The New Japanese Postgraduate Medical Education and Quality of Emergency Medical Care

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Title: **The New Japanese Postgraduate Medical Education and Quality of Emergency Medical Care**

Running head: **Education Program and Quality of Emergency Care**

Abstract

Background: The new Postgraduate Medical Education (PGME) was recently introduced to improve quality of emergency care in Japan.

Objectives: To compare the quality of care and confidence in provision of emergency medicine between physicians who completed the old and new PGME programs.

Methods: A cross-sectional survey was sent to 279 physicians of postgraduate years 4-9, and 208 responses (75%) were received. Quality of care in emergency medicine was measured using 26 questions on treatment choices for various clinical conditions. Each question had six responses, including a single correct choice. Effect size was obtained by dividing the total difference in score by the standard deviation of the score distribution. Confidence in emergency medicine was rated using four self-reported items on the level of confidence in treating acute illnesses in various emergency medicine settings.

Results: The mean score for quality of care was significantly higher in the new PGME group (15.3) compared to the old PGME group (12.8). The difference in scores was 2.5 ($p<0.01$) and the effect size (0.47) indicated a moderate difference. Linear regression of total scores adjusted for physician covariates produced similar results of an adjusted score difference of 2.5 ($p<0.01$) and an adjusted effect size of 0.47. The new PGME group also had significantly greater confidence in provision of emergency medicine based on significant differences between the groups for all four self-reported items (all $p<0.05$).

Conclusions: Japanese physicians who complete the new PGME program are likely to provide higher quality of care and have greater confidence in emergency

medicine compared to those who completed the old PGME program.

Key Words: postgraduate medical education; quality of care; clinical confidence; emergency medicine.

Introduction

The old postgraduate medical education (PGME) program in Japan had several serious weak points. In this program, most medical graduates took their PGME in a single specialty department at a university hospital and training focused solely on this specialty.[1] This style of PGME training created wide differences in the levels of attainment of clinical skills and knowledge among residents and sometimes led to inadequate preparation for basic primary care.[2] Most hospital-based Japanese physicians also see patients in emergency departments on a regular basis and this limited training may also have led to inadequate emergency medical care.[3]

Under public pressure for better PGME training in primary care and especially in emergency medicine, the Japanese government implemented a new two-year PGME program in 2004.[4] The new program was designed to provide a range of clinical opportunities through which medical graduates could acquire basic clinical skills for practicing primary care, including a mandatory three-month rotation in emergency medicine.[5] A recent study reported that the new PGME program has improved the clinical experience and confidence levels of residents in broad areas, including emergency medicine.[6] However, this study was conducted among postgraduate year-two (PGY 2) residents based on a self-reported survey.[6] Objective assessment of clinical competency among practicing physicians who have completed the new PGME program has not been performed. Thus, in the current study, we conducted a survey to compare the quality of emergency medical care between physicians who took the old and new PGME programs.

Methods

Subjects

We conducted an anonymous web-based survey of physicians throughout Japan in November 2009. The subjects were recruited by a panel of Japanese physicians. The new PGME program was implemented in academic year 2004. Thus, the subjects were young physicians (PGY 4-6) who took the new PGME program and those (PGY 7-9) who completed the old PGME program. The different characteristics of the two programs have been explained elsewhere (6). E-mail messages with an invitation to participate in the survey were sent to the target groups of physicians. The solicitation e-mail included a brief introduction describing the objectives of the study, as well as statements guaranteeing the confidentiality and anonymity of responses. To avoid a biased sampling of physicians with a particular interest in emergency medicine, the purpose of the study was stated to be an examination of general issues related to medical care. All participants provided informed consent based on their understanding of the survey before taking part in the study.

Questionnaire

The physicians completed a self-administered questionnaire consisting of two sections that evaluated clinical performance and confidence in provision of emergency medicine. The performance section comprised 26 questions regarding treatment choices for various clinical conditions. Each question had 5 responses, including a single correct choice (see appendix). The contents were

developed by the principal investigator (YT, a physician with Japanese board certification in internal medicine, 21 years of experience in adult emergency care, and FACP certification). The validity of the content was confirmed by consensus of all co-investigators. The confidence section comprised four self-reported items regarding caring for patients with acute illnesses (see appendix). The physicians were asked to indicate their level of confidence in treating patients with acute illnesses in various settings of emergency medicine (daytime walk-in patients, daytime ambulance patients, nighttime walk-in patients, and nighttime ambulance patients). Answers were given on the basis of performance: 1, able to treat almost all patients; 2, able to treat more than half of patients; 3, able to treat some patients; and, 4, can only treat a few patients.

Statistical analyses

Total scores on the performance section were calculated by adding the number of correct responses to all 26 questions. Characteristics and mean total scores for this section were compared between the PGY 4-6 and PGY 7-9 physicians. A multivariate linear regression model was constructed for the total scores using covariates including the physicians' characteristics. The confidence levels of physicians were compared using a trend test for each of the four clinical settings. A distribution-based approach was used to estimate the effect size for examining the clinical significance of differences in mean total scores between the groups. To this end, effect sizes were computed by dividing the mean difference in scores by the SD for all participants.[7] For interpretation of effect sizes, the recent criteria of <0.3, 0.3-0.8, and >0.8 to indicate small, moderate

and large differences were used.[7] Statistical analyses were performed using STATA 10.0 (College Station, TX, USA). Two-tailed p values <0.05 were considered to be statistically significant.

Results

We obtained responses from 105 (73%) of 144 physicians who took the old PGME program and from 103 (76%) of 135 physicians who took the new program. The overall response rate was 75% (208/279). Of the respondents, 169 were men, 39 were women, and 37 (18%) were specialists in internal medicine. The median number of ER shifts worked per month was 3 (range, 0-20). The mean total scores for quality of ER care was 14.1 ± 5.3. The mean scores for quality of ER care showed no trend among physicians in different PGYs, as shown in Figure 1.

A comparison of the characteristics of physicians who took the old (PGY 7-9) and new (PGY 4-6) PGME programs is shown in Table 1. Gender, the number of ER shifts worked per month, and the percentage of internal medicine specialists did not differ significantly between the groups. However, the mean score for quality of ER care was significantly greater for the new PGME group (15.3) compared to the old PGME group (12.8). The difference in score was 2.5 and the effect size was 0.47 (2.5/5.3), which was considered to indicate a moderate difference.

The results of multivariate linear regression analysis of the total ER care scores are shown in Table 2. The number of ER shifts worked per month and an internal medicine specialty were significantly associated with a higher score for

quality of ER care. The new PGME group was significantly more likely to have a higher score for quality of ER care and the adjusted score difference (beta coefficient of the new PGME group) was 2.5. The adjusted effect size was 0.47.

The results for confidence in providing emergency medicine are shown in Table 3. All four items showed significantly different distributions of responses between the groups. Physicians in the new PGME group were significantly more likely to have greater confidence in providing emergency medicine.

Discussion

A comparison between physicians who completed their two-year residencies under the old and new PGME programs indicated that physicians who took the new PGME program are more likely to adhere to an appropriate standard of care in emergency medicine and are more confident in caring for patients with acute illnesses. These results are consistent with those of a previous resident survey using a self-reported assessment of basic clinical skills and knowledge related to primary care, including emergency medicine.[6] Therefore, clinical training under the new PGME program seems to lead to a more appropriate quality of care and greater confidence in emergency medicine among Japanese physicians, thereby leading to better emergency medical care. Thus, the new PGME program appears to have achieved its original goal of improving the clinical skills and knowledge of physicians.

The major reasons for the discrepancy in quality of care and confidence in emergency medicine among physicians trained in the two programs are likely to be derived from the characteristics of the programs. Most physicians who took

the old PGME program received training in a single specialty during their residency, whereas the proportion of residents reporting experience in emergency medicine has significantly increased in the new program.[1,6] In the old PGME program, residents were traditionally placed in charge of inpatient care while senior staff physicians provided care for outpatients. On the contrary, in the new program residents see outpatients, including those with common acute illnesses, and have more opportunities to gain experience in emergency medicine. This characteristic of the new PGME program is more consistent with the learning goals set by the Ministry of Health, Labor and Welfare of the Japanese government to address the needs for primary care and emergency care.

After introduction of the new PGME program, physicians serving as teaching staff at Japanese hospitals may also have developed greater enthusiasm for teaching residents, since many teaching staff have taken faculty development programs certified by the Ministry of Health, Labor and Welfare.[8] They are also likely to have greater clinical competency and teaching skills compared to staff in the old program.[9] Thus, a higher quality of educational programs offered by skilled teachers at non-university hospitals may be one cause of the increased quality of care in emergency medicine among physicians who have completed the new program.

Our study has several limitations. First, physicians who have been in practice for longer might have less factual knowledge about emergency medicine and might be less likely to adhere to an appropriate standard of care.[10] However, as shown in Figure 1, there was no linear relationship between the

mean scores on the emergency medicine questionnaire and post-graduation years. Among participants from PGY 4 to PGY 9, the maximum mean score was achieved by PGY 6 physicians (new PGME program) and the minimum mean score was found for PGY 8 physicians (old PGME program). Second, assessment of clinical performance on the basis of adherence to guidelines or standards of care may not be reliable for evaluation of quality of care, since there may be disagreements with guidelines and this can make it difficult to establish appropriate clinical norms.[11] However, our questionnaire was developed using clinical norms considered to reflect widely accepted standards of practice. Third, because of the cross-sectional study design, exact causality cannot be determined and thus the results require careful interpretation. Further studies are needed for prospective examination of the quality of care at predetermined years of postgraduate training among physicians who completed the new PGME program.

In summary, our results suggest that Japanese physicians who trained under the new PGME program are likely to provide a higher quality of emergency medical care. As a quality improvement intervention, the new PGME program appears to have succeeded in improving primary care for patients with acute health problems.

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Table 1. Characteristics of physicians who responded to the survey and took the old and new PGME programs (n=208)

Characteristic	Old PGME n=105	New PGME n=103	P value*
Gender, n (%)			
Men	84 (80)	85 (83)	0.723
Women	21 (20)	18 (17)	
No. of ER shifts per month, median (range)	2 (0-20)	3 (0-20)	0.065
Specialty, n (%)			
Internal medicine	21 (20)	16 (16)	0.470
Other specialty	84 (80)	87 (84)	
Total scores, mean (SD)	12.8 (5.9)	15.3 (4.3)	<0.001

ER=emergency room, PGME=postgraduate medical education, CI=confidence interval, SE=standard error of the beta coefficient
*Based on a Fisher exact test or t-test as appropriate

Table 2. Multivariate linear regression analysis of total ER care scores (n=208)

Covariate	Beta coefficient (95% CI)	SE	P value
Male gender	0.03 (-1.67, 1.74)	0.86	0.968
No. of ER shifts per month	0.29 (0.12, 0.47)	0.09	0.001
Specialty of internal medicine	4.41 (2.70, 6.12)	0.87	<0.001
New PGME program	2.49 (1.19, 3.79)	0.66	<0.001

ER=emergency room, PGME=postgraduate medical education, CI=confidence interval, SE=standard error of the beta coefficient

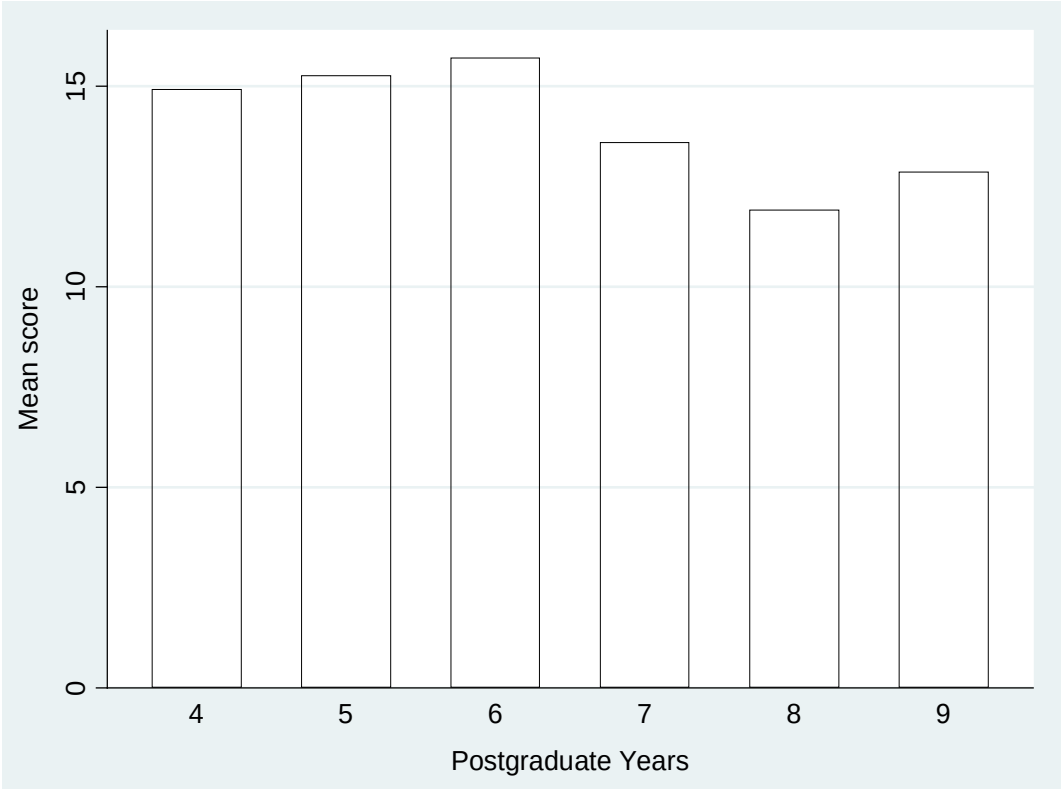
Table 3. Clinical confidence in provision of emergency medicine (n=208)

Item	Old PGME n=105 n (%)	New PGME n=103 n (%)	P value*
A) Primary emergency in daytime			0.008
1. I can manage almost all patients.	38 (36)	52 (50)	
2. I can manage more than half of the patients.	36 (34)	36 (35)	
3. I can manage some of the patients.	22 (21)	12 (12)	
4. I can manage few of the patients.	9 (9)	3 (3)	
B) Secondary emergency in daytime			0.025
1. I can manage almost all patients.	22 (21)	33 (22)	
2. I can manage more than half of the patients.	38 (36)	56 (54)	
3. I can manage some of the patients.	31 (30)	18 (17)	
4. I can manage few of the patients.	14 (13)	6 (6)	
C) Primary emergency at nighttime			0.011
1. I can manage almost all patients.	31 (30)	42 (41)	
2. I can manage more than half of the patients.	40 (38)	44 (43)	
3. I can manage some of the patients.	21 (20)	12 (12)	
4. I can manage few of the patients.	13 (12)	5 (5)	
D) Secondary emergency at nighttime			0.014
1. I can manage almost all patients.	19 (18)	20 (19)	
2. I can manage more than half of the patients.	36 (34)	55 (53)	
3. I can manage some of the patients.	33 (31)	21 (20)	
4. I can manage few of the patients.	17 (16)	7 (7)	

*P values for trend

Figure Legends

Figure 1. Mean scores for quality of care in emergency medicine for physicians in different postgraduate years



Appendix

Questionnaire
(1) Considering emergency or nighttime outpatient care (adult patients), please select only 1 item that you actually use (or an item in the same class) among the suggested medications or treatments. In a case in which you do not use any of the treatments, please select the item that you think is most appropriate.

A) Bronchial asthma attack not relieved with a beta-agonist nebulizer
1. Intravenous theophylline
2. Intravenous epinephrine
3. Intravenous methylprednisolone
4. Oral leukotriene antagonists
5. Intravenous propranolol
6. Do not know

B) WPW syndrome with atrial fibrillation
1. Intravenous digoxin
2. Temporary external cardiac pacing
3. Intravenous verapamil
4. Intravenous propranolol
5. Intravenous disopyramide
6. Do not know

C) Gastroduodenal ulcer with active bleeding
1. Intravenous famotidine
2. Intravenous transamine
3. Oral aspirin
4. Intravenous omeprazole
5. Intravenous pirenzepine
6. Do not know

D) Community-acquired pneumonia with positive urine pneumococcal antigen test
1. Intravenous ceftriaxone
2. Intravenous meropenem
3. Intravenous vancomycin
4. Oral oseltamivir
5. Intravenous tobramycin
6. Do not know

E) Benign paroxysmal positional vertigo
1. Intravenous sodium bicarbonate
2. Intravenous epinephrine
3. Intramuscular diphenhydramine
4. Oral adenosine trisphosphate sodium (ATP)
5. Intravenous glycerol
6. Do not know

F) Burn with oliguria from dehydration (pre-renal renal failure)
1. Intravenous human albumin
2. Intravenous hetastarch
3. Intravenous lactate Ringer
4. Fresh frozen plasma transfusion
5. Intravenous furosemide
6. Do not know

G) Acute viral upper respiratory infection
1. Oral acetaminophen
2. Intravenous acyclovir
3. Intravenous norfloxacin
4. Oral prednisolone
5. Oral clindamycin
6. Do not know

H) Deep coma from massive dose of benzodiazepine taken 6 hours ago
1. Intravenous pralidoxime (PAM)
2. Dialysis
3. Gastric lavage
4. Tracheal intubation
5. Intravenous midazolam
6. Do not know

I) Status epilepticus uncontrollable with intravenous diazepam
1. Intravenous meropenem
2. Intravenous phenytoin
3. Intramuscular phenobarbital
4. Intravenous pancuronium
5. Intravenous vecuronium
6. Do not know

J) Anaphylactic shock from bee sting allergy
1. Intravenous chlorpheniramine
2. Oral nifedipine
3. Intravenous stronger neo-minophagen C
4. Intramuscular epinephrine
5. Topical steroid ointment
6. Do not know

K) Hypertension with acute left sided heart failure
1. Intravenous diltiazem
2. Intravenous dopamine
3. Intravenous nitroglycerin
4. Sublingual nifedipine
5. Intravenous dobutamine
6. Do not know

L) Community-acquired bacterial enteritis with fever and diarrhea
1. Intravenous fosfomycin
2. Intravenous clindamycin
3. Oral vancomycin
4. Oral ciprofloxacin
5. Oral sennoside
6. Do not know

M) Bell's palsy
1. Oral prednisolone
2. Intravenous glycerol
3. Oral valacyclovir
4. Mixed gas (oxygen + carbon dioxide) inhalation
5. Oral acyclovir
6. Do not know

N) Acute deep vein thrombosis without pulmonary embolism
1. Intravenous transamine
2. Oral aspirin
3. Intravenous heparin
4. Elastic stocking
5. Intravenous t-PA
6. Do not know

O) Acute gout with chronic renal failure (Cr 3.0 mg/dl)
1. Oral loxoprofen sodium
2. Oral allopurinol
3. Oral benzbromarone
4. Oral prednisolone
5. Intravenous morphine
6. Do not know

P) Pulseless electrical activity (PEA)
1. Electrical defibrillation
2. Intravenous furosemide
3. Synchronized cardioversion
4. Intravenous epinephrine
5. Intravenous dobutamine
6. Do not know

Q) Vomiting due to adhesive small bowel obstruction
1. Nasogastric tube insertion
2. Intravenous scopolamine
3. Intravenous metoclopramide
4. Intravenous pentazocine
5. Intravenous morphine
6. Do not know

R) Acute viral encephalitis in a young patient without immunodeficiency
1. Oral rifampin
2. Intravenous glycerol
3. Intravenous ceftriaxone
4. Intravenous acyclovir
5. Oral oseltamivir
6. Do not know

S) Pulseless ventricular tachycardia after acute myocardial infarction
1. Electrical defibrillation
2. Intravenous dobutamine
3. Synchronized cardioversion
4. Intravenous epinephrine
5. Intravenous lidocaine
6. Do not know

T) Bradycardia (50 /min) due to hyperkalemia (7.0 mEq/L) in a dialysis patient
1. Intravenous atropine
2. Intravenous noradrenaline
3. Intravenous calcium gluconate
4. Intravenous furosemide
5. Intravenous isoproterenol
6. Do not know

U) First-time acute cystitis in a woman without an underlying condition
1. Oral amoxicillin
2. Oral cefcapene
3. Intravenous fosfomycin
4. Intravenous meropenem
5. Intravenous vancomycin
6. Do not know

V) Persistent septic shock despite antibiotics and massive Ringer's lactate administration
1. Intravenous human albumin
2. Intravenous furosemide
3. Intravenous hetastarch
4. Intravenous dobutamine
5. Intravenous dopamine
6. Do not know

W) Hypotension (80/40 mmHg) due to acute myocardial infarction
1. Intravenous human albumin
2. Intravenous hetastarch
3. Intravenous dobutamine
4. Intravenous dopamine
5. Intravenous furosemide

6. Do not know

X) Hypoxemia (SpO_2 88%) with drowsiness due to CO_2 narcosis in a patient with acute aggravation of COPD
1. Low flow oxygen (through nasal cannula)
2. High flow oxygen (by reservoir oxygen mask)
3. Oral diazepam
4. Intravenous theophylline
5. Intravenous midazolam
6. Do not know

Y) Respiratory suppression due to morphine HCl
1. Intravenous flumazenil
2. Intravenous naloxone
3. Intravenous doxapram
4. Intravenous midazolam
5. Intravenous pentazocine
6. Do not know

Z) Acute aortic dissection (Stanford type B) with hypertension and tachycardia
1. Sublingual nifedipine
2. Intravenous nicardipine
3. Intravenous propranolol
4. Intravenous dobutamine
5. Intravenous dopamine
6. Do not know

(2) Assume that your working schedule is flexible so that you can accommodate
emergency or nighttime outpatient care. For each of the situations below, to what extent will you be able to manage the patient? Please select only 1 item that you think is the closest to the real situation.

A) Primary emergency in daytime (undiagnosed, acute patient who visits without notice)
1. I can manage almost all patients.
2. I can manage more than half of the patients.
3. I can manage some of the patients.
4. I can manage few of the patients.

B) Secondary emergency in daytime (undiagnosed, acute patient who arrives by ambulance)
1. I can manage almost all patients.
2. I can manage more than half of the patients.
3. I can manage some of the patients.
4. I can manage few of the patients.

C) Primary emergency at nighttime (undiagnosed, acute patient who visits

without
notice)
1. I can manage almost all patients.
2. I can manage more than half of the patients.
3. I can manage some of the patients.
4. I can manage few of the patients.

D) Secondary emergency at nighttime (undiagnosed, acute patient who arrives by
ambulance)
1. I can manage almost all patients.
2. I can manage more than half of the patients.
3. I can manage some of the patients.
4. I can manage few of the patients.