RESEARCH

Importance and fitness of family medicine milestone project from America to Taiwan

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Abstract

Background The six core competencies of ACGME - patient care (PC), medical knowledge (MK), system**s**-based practice (SBP), practice-based learning and improvement (PBLI), professionalism (PROF), and interpersonal and communication skills (ICS) - represent domains in which physicians must ultimately demonstrate competence. Although the ACGME's six core competencies have been applied in Taiwan with the milestone project, the application of the six core competences in the Family Medicine milestones for residency training have not yet been established.

Methods We recruited 61 family medicine physicians from 25 hospitals from four major geographic areas for a Delphi round one survey and 72 physicians from 27 hospitals for a Delphi round two survey. With 5-point scales, the Cronbach's alphas for both importance and fitness were 0.98 in round one. In round two, the Cronbach's alphas were 0.86 and 0.83 for importance and fitness. The mode and quartile deviation in Delphi method, importance-performance matrix analysis (IPA), and importance-performance matrix analysis (IPA) were used for three stages IPA process.

Results In IPA, a total of 72.7% (16/22) of the sub-competencies exhibited high importance and fitness, with a mean score ≥ 4.7; the exceptions were PC-1 (cares for acutely ill or injured patients), MK-2 (critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PBLI-3 (improves systems), PROF-3 (humanism/cultural proficiency), and ICS-4 (utilizes technology). In IPMA, the performance value of six core competencies for FMM-Taiwan was 92.6 when considering the importance and fitness indices of the 22 sub-competencies.

Conclusions The accordance of the ACGME's milestones to Taiwan was acceptable to good and related milestones could been developed for residency training.

Keywords Family medicine, Delphi method, Importance-performance analysis, Importance-performance-matrix analysis

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Background

Since 1950s, medical education in Taiwan has been closely connected to the American system [1]. Medical education has been influenced by Flexner's report and "Educating Physicians: A Call for Reform of Medical School and Residency," which emphasize competence-based medical education [2]. The shift in medical education from a content-based curriculum to a competency-based curriculum has led to efforts to identify core competencies and to assess learners according to how well they perform in various aspects of a physician's expected role in the society [3].

Training in family medicine for Taiwanese residents began with a government-funded fostering program for general practitioners in 1976 [4]. In 1979, Taiwan Hospital initiated a resident training program for general practitioners, and this initial program evolved to become the prototype of Taiwan's family medicine training system for residents. The Taiwan Association of Family Medicine was established in 1986, and this organization was the first institute entrusted by the Taiwanese government to implement a family medicine specialty certification examination and residency training program accreditation. In 2013, the Residency Review Committee was organized by the government to assess and approve accreditation processes conducted by medical specialist societies for the evaluation of their residency training programs in Taiwan [4].

Competency-based medical education (CBME) is an outcomes-based approach to design implementation, assessment and evaluation of an education program. It uses an organized framework of competencies for training to lead better care for patients [5]. Family medicine was one of the earliest adopters of CBME framework in Canada and the United States with its programs being implemented into residency training on a national scale [6, 7]. There are three frameworks, the Accreditation Council for Graduate Medical Education (ACGME), CanMEDS-Family Medicine (CanMEDS-FM) and Triple C Competency-based Curriculum for Family Medicine from 2000 to 2020 [8] and the core competencies from ACGME had used in Taiwan. The six core competencies of ACGME - patient care (PC), medical knowledge (MK), systems-based practice (SBP), practice-based learning and improvement (PBLI), professionalism (PROF), and interpersonal and communication skills (ICS) - represent domains in which physicians must ultimately demonstrate competence [9]. In 2015, ACGME Family Medicine Milestone Project was initiated to develop a framework to design goal statements for different stages for resident training, from the beginner to the professional [10]. The core concept of family medicine is similar throughout the world; however, family medicine milestones for residency training may differ by culture or country. In preparing to introduce CBME into the Family Medicine residency program, the Association of Family Medicine, Taiwan, conducted the workshop to promote Family Medicine competency and Milestones for residency training from 2017 to 2018. The main reference was ACGME Family Medicine Milestone Project 1.0 [10].

Importance-performance analysis (IPA) has been used in education, hospitality and marketing research [11]. The IPA is a two-dimensional-grid-based analysis method in which the averages of importance and performance are arranged into a binary matrix [12]. The grid is based on the importance and performance domains of measured items or constructs as well as classifications in the educational and clinical services to promote the efficacy such as finding the item to keep up the good work or possible overkill [11–13]. The IPA included 3 stages: collecting data with Delphi method, basic analysis with IPA and advance analysis with importance performance mapping analysis (IPMA) [11]. Under the collectivism which more concern the fitness in the context [14], and the performance could be modified as fitness in the IPA [13]. Based on the research purposes, the performance index could be modified as fitness or satisfaction in the IPA for classing the items to concentrate here, keep up the good work, low priority and possible overkill [11, 13]. The goal of this study was to examine the application of 22 sub-competencies from the ACGME Family Medicine Milestone Project [10] to Family Medicine Milestones of Taiwan (FMM-Taiwan) in residency training based on the 3 stages IPA process with the important and fitness index. Following the 3 stage IPA, the fitness of ACGME Family Medicine from US to Taiwan will be exam.

Methods

This study was approved by the institutional review board of **** Hospital (protocol IRB number = A-ER-107-069 and date of approval: august 1, 2018) and collected data from 30 hospitals in four major geographic areas (north, central, south, and east) of Taiwan in 2018. For the goal of this study, the two-round Delphi process [15, 16] had used to collect the importance and fitness index for ACGME 6 competencies and 22 sub-competencies for Family medicine and the 3 stage of IPA [11] had used to exam the application of the ACGME from US to Taiwan. Participants.

We recruited family medicine physicians from 30 hospitals in four major geographic areas (north, central, south, and east) of Taiwan in 2018. The participants participated in a questionnaire survey in two Delphi rounds. A total of 13 directors, 28 attending physicians, and 20 residents from 25 hospitals completed the questionnaire in round one. Moreover, 24 directors, 33 attending physicians, and 15 residents from 27 hospitals completed the questionnaire in round two. The mean age of the participants was 41.9 ± 11.4 and 42.5 ± 11.4 years in round one and round two, respectively. The male/female distribution was 69.4%/30.6% in round one and 64.4%/35.6% in round two. Their mean of experience in Family Medicine was 10.6 ± 7.7 years.

Survey instrument

The ACGME Family Medicine Milestone Project, which consists of 22 sub-competencies of six core competencies, was used as the basis for constructing FMM-Taiwan for residency training. The Delphi questionnaire was developed through three stage: (1) bidirectional translation by two professional translators and two English language specialists, (2) worded and enhance the content agreeable (more than 90%) of the 22 sub-competencies by two attending physicians and two residents of the Department of Family Medicine of a medical center and (3) the Delphi questionnaire was confirmed by a task force of the Teaching and Training Committee of the Taiwan Association of Family Medicine with 8 experts. With 5-point scales for importance and fitness, in which a higher score indicated greater importance or better fitness, the Cronbach's alphas were 0.98 for both importance and fitness in round one. In round two, the Cronbach's alphas for importance and fitness were 0.86 and 0.83, respectively. The item-level content validity index was 0.99 by tow family physician and one education PhD. Based on the ACGME's six core competencies framework, we conduct exploratory factor analysis for construct validity. When using the principal axis factor analysis for the index of importance, we find 6 factors was the eigenvalue more than 1 and explained 71.2% variance. The results indicated that the questionnaire had acceptable reliability and validity.

Delphi method for the importance and fitness score

To minimize burden on our experts, we made a priori decision to use a two-round Delphi process [15, 16]. The Delphi method involves four steps: (1) conducting the questionnaire by bidirectional translation, (2) mail for first round survey anonymously (3) providing the firstround's result with Mode and conduct the round tow survey (4) summarizing the finding. As the Delphi method to find the consensus from those experts, Doyle sets the criteria that Q-Dev more than 1 and the mode percentage less than 50% as the experts' opinions on the importance of this scale have not reached consensus [17]. The Mode reflects that the item is most experts agreeable and the percentage reflects how many experts choose the item to show the representative value. After the Delphi method was completed, the mode and the quartile deviation (Q-Dev) of the importance and fitness scores were used to determine the importance and fitness indices for the 22 sub-competencies.

Importance-performance analysis (IPA)

The IPA is a two-dimensional-grid-based analysis method in which the averages of importance and performance are arranged into a binary matrix [11, 12]. The grid is based on the importance and performance domains of measured items or constructs as well as classifications in the educational field. IPA is a technique for prioritizing attributes based on measurements of performance and importance, and it can be modified for importance and fitness analysis based on their indices [11–13].

In the IPA, the importance score was used as the X-axis and the fitness score was used as the Y-axis. Then, the relative positions of importance and fitness for the 22 subcompetencies were indicated at coordinates divided into four quadrants by the mean of the importance and fitness scores of the sub-competencies. In the first quadrant, both importance and fitness were higher than the mean, and the corresponding competencies were considered major competencies and thought that keep up the good work. In the second quadrant, importance was less than the mean but fitness was higher than the mean. The corresponding competencies were regular competencies or possible overkill because they reflected daily routine. In the third quadrant as low priority, both the importance and fitness scores were less than the mean, and the corresponding competencies required modification. The competencies in the fourth quadrant had to be adapted for situation because importance was higher than the mean but fitness was less than the mean [11-13].

Importance-performance matrix analysis (IPMA)

Analysis of the importance-performance matrix of path modeling was conducted to identity areas possibly requiring improvement through management activities [11, 12]. IPMA has been widely used in fields such as the customer satisfaction, and it has also been implemented in education [11, 12]. In this study, IPMA was employed to examine the contribution of the 22 sub-competencies to the ACGME's six core competencies and to FMM-Taiwan. Initially, the fitness and importance indices for each sub-competency were assessed from the raw score obtained in round two of the Delphi method survey.

Three models of IPMA were used in this study. In the first model, the importance index of the 22 sub-competencies was used to explore their importance to ACG-ME's six core competencies and to FMM-Taiwan. In the second model, the fitness index of the 22 sub-competencies was used to examine their fitness to ACGME's core competencies and to FMM-Taiwan. In the third model, which was based on the combined findings of model 1 and model 2, both the importance and fitness indices were used to explore the relationships of the 22 sub-competencies with ACGME's core competencies and with FMM-Taiwan.

Data analysis

There was no outlier and missing value was using permutation for analysis. All data generated and analysed during this study are included in this published article. Initially, a two-round Delphi method was used for examining the importance and fitness of the 22 sub-competencies of the ACGME Family Medicine Milestone Project for FMM-Taiwan. Then, IPA was used to explore the importance and fitness of the 22 sub-competencies. Finally, IPMA was used to explore the contributions of the 22 sub-competencies to the six core competencies of the ACGME and to FMM-Taiwan. These models in IPMA could be regarded as reflective-formative hierarchical component models in PLS-SEM and the IPMA rescales indicator scores on a range from 0 to 100 to facilitate the interpretation and comparison of performance value. We completed all statistical analysis with Statistical Package for the Social Science software version 20.0 (SPSS Inc. Chicago, Illinois, USA) and Smartpls 2.0 [12].

Results

Based on the 3 stages IPA process, the result has showed as following. First, the importance and fitness index had be collected with Delphi questionnaire from 30 hospitals. On the 5-point scale, the scores for the importance and fitness of the 22 sub-competencies, except PBLI-3 (improves systems), were 4 or higher in round one. Moreover, the scores for all the items were 4 or higher in round two. In round one, the percentages of the mode for the importance of PC-1 (cares for acutely ill patients), MK-2 (applies critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PBLI-1 (scientific evidence related to the patients' health problems), PBLI-2 (demonstrates self-directed learning), PROF-3 (humanism /cultural proficiency), ICS-4 (utilizes technology) and for the fitness of PC-1 (cares for acutely ill patients), PC-5 (performs specialty-appropriate procedures), SBP-1 (cost-conscious medical care), PBLI-2 (demonstrates selfdirected learning), PBLI-3 (improves systems), PROF-3 (humanism /cultural proficiency), PROF-4 (maintains health and pursues personal and professional growth), and ICS-4 (utilizes technology) were less than 50%. In round two, the percentages of the mode for most items, except the importance of MK-2 (applies critical thinking skills in patient care) and the fitness of PBLI-3 (improves systems), were more than 50%. With regarding to the deviation, some Q-Dev values, including those for the importance of PC-1 (cares for acutely ill patients), MK-2 (applies critical thinking skills in patient care), PROF-3(humanism /cultural proficiency), and ICS-4 (utilizes technology) as well as the fitness of PC-1 (cares for acutely ill patients), SBP-1 (cost-conscious medical care), PROF-3 (humanism /cultural proficiency), and ICS-4 (utilizes technology), were greater than one in round one. Moreover, all Q-Dev values were one or less in round two. These results indicated that consensus regarding the importance and fitness for the sub-competencies was enhanced from round one to round two, with an increase in the percentage of the mode and a decrease in the Q-Dev value. The mode for the importance score of MK-2 (applies critical thinking skills in patient care) was enhanced from 4 to 5; however, the consensus was less than 50% (31%) from round one to round two. Although the mode for the fitness score of PBLI-3 (improves systems) was enhanced from 3 to 4, the consensus was less than 50% (40.8%). After two round Delphi method, Table 1 presents the importance and fitness scores, the percentage of the mode, and the Q-Dev for a consistency analysis of the 22 sub-competencies. The consensus was enhancing from round one to round two Delphi and in the acceptable range based on the Q-Dev. In advance, the importance and fitness score from round two Delphi had used in the next stage IPA.

According to conventional IPA, the importance and fitness scores of the sub-competencies were divided into four quadrants by using a cutoff mean of 4.7. All competencies, except PC-1 (cares for acutely ill patients), MK-2 (applies critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PBLI-3 (improves systems), PROF-3 (humanism /cultural proficiency) and ICS-4 (utilizes technology), were important and fit with scores of \geq 4.7 and were major competencies. The fitness score of PC-1 (cares for acutely ill patients) was <4.7, and its importance score was \geq 4.7. Thus, PC-1 (cares for acutely ill patients) had to be adapted. Five competencies, namely MK-2 (applies critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PBLI-3 (improves systems), PROF-3 (humanism /cultural proficiency), and ICS-4 (utilizes technology), were less important and fit, with both importance and fitness scores of < 4.7 (Fig. 1). These competencies had to be modified.

In the stage 3 IPMA, three models were used to investigate the contributions of the importance and fitness domains from the 22 sub-competencies to the ACGME's six core competencies and to FMM-Taiwan. For the first model, Fig. 2 indicates the means (performance values) of latent variables (indicated by circles) and the contribution of the importance index of the sub-competencies (indicated by arrows) to their relative core competencies in the ACGME and FMM-Taiwan. The performance value was from 0 to 100 and the contribution showed as weighting. The contribution of each sub-competency to its relative ACGME core competency was calculated by percentage. For example, the contribution weighting of the importance of PC-1 (cares for acutely ill patients), PC-2 (cares for chronic conditions), PC-3 (improve health), PC-4 (partners with the patient), and PC-5 (performs specialty-appropriate procedures) to the PC

Table 1 The percent of the mode (Mo) and the quartile deviation (QD) for the level of consensus of 22 sub-competencies in round one and two, based on Delphi method

	Importance		Fitness	
	Round one	Round two	Round one	Round two
	Mo (%)/QD	Mo (%)/QD	Mo (%)/QD	Mo (%)/QD
PC-1 Cares for acutely ill	5 (43.1)/1.5	5 (75.0*)/0.75	4 (49.2)/1.5	4 (62.5*)/1.0
PC-2 Cares for chronic conditions	5 (69.2)/1.0	5 (87.5*)/0	5 (72.3)/1.0	5 (93.1*)/0
PC-3 Improve health	5 (63.1)/1.0	5 (90.3*)/0	5 (76.6)/0	5 (93.1*)/0
PC-4 Partners with the patient	5 (60.0)/1.0	5 (87.3*)/0	5 (55.4)/1.0	5 (91.7*)/0
PC-5 Appropriate procedures	5 (61.5)/1.0	5 (93.1*)/0	5 (49.2)/1.0	5 (91.7*)/0
MK-1 Medical knowledge	5 (52.3)/1.0	5 (77.8*)/0	5 (53.8)/1.0	5 (77.8*)/0
MK-2 Critical thinking skills	4 (41.5)/2.0	5 (31.0)/1.0	4 (50.8%)/1.0	4 (58.3*)/0
SBP-1 Cost-conscious medical care	4 (49.2)/1.0	4 (63.9*)/0	4 (47.7)/2.0	4 (62.5*)/1.0
SBP-2 Emphasizes patient safety	5 (75.4)/0.5	5 (94.4*)/0	5 (63.1)/1.0	5 (91.7*)/1.0
SBP-3 Advocates health	5 (58.5)/1.0	5 (83.3*)/0	5 (56.9)/1.0	5 (87.5*)/0
SBP-4 Coordinates team-based care	5 (52.3)/1.0	5 (86.1*)/0	5 (60.0)/1.0	5 (88.7*)/0
PBLI-1 Scientific study evidence related to patients' problems	5 (47.7)/1.0	5 (79.2*)/0	5 (50.8)/1.0	5 (81.9*)/0
PBLI-2 Self-directed learning	5 (47.7)/1.0	5 (81.9*)/0	5 (47.7)/1.0	5 (77.8*)/0
PBLI-3 Improves systems	4 (50.8)/1.0	4 (75.0*)/0	3 (35.4)/1.0	4# (40.8*)/1.0
PROF-1 Completes professionalization	5 (58.5)/1.0	5 (91.7*)/0	5 (67.7)/1.0	5 (90.3*)/0
PROF-2 Professional accountability	5 (67.7)/1.0	5 (93.1*)/0	5 (56.9)/1.0	5 (93.1*)/0
PROF-3 Humanism/cultural proficiency	5 (35.9)/2.0	5 (66.7*)/1.0	4 (38.5)/2.0	5 # (54.2*)/1.0
PROF-4 Personal health and professional growth	5 (56.9)/1.0	5 (94.4*)/0	5 (46.2)/1.0	5 (80.3*)/0
ICS-1 Therapeutic relationships	5 (67.7)/1.0	5 (95.8*)/0	5 (63.1)/1.0	5 (97.2*)/0
ICS-2 Effective communication with patients and public	5 (70.8)/1.0	5 (98.6*)/0	5 (63.1)/1.0	5 (95.8*)/0
ICS-3 Effective communication with health professionals	5 (75.4)/0.5	5 (95.8*)/0	5 (66.2)/1.0	5 (90.3*)/0
ICS-4 Utilizes technology	4 (30.8)/2.0	4 (60.3*)/0	4 (38.5)/2.0	4 (52.8*)/1.0

Data expressed as mode (%)/quartile deviation;

*the consensus enhancing in round two

mode enhancing in round two

(patient care) core competency were 0.13, 0.17, 0.29, 0.21, and 0.20 respectively. The contributions of other subcompetencies to their core competencies are also displayed in Fig. 2.

Overall, the performance value of sub-competencies was 88.5 to 98.5 for the contributions of the 22 sub-competencies to the six core competencies (PC: 96.3, MK: 90.1, SBP: 94.5, PBLI: 88.5, PROF: 97.2, and ICS: 98.5). Finally, the performance value for FMM-Taiwan was 96.0, which was derived from the six core competencies with the important index of the 22 sub-competencies. The results indicated that the importance index of the 22 sub-competencies in FMM-Taiwan through the six core competencies. In addition, the result also showed well construct validity for the importance of the Delphi questionnaire.

For the second model, Fig. 3 presents the performance values and the contribution of the fitness index of the 22 sub-competencies to their relative core competencies in the ACGME and FMM-Taiwan. The performance values were from 87.1 to 97.5 for the ACGME core competencies and that of FMM-Taiwan was 95.0. This result suggested that most of the fitness of FMM-Taiwan could be explained by the fitness index of the 22 sub-competencies.

In addition, the result also showed well construct validity for the fitness of the Delphi questionnaire.

In the third model (Fig. 4), which was based on the combined findings of model 1 and model 2, both the importance and fitness indices were used to explain the six core competencies for FMM-Taiwan. The performance values of the ACGME's six core competencies for the importance and fitness of the sub-competencies were from 87.6 to 95.3. Moreover, the performance value of the competency framework of FMM-Taiwan for the importance and fitness of the sub-competencies was 92.6.

Discussion

In this study, with 3 stages IPA process including a tworound Delphi method, the six core competencies and their 22 sub-competencies were explored for determining the importance and fitness of the ACGME competencies and FMM-Taiwan. Based on the responses of 72 family medicine physicians, including 24 directors, 32 attending physicians, and 15 residents, 16 of the 22 (72.7%) sub-competencies exhibited high importance and fitness, with a mean score of 4.7 or higher for FMM-Taiwan in IPA. Typically, cutoffs with a minimum of 4.0 on a 5-point scale are acceptable [17]. Based on the



keep up the good work/ major competencies

Fig. 1 The importance and fitness scores of 22 sub-competencies based on a cut point with the mean score of 4.7

mode of the importance and fitness from round 2 Delphi method 22 sub-competencies had a score of 4 or higher; thus, all of the ACGME Family Medicine Milestone Project sub-competencies were acceptable for FMM-Taiwan (Table 1). Regarding the findings in IPA, the following six competences, PC-1 (cares for acutely ill patients), MK-2 (applies critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PROF-3 (humanism /cultural proficiency), PBLI-3 (improves systems), and ICS-4 (utilizes technology) need some modification based on the consensus of the next revision of FFM-Taiwan in the future. Following the 6 factors model for ACGME core competency [10, 18], the performance value of six core competencies for FMM-Taiwan was 92.6 when considering the importance and fitness indices of the 22 sub-competencies. The results were consistent with that MK-2 (applies critical thinking skills in patient care), PBLI-3 (improves systems), and PROF-3 (humanism /cultural proficiency), and ICS-4 (utilizes technology) have some modification from the first revision of ACGME Family Medicine Milestone Project to the second revision [10, 18]. A recently Delphi study has found that the framework of the core competencies must been consider the contextualization [19]. Furthermore, professionalism is a multidimensional social construct and context dependence in different countries and thus it is not surprised that there were cultural and social gaps of these 22 sub competencies between America and Taiwan.

In the IPA, PC-1 (cares for acutely ill patients) was important (mean score of 4.7) but not highly fit (mean score of 4.3) for FMM-Taiwan. The explanation for the somewhat lower fitness may be related to Taiwan's highaccessibility and low-copayment situation for medical emergency services provided by emergency specialists



Fig. 2 The performance value (indicated by circle) and the contribution of the importance indexes of 22 sub-competencies (indicated by arrow) to their relative core competencies of ACGME and FMM-Taiwan



Fig. 3 The performance value (indicated by circle) and contribution of the fitness indexes of 22 sub-competencies (indicated by arrow) to their relative core competencies of ACGME and FMM-Taiwan

because that Taiwan's national health insurance scheme has contracted with 100% of hospitals and 92.6% of primary clinics nationwide, and people can visit medical institutions freely because of low effectiveness of the referral system from family practice to emergency. Thus, PC-1 (cares for acutely ill patients) will be considered to be adapted for FMM-Taiwan. Of the 22 subcompetencies, only the fitness score of 3.8 for PBLI-3



Fig. 4 The performance value (indicated by circle) and contribution of both the importance and fitness indexes of 22 sub-competencies (indicated by arrow) to their relative core competencies and FMM-Taiwan

(improves systems) was <4 for FMM-Taiwan; however, its importance score was 4.1. The lower fitness score may be related to the high coverage rate (up to 99%) and low payment of Taiwan's national health insurance, and the capacity of doctors for "improving the system in which the physician provides care" is less than that of the national health insurance program. As the increase of private health insurance, family physicians may have more drive to improve systems.

The four sub-competencies of MK-2 (applies critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PROF-3 (humanism /cultural proficiency), and ICS-4 (utilizes technology) were acceptable, with scores of 4.0 to 4.6 for FMM-Taiwan; however, their scores were less than the mean score of 4.7 for both importance and fitness. The mean score of SBP-1 was 4.0 for both the importance and fitness domains. The relatively low importance and fitness scores of the subcompetencies may be related to the fact that Taiwan's national health insurance system is the fee for services and provides high coverage of disease scope with low copayment, and people can use medical services without spending considerable money. Thus, cost-conscious medical care is less emphasized in Taiwan. The mean scores of MK-2 (applies critical thinking skills in patient care) were 4.3 and 4.2 for importance and fitness, respectively; however, the modes were 5 and 4 for importance and fitness, respectively. The somewhat low scores may be related to that doctors may not have enough time to spend with patients under great load and fee for services system. In addition, Asian students focusing more on obtaining knowledge, passing examinations, and providing model answers than on critical thinking [20]; however, Asian education is gradually emphasizing this critical ability. The mean scores for PROF-3 (humanism/

cultural proficiency) were 4.6 and 4.4 for importance and fitness, respectively; however, their modes were 5. In this study, most family physicians considered humanism and cultural proficiency important for resident training; however, the time is limited in busy medical services and the methods for teaching and practicing it are still being discussed. Consequently, a somewhat low fitness score was achieved. ICS-4 (utilizes technology) was considered important; however, too much load to learn technology for physician and the diverse and complex aspects of technology may demotivate the teaching and practice for residency training. Thus, relatively low importance and fitness scores of 4.3 and 4.1, respectively, were obtained for ICS-4 (utilizes technology), with the modes of both importance and fitness being 4.

A competency framework is an organized schema composed of statements of abilities required for effective professional practice [21, 22]. ACGME milestones have been operationalized for the development of competence in numerous ways. The finding of the "Milestone Project Movement" was that 25 specialties contained 601 subcompetencies, with one specialty having 10 to 41 subcompetencies [3]. In addition, new competencies have been developed for rural contexts [23], and the competencies of clinician educators have also been addressed [24]. In this study, 16 sub-competencies were retained as major competencies. One competency, namely PC-1 (cares for acutely ill patients), must be adapted to fit practice. Moreover, five competencies, namely MK-2 (applies critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PROF-3 (humanism/cultural proficiency), PBLI-3 (improves systems), and ICS-4 (utilizes technology), require some modification for Taiwanese practice. As the different culture or context will influence the education system [25]. In East, as compared to West, the social hierarchy may play a role in education systems [26] and the bond within a group may affect that the individualist approach views competency as an attribute that individuals "acquire" and learning with oneself, but the collectivist views learning is situated or distributed within a group [14]. In general, the 22 sub-competencies were good to very good in the aspects of importance and fitness for FMM-Taiwan. Thus, these 22 milestones have been selected to form a preliminary revision of family medicine milestones for residency training in Taiwan [27]. Although the core of CBME may be similar, there are local differences to meet local needs, because the implementation of CBME is a social construction process within a cultural context [25]. "Glocalization" has been proposed as "think globally and act locally" and adapting global standards may be helpful for local needs [28], as this study addressed the importance and fitness of FMM-Taiwan from America to Taiwan.

In conclusion, the accordance of 22 sub-competencies appeared very good (up to 95% with a cutoff of 4.0 in IPA) or acceptable (72.7% with a cutoff of 4.7) for the United States and Taiwan. The six core competencies were evaluated through their 22 sub-competencies in IPMA, and the competency framework of the ACGME provided a performance value 92.6 explanation for Taiwanese domains. In the future, we will take the 2019 s revision of the ACGME Family Medicine Milestone Project into the consensus process for the next revision of FFM-Taiwan. As the sample size limitation, studies are required to explore cultural and social differences in medical competencies and their sub-competencies, especially the following five sub-competencies: PC-1 (cares for acutely ill patients), MK-2 (applies critical thinking skills in patient care), SBP-1 (cost-conscious medical care), PROF-3 (humanism/cultural proficiency), PBLI-3 (improves systems), and ICS-4 (utilizes technology) for more sample.

Ethic approval and consent to participate

The institutional review board of National Cheng Kung University Hospital approved this study (protocol IRB number = A-ER-107-069 and date of approval = august 1, 2018) with the waiver to obtain informed consent from the study participants. All methods were carried out in accordance with relevant guidelines and regulation.

Acknowledgements

The authors gratefully acknowledge the 30 hospitals for data collection in Taiwan.

Author contributions

Shih-Ming Li, Jin-Shang Wu wrote the main manuscript text and Chyi-Her Lin and Zih-Jie Sun modified the manuscript text. Yaw-Wen Chang, Ming-Nan Lin and Chi-Wei Lin prepare the study and conduct the instrument. Cheng-Chieh Li, Yin-Fan Chang and Li-Kuang Chen provide the data analysis and prepare the Figs. 1, 2, 3 and 4. Ming-Hwai Lin, Fang-Yih Liaw, Jaw-Shiun Tsai and Shinn-Jang Hwang provide the professional suggestion for the study design and collection data. All authors reviewed the manuscript.

Fundina

National Science and Technology Council in Taiwan (funding number: MOST 107 2511 H 006 010).

Data availability

All data generated and analysed during this study are included in this published article.

Declarations

Consent for publication

Not applicate.

Competing interests

The authors declare no competing interests.

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Received: 1 May 2023 / Accepted: 10 January 2025 Published online: 24 January 2025

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