

Original Article

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# Investigation of residents' performance in ACGME competencies following a PGY-1 training program: A single medical university hospital experience

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**Background:** In 2003, the post-graduate year (PGY)-1 system was implemented in Taiwanese medical education. This program ensured that all resident physicians in Taiwan would receive adequate training in the emergency medicine and other specialties such as community medicine, internal medicine, and surgery before entering their specialized resident training program in order to provide safe, evidenced-based, and humanistic care to their patients. However, the variations in training environments during these rotations continue to pose a challenge for residency training. **Objective:** To assess the effect of the program by measuring residents' performance on a 9-point scale for the Accreditation Council for Graduate Medical Education (ACGME) core competencies before and after completing emergency department (ED) and ward training. **Methods:** A cross-sectional survey study was conducted in a single medical university hospital. The performance of PGY-1 residents was assessed and rated before and after the training in the ED and in-patient ward. A nine-point Likert scale was used to measure each competency. A Wilcoxon signed-rank test was used to compare performance before and after training. **Results:** Twenty-three residents completed the training course in 2009. Their performance scores significantly increased in all six competencies after training in both the ED and ward. **Conclusion:** The PGY-1 training program in the ED and ward improved residents' performance in all six ACGME competencies.

**Key words:** ACGME competencies, emergency department, general ward, postgraduate training

## Introduction

After the outbreak of severe acute respiratory syndrome (SARS), the post-graduate year (PGY) program was implemented in Taiwanese

medical education. Before the SARS outbreak, residents' training focused on their specialty, and residents did not receive formal training in general medicine. The outbreak showed that early and highly specialized training might lead to the weakening of general competencies during patient care<sup>[1]</sup>. In recent decades, changes in postgraduate medical education programs in different countries have come as a response to concerns about new graduates' ability to meet the demands of today's practice environment<sup>[2-4]</sup>. In Taiwan, the Taiwan Joint Commission on Hospital Accreditation and Department of Health has reformed the residency

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training program based on the United States Institute of Medicine's recommendation that delaying sub-specialized professional training can enhance physicians' clinical competency in providing patient-centered medical care and promoting care quality<sup>[5]</sup>. Taiwan's PGY program ensures that all resident physicians receive adequate training in the emergency medicine and other specialties such as community medicine, internal medicine, and surgery before entering a specialized resident training program in order to provide patients with safe and humanistic care. During one-month rotations among the departments related to these specialties, residents are expected to develop and demonstrate ability in six core competencies as endorsed by the Accreditation Council for Graduate Medical Education (ACGME): patient care, medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice<sup>[6]</sup>.

Residency program directors are responsible for ensuring that residents receive appropriate training in these areas and for evaluating their performance. Nevertheless, variations in training environments and faculties during these rotations continue to pose a challenge for residency training<sup>[7]</sup>. Training sites such as the emergency department (ED), outpatient department, operating room, and internal medicine in-patient service (ward) are traditional learning bases. In the ED, competencies can be integrated into a model including the clinical care and learning cycles during patient workup and management<sup>[8]</sup>. On the one hand, the volume of patients with undifferentiated medical problems and the requisite emphasis on diagnosis and treatment in emergency medicine seemingly facilitates the development of competencies around patient care and medical knowledge. On the other hand, overcrowding and chaos in many EDs may be a barrier to core competency development<sup>[9]</sup>. To date, few studies have evaluated to what degree core competency performance of PGY-1 residents following training in the ED differs from that following other clinical rotations. To fill this gap, we sought to compare PGY-1 residents' performance in terms of the six ACGME core

competencies after completion of a one-month rotation in the ED and in-patient ward.

## Materials and Methods

This was a cross-sectional survey study. It was conducted at a single medical university hospital with 1,000 beds. Approximately 56,000 patients visit its ED annually. In the post-graduate year one PGY-1 program (PGY-1) starting in September 2009, a total of 23 PGY-1 resident trainees were required to spend one month each in the ED and a ward. "Ward" was defined as an internal medicine in-patient facility. Trainees' tasks were similar to those of residents primarily focusing on those specialties and they were required to manage patients in both departments.

During the study period, half of the trainees were trained first in the ED and then rotated to the ward, and half were trained first in the ward and then rotated to the ED. During the one-month training period in the ED, one of the 16 attending emergency physicians qualified to serve in the PGY tutor training program was assigned as a tutor to each PGY-1 trainee. The tutor directly observed the trainee's performance during the one-month course and rated his or her performance in terms of the six ACGME general competencies before and after the course, using a 9-point Likert scale (1, unsatisfactory; 9, outstanding). Supplementary assessment methods such as a mini-clinical evaluation exercise, direct observation of procedural skills, objective structured clinical exams, and a 360-degree evaluation were also used. During the rotation-training period in the ward, one of the five attending internal medicine physicians qualified to serve in the PGY tutor-training program was assigned as a tutor to each PGY-1 trainee. Performance was assessed similarly. All trainees were blinded to this study. This study was exempt from informed consent by the hospital Institutional Review Board because it was a part of formal medical education program (CSMUH No: CS12196). Because of the skewed distribution of parameters in the sample in the Kolmogorov-Smirnov test, continuous data are described as median and interquartile ranges. Categorical

data are expressed as counts and percentages. A Wilcoxon signed-rank test was used to compare performance before and after training. All analyses were performed using IBM SPSS version 19. The significance threshold was set at 0.05.

## Results

In total, 23 PGY trainees completed the PGY training course in 2009. Table 1 shows the demographic data of these trainees. The median age was 29 years old, and most were male (69.6%). The distribution of their original specialized backgrounds is as follows: pediatrics (21.7%), surgery (17.4), internal medicine (8.7%), and rehabilitation (8.7%). Table 2 shows that the median performance scores significantly increased in all six competencies after training in both the ED and ward.

## Discussion

In 1999, the ACGME introduced six elements of clinical competency for medical education<sup>[6]</sup>. Three years later, the ACGME shifted from structure- and process-based to outcome-based accreditation. The 2003 SARS epidemic had a considerable impact on Taiwanese society<sup>[10]</sup>. It made Taiwanese medical educators reflect on and reappraise the

**Table 1.** The demographic data on PGY-1 trainees

Characteristic	Count, (%)
Number of trainees	23
Sex, (%)	
Male	16 (69.6)
Female	7 (30.4)
Age, median (IQR)	29 (28-31)
Specialty, number (%)	
Pediatrics	5 (21.7)
Surgery	4 (17.4)
Internal medicine	2 (8.7)
Rehabilitation	2 (8.7)
Psychiatric	1 (4.35)
Radiology	1 (4.35)
Urology	1 (4.35)
Anesthesiology	1 (4.35)
Neurology	1 (4.35)
Ear, nose, and throat	1 (4.35)
Oncology	1 (4.35)
Orthopedic	1 (4.35)
Emergency medicine	1 (4.35)
Ophthalmology	1 (4.35)

IQR = interquartile ranges

effects of various residency programs in different specialties. During the SARS outbreak, the allocation of general medical personnel to provide patient care was very difficult in reality. Before the outbreak, residents' training was focused on their specialties. Training in general medicine was not well established among various specialties, which

**Table 2.** The performance score before and after training in both ED and ward

ACGME's competencies	Training place	Score before training, median (IQR)	Score after training, median (IQR)	P value
Patient care	ED	6 (5-6)	7 (6-8)	<0.001
	Ward	6 (5-6)	6 (6-7)	0.001
Medical knowledge	ED	5 (5-6)	7 (7-8)	<0.001
	Ward	5 (4-6)	6 (5-6)	0.002
Practice based learning and improvement	ED	6 (5-6)	7 (7-8)	<0.001
	Ward	5 (4-7)	6 (6-7)	0.002
Interpersonal and communication skills	ED	6 (5-7)	7 (7-8)	<0.001
	Ward	6 (5-7)	6 (6-7)	0.015
Professionalism	ED	6 (5-7)	7 (7-8)	<0.001
	Ward	6 (5-7)	6 (6-7)	0.023
System based practice	ED	6 (5-7)	7 (7-8)	<0.001
	Ward	6 (5-6)	6 (5-7)	0.009

IQR = interquartile ranges

ED = emergency department

led to a shortage of general medical healthcare providers at the time of the SARS outbreak. In brief, the weakening of general competencies in all types of resident training was attributed to training being too early and highly specialized<sup>[11-12]</sup>. Medical educators in Taiwan, therefore, decided to reset the goals of residency training as well as encourage a change in mindset. The PGY program was implemented in a stepwise manner, starting with three months of rotation and increasing to six months until a one-year PGY program was established in 2009. The implementation of the PGY-1 program in Taiwan ensured that subspecialty residents would have a sound base competency in managing patients before entering various sub-specialties. The aim of that program is to enhance the ability of a resident physician to provide safe, evidenced-based, and humanistic medical care to his or her patients<sup>[13]</sup>. The ED and ward are two major rotation sites in which all PGY-1 trainees must work. Their six general competences in these areas were also objectively documented as primary outcome performance.

The most relevant finding of this study was that both ward and ED provided a realistic training environment for all six general competences. Internal medicine has been referred to as the cornerstone of the health care system. Extensive medical knowledge and skills are essential in order to provide comprehensive care to patients in the ward. The daily practice in an internal medicine ward, including chart rounds, bedside teaching, case conferences, mortality and morbidity conferences, journal reading, and attending teaching sessions, can enhance patient care skills, medical knowledge, professionalism, and systems-based practice<sup>[14-18]</sup>. On the other hand, primary care practice with low-acuity patients provides learning opportunities in training practice-based learning and improvement as well as in interpersonal and communication skills<sup>[19]</sup>. During the ED training, most of the PGY-1 resident trainees focused on primary care of low-acuity ED patients including adults and pediatric and trauma patients. Procedures such as simple suture, splinting, intravenous catheter placement, nasogastric tube insertion, and foley tube insertion are common practice skills in the ED.

In the ED, competencies can be integrated into a model including the clinical care and learning cycles during patient workup and management<sup>[8]</sup>.

All six ACGME competencies can be illustrated with each patient during the pre-hospital course, ED management, and disposition. The unique setting of the ED provides a realistic training environment for interpersonal and communication skills. These skills are essential for quality of health care<sup>[20]</sup>. Good communication skills are associated with greater patient satisfaction<sup>[21]</sup>. However, communication failure can cause medical errors and affect patient safety<sup>[22]</sup>.

EDs in Taiwan, especially those located in medical centers, often have high patient volumes. Emergency physicians are trained in the ability to multitask and manage patients both efficiently and effectively<sup>[23]</sup>. Therefore, effective communication is very important during practice in EDs. In this department, physicians have to take patients' medical histories and explain all investigations, procedures, diagnoses, treatment options, and prognoses to the patients. Moreover, they have to consult with other sub-specialties for further treatment plans and final disposition. They also play a key role as team leaders during resuscitation. All of these practices enhance the individual interpersonal and communication skills of trainees in the ED.

## Limitations

This study has some limitations. First, the attending physician tutors used direct observation as an assessment tool to evaluate trainees. There is no measurement of inter-rater reliability. However, all tutors were senior physicians and were qualified for the PGY tutor-training program. They were also required to obtain credits in the PGY tutor continuous education program. We can, therefore, assume that all of the tutors had some level of consensus in the assessment of ACGME performance. Second, the sample was collected only from a single medical university hospital. Training programs differ across facilities. Therefore, the present results may lack generalizability to other facilities. Future

multi-center studies are needed to overcome this limitation.

## Conclusions

Residents' performance in all six ACGME general competencies improved following both ED and ward training.

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## Potential conflicts of interest

No conflicts for all authors.

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# 探討畢業後一般醫學教育訓練制度ACGME六大核心能力的成果：單一醫學大學附設醫院的經驗

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**前言：**2003年爆發SARS（嚴重急性呼吸道症候群）大流行後，台灣醫學發生重大改革引進PGY-1（畢業後一般醫學教育訓練）制度。透過PGY-1教育，希望每一個醫師都有一個最基本的病人照護能力。能提供一個安全、符合實證醫學及人性化的醫療服務。ACGME（美國畢業後醫學教育評鑑委員會）六大核心能力是世界公認用來評鑑住院醫師能力的一個標準。PGY-1的訓練場所可包括急診、門診、病房、手術室及社區醫學。目前沒有相關研究到底那一個場所比較適合作為訓練ACGME六大核心能力。**研究目的：**測量急診及病房訓練ACGME（美國畢業後醫學教育評鑑委員會）六大核心能力的差異。**研究方法：**採觀察式研究方法，測量23位PGY-1學生在急診及病房訓練前及訓練後的成績。**研究結果：**PGY-1學生在急診及病房訓練後，其ACGME六大核心的能力都有明顯進步。研究結論：急診與病房的訓練同樣能增加PGY-1學生的ACGME六大核心的能力。

**關鍵詞：**美國畢業後醫學教育評鑑委員會六大核心能力、急診、病房、畢業後一般醫學教育

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