hospital. Other than the advantages of a district hospital in the acquisition of clinical skills,<sup>(16)</sup> a range of personal skills is cultivated, from the ability to work as a team to fostering independence. In pre-empting the most daunting aspect of work, the highest number of students chose "competence required in knowledge

and judgment" in both surveys. There was a marked increase at the end of the semester in those who chose the effects of physical demand on clinical judgment. This reflects the maturity of the students and the priority they place on clinical skills and judgment in patient care, having gained further insight, during the final six months, into the working routines and life of a houseman. Despite improved recognition of work demands as a junior doctor, there was a significant increase over six months in the students' readiness to work. However, one-quarter of the students indicated that they were less ready than expected, with a corresponding poorer perception of their clinical competence in comparison to their peers. This appeared to be a group in greater need of assistance in preparation for their housemanship. It would be of major interest to further evaluate this group of students, specifically with regard to their learning paths, personal characteristics, undergraduate achievements, and perhaps more importantly, their performance as doctors, in order to understand the reasons and the significance of the finding, which the current survey is unable to provide. The finding in turn highlights the limitations of the survey in the form of self-reports, which could suffer from being over-simplistic and subjective to personal bias. More objective and discriminative measures of competence, such as performance in clinical examinations, might be a more useful indicator when the relationship with work readiness is assessed.

In conclusion, despite its limitations, this survey delineates the progress of our students in a wide range of clinical, practical and personal skills during a short but crucial period in their undergraduate training. While satisfactory progress was achieved in most skills, some deficiencies have been identified. Dedicated clinical skills sessions and strengthening on-site supervision have been recommended as the keys to improving student competence. This report paves the way for a comprehensive documentation on the progress of our students in clinical skills across all semesters in the clinical phase, leading to the development of target competencies for all the essential clinical and practical skills specific to our university. Ongoing

evaluations in student competencies should be undertaken, and new learning strategies must be implemented in anticipation of the changes in their learning environments and the opportunities for clinical skill acquisition. These measures are crucial to maintaining the standard of clinical competence in future cohorts of students.

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