The Model for Thai Physician Competency Development

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Objective: The purpose of the present research was to study the model of competency development of Thai physicians. And find the desired performance, including a model that will be a guideline for Thai doctors to be consistent and suitable for Thai society both in the present and in the future.

Materials and Methods: The present study used qualitative and quantitative technique combinations. Data were acquired using the Delphi technique; three experts selected 21 experts from different domains with in-depth knowledge of Thai medical competence. Several basic elements were built through in-depth interviews with five-level Likert items for 21 experts' content analysis and three-level Likert items for three experts' content validity. The analysis was based on the items of objectives congruence (IOC), the median (MD) and the quartile deviation (QD). A focus group discussion was then held with other qualified medical professionals on the competence development model for Thai physicians, which is widely acknowledged in the medical community.

Results: Five current problems affecting the work performance of Thai physicians were identified. Medical knowledge, patient care, professionalism, compliance with system-based learning, practice-based learning, and interpersonal relationships and communication skills are desirable competencies of Thai physicians. Final Thai doctors' competency development model was designed, combining individual, organizational, network, and enable environmental development.

Conclusion: The present study has demonstrated validity and reliability in measuring medical competence in Thailand and can be utilized in government health policies to improve the quality of public health services and encourage and cultivate doctors with higher competency and strong expertise.

Keywords: Competency Development; Thai Physicians; Model; Competency; Delphi

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As the work of doctors is complex and challenging, doctors need to train professionally to cope with the daily situation. Professionalism is defined as the competence to provide effective treatment to patients, and that competence must consist of knowledge, attitude, and skills[1]. With the challenges of changing demographics, rising trend of chronic diseases, advances in medicine and health information technology to make care safer and more efficient, increasing health care costs, and the impact of the National Health Care Act, there has been an increase in the emphasis placed on rethinking of major healthcare reforms, from health care workforce education to the health care delivery system[2]. To be the competent physician in the community, quality health care must meet the medical community's goals of safety, effectiveness, patient-centeredness, efficiency, timeliness, and equity[3]. However, most medical university curricula do not adequately prepare future health care professionals with all the skills needed to provide quality health care. Vimmi et al (2010) also highlighted that the management of future doctors requires analysis and development of the professionalism of doctors, starting with curriculum design, selection of medical students, teaching and learning methods, role model function and assessment[4]. All of this will promote the professionalism of doctors so that they can deal efficiently with future social changes and the process of health care. As described by the Institute
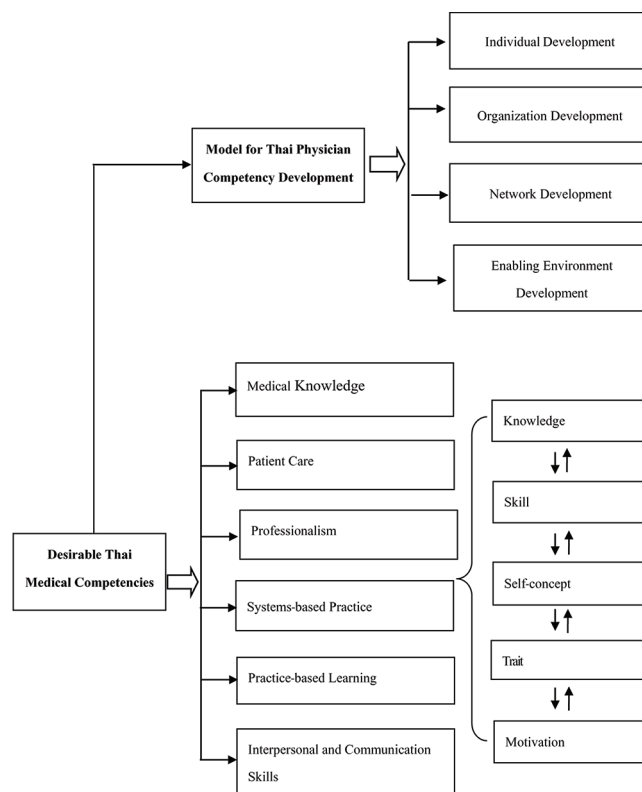
Figure 1. Conceptual model of desirable Thai medical competencies.

of Medicine (IOM, 2003), all health professionals should be educated to provide patient-centered care as members of an interdisciplinary team, emphasizing evidence-based practice, quality improvement approaches, and informatics[5].

The same is true for Thailand as mentioned above in terms of health care. Thai physicians are also needed to adjust themselves to survive on many crises, such as economic (low salary), ineffective welfare support, lack of doctor-patient communication skills, managerial skill on limited resources, multitasking works, lack of law knowledge, etc.[6]. Apart from that, there is also evidence to show that Thai medical personnel are now facing a critical problem caused by litigation. The data from the Office of Permanent Secretary of Public Health, Thailand, regarding medical cases from 1995 to 2015 shows 241 civil cases, 36 criminal cases, and two administrative court cases, and the total value of lawsuits on this issue also increases each year[7]. Therefore, how physicians need to adjust by increasing their competence in medical treatment in all three dimensions (i.e., physical, mental, and social) defined by the World Health Organization becomes a key issue in their patient care. This raises the issue of a "Thai physicians' competency development model" among government officials who implement government policies and medical personnel, especially doctors in the civil service, to have adequate diagnosis and medical treatment competency. With adequate competencies, these doctors will be able to provide timely treatments, reduce risks of errors, as well as contribute to the effective referral of patients to specialists[8].

The present study aimed to explore the current problems relating to the work performance of Thai physicians, find out the important key competencies, and propose the desirable model for Thai physician's competency development, with the conceptual model (Figure 1) based on the expectation that the competency-based model discussed and refined by experts in the medical community can be used for government health policies to promote and cultivate physicians with strong knowledge.

Materials and Methods

A mixed-method of qualitative and quantitative research was conducted between 1 August 2016 and 30 September 2017 with 3 steps, including document
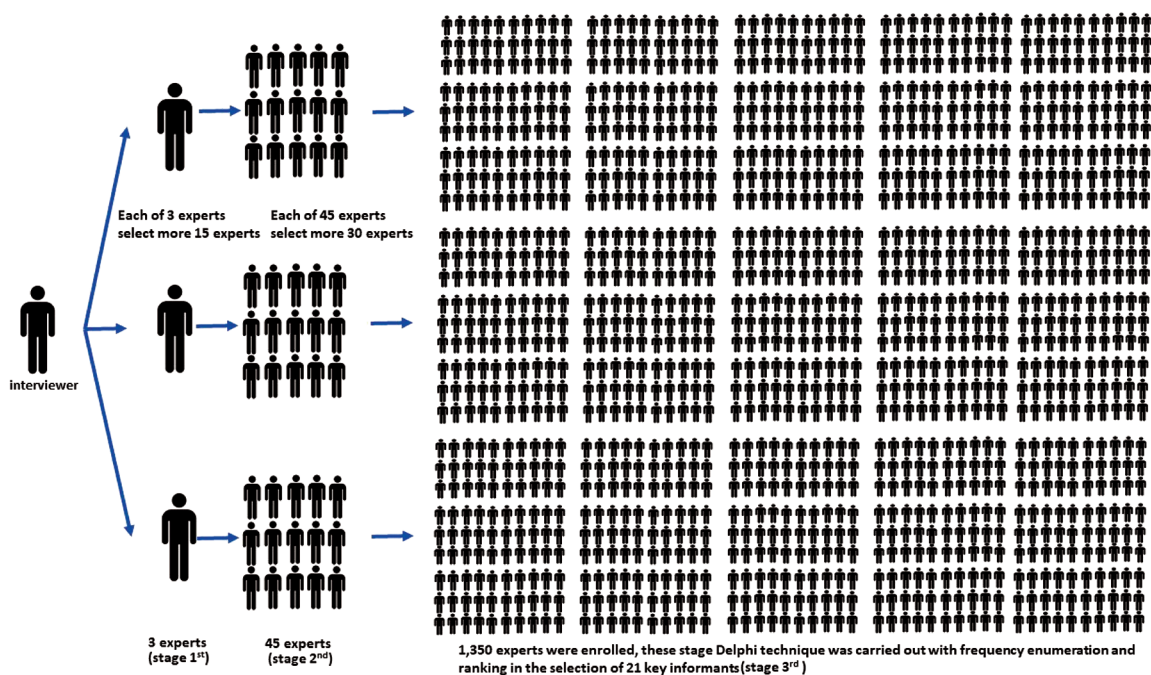
Figure 2. The 1,350 experts were enrolled. This stage Delphi technique was carried out with frequency enumeration and ranking in the selection of 21 key informants.

review and research focusing on content analysis, in-depth interview, and focus group. The present research was approved by MU-SSIRB, Mahidol University(MU-SSIRB 2016/3452009)

Research process and tools

Recruiting key informants for determining preliminary elements: A total of three experts with deep knowledge of Thai medical competencies were selected using a systematic purposive sampling method. The subjects are the President of the Medical Council of Thailand, the President of the Medical Association of Thailand, and the Executive Director of Health Systems Research Institute (HSRI). They are able to precisely provide essential information about a model for Thai physician competency development, both in terms of academics and the other competencies. Therefore, each sample was regarded as a person who is truly experienced in the medical profession. Each of the three experts was tasked to recommend a list of 15 qualified experts further, totally of 45 experts were recommended at this stage. Then, each of these 45 experts was assigned to recommend another 30 qualified experts. Therefore, the total number of selected experts was 1,350 with some duplication (Figure 2). From these, the Delphi technique was carried out with frequency enumeration

and ranking in the selection of 21 key informants, which is more than enough to be recommended 17 experts for the Delphi technique[9]. Then, two rounds of in-depth interviews with 21 key informant experts for element analysis were conducted with open-end questions. All of the data was planned to collect by only one researcher with a backup tape record if the answer was unclear or needed to get other information from the interviewing process.

Questionnaires development and validation: Questionnaires were developed based on elements derived from open-ended questions in step 1. For reliability testing, two rounds of the five-level Likert scale items (i.e., strongly agree=5, agree=4, neither agree nor disagree=3, disagree=2, and strongly disagree=1) for measuring the dispersion and congruence of the experts' opinions using the Delphi technique. The median and the quartile deviation was used as statistical calculation to check the distribution of experts' opinions. The criteria base value was not less than 3.5, and the quarter range is not over 1.5. An inspection of the distribution coefficient resulting from standard deviation is divided into average. The spread of the distribution coefficient was greater than zero but not exceeding 0.5 will be able to terminate the research with the Delphi technique. The Likert scale with three-level Likert items (i.e.,

Slightly appropriate=1, Appropriate=2, Absolutely appropriate=3) was used for content validity based on the index of item-objective congruence (IOC). Then, the statistics (i.e., percentage, median, and quartile deviation; QD) obtained were processed, and only elements with the value of IOC above 0.5 were kept, while any elements below 0.5 IOC value were removed. At this step, the elements relating to the current problem that affect the work performance of Thai physicians, desirable Thai medical competency, and the model of Thai physician competence development with some degree of clarity and tangibility were formulated.

Focus group discussion: With permission from Medical Association, as one of the agenda items of the Medical Association's monthly meetings, research findings were presented and got an opportunity for face-to-face two-way focus group discussion to revise, update, verify and critic the findings. The final result was regarded as a reliable resolution that can be used to develop the Thai physician competency development model in four dimensions that are tangible and entirely suitable for Thai society.

Data analysis

The documentary review was used to outline information about the current problems affecting the work performance of Thai physicians, the element of desirable Thai medical competencies, and the model for Thai physician competency development. In addition, there are in-depth interviews with experts who are selected using a Delphi technique. Before developing a Thai physician competency development model, it is necessary to identify the basic skills and then look for a way to achieve such a baseline. Consequently, the results of the data analysis are presented in the form of content and supporting tables. The data analysis is divided into 4 parts as follows: (a) Analysis of the background data of 21 key informants, (b) Analysis of the current problems that affect the work performance of Thai physicians, (c) Analysis of the elements of desirable Thai medical competencies, and (d) Analysis of the model for Thai physician competency development.

Results
Result of the background data of 21 key experts

Background characteristics of the key experts were doctors in both sexes between the ages of 40 and 79 in all specialties (general surgery, neurosurgery, forensic medicine, family medicine, ear, nose and throat medicine, plastic surgery, internal medicine,

Table 1. Description of 21 key informant experts

Description	Person; n (%)
Sex	
Male	17 (80.95)
Female	4 (19.05)
Age	
40 to 49 years	1 (4.77)
50 to 59 years	7 (33.33)
60 to 69 years	6 (28.57)
70 to 79 years	7 (33.33)
Qualification/specialty	
General Surgery	3 (14.28)
Neurosurgery	3 (14.28)
Forensic Medicine	1 (4.76)
Family Medicine	2 (9.52)
Otolaryngology	1 (4.76)
Plastic surgery	2 (9.52)
Internal Medicine	1 (4.76)
Epidemiology	3 (14.28)
Anatomical Pathology	1 (4.76)
Obstetrics and Gynecology	3 (14.28)
Hematology	1 (4.76)
Experience	
20 to 29 years	6 (28.58)
30 to 39 years	4 (19.04)
40 to 49 years	8 (38.10)
50 to 59 years	3 (14.28)

epidemiology, anatomical pathology, obstetrics and gynecology, hematology). They had between 20 and 59 years of experience in medical activities (see Table 1). The key experts in the present study have education qualifications, key medical positions, and work experiences that are highly reliable and widely recognized in society and the medical profession. They can provide accurate key information on a Thai physician competency development model, both in terms of academia, science and reality. Therefore, each expert is regarded as a person who is truly experienced in the medical profession.

Result of the current problems that affect the work performance of Thai physicians

Concerning the current problems that affect the work performance of Thai physicians, the researcher used documents reviews, concepts, theories and research papers on the current issues affecting the work performance of Thai physicians from 21

Table 2. The results of content analysis and content validation on the problem in work performance and their elements

Element No.	The problem in work performance						
	Content analysis by 21 experts key informants					Content validation by 3 experts	
	Round 1		Round 2		Congruence interpretation	IOC value	Remarks
	Median	QD	Median	QD			
1	4	0.83	4	0.83	High degree	−0.3	Removed
2	4	0.83	4	0.83	High degree	0.3	Removed
3	4	0.86	4	0.86	High degree	−0.3	Removed
4	4	0.94	4	0.94	High degree	−0.3	Removed
5	4	0.92	4	0.92	High degree	−0.6	Removed
6	4	0.60	4	0.60	High degree	1	
7	4	0.77	4	0.77	High degree	1	
8	5	0.59	5	0.59	High degree	1	
9	4	0.99	4	0.99	High degree	0.6	
10	4	0.87	4	0.87	High degree	0.6	
11	5	0.91	5	0.91	High degree	−0.3	Removed
12	5	0.59	5	0.59	High degree	0	Removed
13	5	0.75	5	0.75	High degree	0.3	Removed
14	4	0.60	4	0.60	High degree	0	Removed
15	4	0.79	4	0.79	High degree	0.3	Removed
16	4	0.78	4	0.78	High degree	0	Removed
17	4	0.59	5	0.52	Higher degree	−0.3	Removed

QD=quartile deviation; IOC=item of objective congruence

Elements	The problem in work performance
1	Most physicians lack general social knowledge and management knowledge; hence inefficient management once they become high-level hospital managers
2	Physicians still lack legal knowledge and awareness regarding medical practice. Therefore, they are often sued over treatment outcomes. This is accompanied by consumer protection laws that allow patients and their relatives to bring lawsuits against physicians more easily.
3	Currently, some physicians are facing limitations on their treatment competence due to excessive workload, stress, anti-development thoughts, different understanding about treatment, lack of flexibility in treatment, etc.
4	Most physicians have adopted the U.S. model, which focuses on producing many experts, so much so that fundamental knowledge about primary treatment is ignored.
5	Due to the lack of specialists, some hospitals do not have a specialist. As a result, physicians have to shoulder all medical treatments, being sued due to medical error. This problem also leads to inequality in access to the medical case, particularly in rural areas.
6*	A critical problem in patient treatment is the lack of basic understanding about illness among the public; hence no effort is taken to prevent their sickness. A heavy burden is placed on physicians who take less time to treat other patients with serious illnesses. Another problem is over expectation from patients and their relatives and consequential lawsuit.
7*	Primary care physicians or family clinic physicians are viewed as second-class doctors receiving less attention from the state. Family level practice is crucial since it is where medical treatment begins.
8*	Doctors cannot use core competencies in several situations, particularly in a hospital's emergency room where treatment is provided in such a hurry manner with restricted conditions and limited medical equipment.
9*	There is no process to establish a public healthcare system that widely extends to every region in order to truly seek cooperation from comm11nities.
10*	Elderly patients and some types of patients who need to be hospitalized for an extended period, such as patients with paralysis, impose a burden on physicians, making them lose an opportunity to treat other patients.
11	Improper learning from the internet allows the new generation to search for knowledge about medical treatment without proper references. This may cause a mistake in which physicians have to correct the misunderstanding, unnecessarily wasting time and effort.
12	People do not take care of their health and lack awareness of healthcare. This imposes a burden on physicians to provide treatment when they already become ill. On top of that, the populist policy on universal health coverage makes physicians become overloaded with work.
13	The current problem is that the remuneration and welfares of most physicians are not suitable to the changing society, causing a brain drain to the private sector or other countries.
14	Persons in authority always issue laws, regulations, and orders governing medical practice without considering the opinions of physicians who practice medicine.
15	The problem of insufficient medical school compared to the number of physicians. For example, out of 2,800 physicians who graduate each year, only 1,500 have an opportunity to continue their higher education. The rest have to work, so they lack proper competency development.
16	Executive's policies to mainly show off impose a burden on operational staffs in which capable persons are forced to seek a fairer system in the private sector. And in the public sector, the benefits are the same whether doing less or more. So, the remuneration should be revised to reflect the actual workload.
17	Different educational backgrounds lead to different viewpoints between physicians and the country's administrative and executive. Persons in authority do not understand medical processes, thus not providing sufficient managerial resources as required.

* Total 5 remaining elements (elements 6-10) were used to develop focus group questionnaire

Table 3. Result of content analysis and content validation on desirable Thai medical competencies and their elements

Element No.	The desirable Thai medical competencies						
	Content analysis by 21 experts key informants					Content validation by 3 experts	
	Round 1		Round 2		Congruence interpretation	IOC value	Remarks
	Median	QD	Median	QD			
1	4	0.50	4	0.50	High degree	1	
2	4	0.60	4	0.60	High degree	1	
3	5	0.60	5	0.60	High degree	1	
4	4	0.51	4	0.51	High degree	1	
5	5	0.60	5	0.60	High degree	1	
6	3	0.91	3	0.91	High degree	−0.3	Removed
7	5	0.60	5	0.60	High degree	0.6	
8	5	0.40	5	0.40	High degree	0.6	
9	5	0.40	5	0.40	High degree	1	
10	5	0.68	5	0.68	High degree	0.6	
11	4	0.50	4	0.50	High degree	1	
12	5	0.59	5	0.59	High degree	1	
13	5	0.36	5	0.36	High degree	1	
14	5	0.60	5	0.60	High degree	0.3	Removed
15	4	0.73	4	0.73	High degree	0.3	Removed
16	4	0.74	4	0.74	High degree	0.3	Removed
17	5	0.51	5	0.51	High degree	1	
18	5	0.60	5	0.60	High degree	1	
19	4	0.60	4	0.60	High degree	1	
20	5	0.68	5	0.68	High degree	1	
21	4	0.80	4	0.80	High degree	0.6	
22	5	0.58	5	0.58	High degree	1	
23	5	0.50	5	0.50	High degree	1	
24	5	0.59	5	0.59	High degree	1	
25	5	0.68	5	0.68	High degree	1	

QD=quartile deviation; IOC=item of objective congruence

Elements	Desirable Thai medical competencies
1*	There are two levels of competencies. The first level is for newly graduated physicians whose duty is to persuade people into community-based healthcare for social development by inviting patients into family medicine. The next level is for specialists who need to have deeper academic knowledge like neurosurgeons and cardiac surgeons.
2*	Doctors who have completed specialized training as specified by the Medical Council, for example, 3-year training for ophthalmologists and 5-year training for surgeons, already have desirable specialized competencies.
3*	They know and understand medical diseases, whether contagious diseases, non-communicable diseases, genetic disorders, environmental diseases, emerging diseases, and re-emerging diseases, require sufficient knowledge and ability to control diseases.
4*	Doctors need to know medical law.
5*	Doctors must acquire specific skills required for each work.
6	Doctors must have the ability to perform surgery
7*	Having an intention to become a good doctor since studying in a medical school; having a purpose of providing public healthcare without expecting wealth.
8*	Doctors must possess accountability, honesty, sacrifice, self-confidence, carefulness, and initiative in their work.
9*	The most important desirable medical competency is being a good person thinking of good things and doing well, being moral, and not thinking of self-interest as these are the fundamentals that lead to other competencies.
10*	Doctors must know about management to encourage cooperation from co-workers and manage administrative resources to efficiently and effectively generate concrete results.
11*	Doctors must have a profound academic knowledge of the medical profession.
12*	Doctors must show leadership in work and at the same time be good followers by being rational and recognizing their roles.

* 21 remaining elements were used to develop focus group questionnaire (elements of medical knowledge=1-5; patient care=7-9; professionalism=10-13; system-based learning=17-19; practice-based learning=20-22; interpersonal and communication skills=23-25)

Table 3. (continued)

Elements	Desirable Thai medical competencies
13*	Good governance must be observed in medical practices.
14	Physicians must live a self-sufficient lifestyle that will positively affect the treatment since self-sufficiency will make physicians be economical and aware of providing medical treatment.
15	Medical competencies must be in accordance with a national standard as specified by the Medical Council.
16	Desirable medical competencies in the present should adhere to the standards in medical education of the World Federation of Medical Education, which comprises: - Association for Medical Education in Europe (AMEE) - Association for Medical Education in the Eastern Mediterranean (AMEEMR) - Association of Medical Schools in Africa (AMSA) - Pan-American Federation of Associations of Medical Schools (PAFAMS) - South-East Asian Regional Association for Medical Education (SEARAME)
17*	For optimized performance, it is necessary to have teamwork among doctors in various fields, such as internal medicine, obstetrics and gynecology, surgery, and pediatrics, to provide holistic and systematic treatment and create a network of patient service that covers all aspects of treatment.
18*	General practitioners must diagnose for a referral from primary care to secondary care; for example, in diabetes, if there are complications relating to the eyes, the referral will be made to an ophthalmologist.
19*	When problems arise, doctors must be able to solve immediate problems efficiently.
20*	Doctors must have a proper understanding of the way of living of patients in each region, applying the royal strategy of understanding, outreaching, and developing.
21*	Doctors must be able to apply innovative technology, be modern and adjust to social changes to carry out their tasks under the government's policy.
22*	Doctors must be able to adjust themselves to the social environment.
23*	Doctors must have the communication skill, both among medical practitioners and patients, to make all parties recognize the fact and open their minds to the patient's freedom to choose treatment.
24*	Doctors must cooperate with other professions to provide comprehensive services.
25*	Doctors must publicize information about illness, such as preventing diseases and basic healthcare knowledge to lessen doctors' workload.

* 21 remaining elements were used to develop focus group questionnaire (elements of medical knowledge=1-5; patient care=7-9; professionalism=10-13; system-based learning=17-19; practice-based learning=20-22; interpersonal and communication skills=23-25)

colleges to analyze keywords relevant to the existing problems. Based on such keyword analysis, this theme has been synthesized into the 17 elements relating to the current issues that affect the work performance of Thai physicians. Detail of all 17 preliminary elements with their median and quartile deviation values were shown in Table 2. Based on the synthesis of the median and quartile deviation values, the experts accept all elements. The authors found only one element (i.e., "Different educational backgrounds lead to different viewpoints between physicians and the countries administrative and executive. Person in authority do not understand medical processes, thus not providing sufficient managerial resources as required") changed in the value of opinion from 4 (agree) to the value of 5 (strongly agree); while the quartile deviation changes in the second round from the value of 0.59 to 0.52. This indicates that the experts tend to agree more with this element in the second round of surveys for content analysis. The decrease in the quartile deviation indicates a greater congruence of experts' opinions on this element. After content validation based on the value of IOC by three experts, five remaining elements related to this area were used to develop the focus group questionnaires.

Result of the elements of desirable Thai medical competency

On this topic, 25 preliminary elements were synthesized, and all elements were accepted by the 21 experts. The detail of the median and quartile deviation value is shown in Table 3. According to the content validity of the three experts based on the IOC value, the remaining 21 elements, which were categorized into 6 domains: medical knowledge (5 elements), patient care (3 elements), professionalism (4 elements), system-based learning (3 elements), practice-based learning (3 elements) and interpersonal and communication skills (3 elements) were used in the focus group questionnaires.

Result of the elements of the model for Thai physician competency development

Based on the keyword analysis, the element of the model for Thai physician competency development has been synthesized into 32 preliminary elements. The 21 experts have accepted all elements and the texts of all elements remain the same in two rounds, except for four elements in which the opinions of some experts are outside the quartile deviation range, i.e., element numbers 15, 16, 22, and 26. Therefore, the text has been revised according to the expert's

Table 4. Result of content analysis and content validation on the model for Thai physicians competency development and their elements

Element No.	The model for Thai physicians competency development						
	Content analysis by 21 experts key informants					Content validation by 3 experts	
	Round 1		Round 2		Congruence interpretation	IOC value	Remarks
	Median	QD	Median	QD			
1	4	0.62	4	0.62	High degree	1	
2	4	0.54	4	0.54	High degree	0.6	
3	4	0.70	4	0.70	High degree	0.3	Removed
4	4	0.83	4	0.83	High degree	0.3	Removed
5	5	0.68	5	0.68	High degree	1	
6	4	0.90	4	0.90	High degree	-0.3	Removed
7	4	0.51	4	0.51	High degree	1	
8	5	0.50	5	0.50	High degree	1	
9	4	0.87	4	0.87	High degree	0.3	Removed
10	5	0.68	5	0.68	High degree	1	
11	5	0.58	5	0.58	High degree	0	
12	5	0.48	5	0.48	High degree	1	
13	4	0.59	4	0.59	High degree	1	
14	4	0.80	4	0.80	High degree	0.3	Removed
15	4	0.94	4	0.94	High degree	1	
16	4	0.73	4	0.73	High degree	1	
17	5	0.51	5	0.51	High degree	1	
18	5	0.74	5	0.74	High degree	1	
19	4	0.51	4	0.51	High degree	1	
20	4	0.66	5	0.54	Higher degree	0.6	
21	4	0.77	4	0.77	High degree	0.6	
22	4	0.84	4	0.84	High degree	0.3	Removed
23	4	0.85	4	0.85	High degree	1	
24	5	0.60	5	0.60	High degree	0.6	
25	5	0.68	5	0.68	High degree	1	
26	4	0.80	4	0.80	High degree	0.6	
27	4	0.58	4	0.58	High degree	1	
28	5	0.48	5	0.48	High degree	1	
29	4	0.62	4	0.62	High degree	0.6	
30	5	0.51	5	0.51	High degree	1	
31	5	0.60	5	0.60	High degree	0.6	
32	5	0.68	5	0.68	High degree	0.6	

QD=quartile deviation; IOC=item of objective congruence

Elements	Model for Thai physicians competency development
1*	The key model for competency development is special training, followed by continuing education to learn about management and medical law so that physicians can use such knowledge to protect themselves.
2*	Essential competency development should begin after graduation when physicians are required to undertake a medical internship in rural areas for a certain period to learn the way of life and develop their minds while exercising academic training.
3	Physicians should regularly refresh their treatment skills to ensure expertise and confidence in treating each particular disease, and they should be evaluated periodically. Also, they should continuously conduct researches on medical treatment.
4	Good competency development is to practice with a simulated patient and to carry out periodic evaluations.
5*	Apart from skill development, the process of medical competency development must also include moral development. Furthermore, physicians must be evaluated according to ethical standards.

* 26 remaining elements were used to develop focus group questionnaire (elements of individual development=1, 2, 5, 7, 8; organization development= 10-13, 15-21, and 23-26; network development=27-28; enabling environment development=29-32)

Table 4. (continued)

Elements	Model for Thai physicians competency development
6	Practical training should be carried out in which a foreign expert acts as a role model. Initially, resource persons for the training may be sponsored by a private party that is financially capable.
7*	Fellowships for further education in other countries should be promoted, but only in selective areas that are essential and suitable for Thai society.
8*	Medical competency development should promote the knowledge of communication and interpersonal skills.
9	Foreign language skills should be promoted in order to accommodate the AEC
10*	Capacity building for medical schools should be prioritized
11*	Physician enhancement should start from enhancing doctors who teach in medical schools.
12*	Moral and ethical development for physicians should be implemented at the beginning of medical education and should be formulated into a clear strategic plan to be further implemented.
13*	In-depth research on a model for Thai physician competency development should be conducted, and summarized the research results to show the precise steps and process for such development.
14	Skill development and training should include one-year practical training in rural areas and two-to-three-year training for residency to make them sufficiently competent.
15*	To allow physicians to further their education, it should consider specialized areas required by Thai society.
16*	The whole system should be improved, including physicians, hospitals, working environments, and other relevant medical institutes.
17*	Congresses and workshops should be constantly organized so that medical knowledge is promoted to keep pace with changes in diseases
18*	An organization should determine a measure to inspect and evaluate physicians' moral standards periodically
19*	At an organizational level, the patient referral system should be improved together with medical competency development
20*	An organization should be determining a model for medical competency development in the form of a clear public policy.
21*	The curriculum should be developed in line with the needs of Thai society based on the most diseases suffered by Thai people in each region; then, physicians who are excellent at each particular disease should be sent out to provide treatment in such specific area accordingly.
22	The law should be revised under which a license to practice medicine will be valid for a limited period. Its renewal shall require continuing education for which an assessment of accumulated knowledge is a prerequisite.
23*	There should be a standardized, systematic, and accountable process in producing physicians, and a committee should be established to monitor and remove disqualified physicians from the system.
24*	There should be a policy encouraging medical teamwork to achieve a comprehensive treatment approach and avoid overlapping treatments.
25*	A process for physician development should be formulated in a clear policy that is continuously and systematically implemented according to an international standard.
26*	The curriculum for physician development should be revised by removing unnecessary subjects and adding general knowledge to broaden their external knowledge.
27*	Another development approach is to encourage expert physicians to become instructors to teach the next generations of physicians.
28*	The development of the medical treatment system should focus on teamwork, including nurses, medical assistants, equipment, and sufficient human resources.
29*	Competency development should comprise supplement knowledge of laws, economics, and management.
30*	Physician competency development should be organized in a way that skills are acquired through on-the-job training, congresses, internet searching, and the exchange of knowledge among physicians.
31*	Besides medical knowledge development, physicians should also learn about the external environment by studying possibilities and changes in society, economy, politics, and cultures.
32*	The government should fully support the work of physicians, such as providing a sufficient budget and simultaneously developing medical competencies, while appropriate measures must be taken to punish physicians who make any errors in work.

* 26 remaining elements were used to develop focus group questionnaire (elements of individual development=1, 2, 5, 7, 8; organization development= 10-13, 15-21, and 23-26; network development=27-28; enabling environment development=29-32)

suggestions to be consistent with all elements. The details of the median and quartile deviation values are shown in Table 4. In the second round of the survey, it was found that there is one element with a change in the opinion values (i.e., element number 20: "An organization should determine a model for medical competency development in the form of a clear public policy". The median value from 4 (agree) to the value of 5 (strongly agree); while the quartile deviation changes from the value of 0.66 to 0.54, which suggested that the experts agree more with this element in the second round, while the decreased quartile deviation indicates that the congruence of experts' opinions on this element is higher. According to the content validity of the three experts based on the IOC value, the remaining 26 elements, which were considered as 4 developments:

individual development (5 elements), organizational development (15 elements), network development (2 elements), and enabling environment development (4 elements) were used in the focus group questionnaire development.

Result of the focus group

After content analysis and content validity, a focus group discussion was held in the monthly meeting of the medical associations. Forty members attended this meeting, including the experts in the present study. The elements derived from the previous steps in the present study have been revised, updated, criticized and finalized. Except one was needed to revise all of the elements in element number 1 part 2 relating to the desirable Thai medical competencies. Additionally, the meeting also suggested that preferably community

healthcare facilities should engage specialists in various areas to provide comprehensive services.

Discussion

Based on the present study, the medical community is naturally moving into the third generation of the revolution called competency-based medical education[10-12]. The competence model is an efficient instrument for evaluating medical qualifications and will become an essential instrument for developing medical training in the future.

Concerning current problems affecting the work performance of Thai physicians, one of the critical problems with patient treatment was the public's lack of basic understanding of their illness. As a result, no effort is made to prevent their illness, and the burden on doctors is increased, with limited time to treat other patients with serious diseases. Other critical issues are the over-expectation of patients and their families and the ensuing litigation. The primary care physicians or family doctors are considered second-class doctors who receive less attention from the government. Indeed, family-level practice is vital because this is where medical treatment begins. In addition, doctors cannot use their core competencies in some situations, especially in emergencies where treatment was carried out under time pressure due to the patient's life-threatening condition and limited medical equipment. There is no process to establish a public health system that reaches far into every region to seek community collaboration[7]. Furthermore, in the elderly and some chronically paralyzed patients who need to be hospitalized for an extended period, the prolonged hospital stay has placed an unexpected burden on medical care and management, as they lose the opportunity to treat other curable patients or acutely illness at the same time.

The present study systematically built up the competency model of doctors. The research had shown that the desirable Thai medical competencies consisted of several factors: 1) medical knowledge, 2) patient care, 3) professionalism, 4) system-based learning, 5) practice-based learning, and 6) interpersonal and communication skills. This finding coincided with the American Hospital Association's work on the study of the development of medical literacy in lifelong learning such as medical knowledge, patient care, hands-on learning and improvement, improving patient care practices, systems-based practice, providing cost-conscious, effective medical care, system-based practice, work to promote patient safety, system-based practice, coordinating care with other health care providers, demonstrating professionalism, interpersonal and communication skills, skills that lead to effective information exchange, interpersonal and communication skills, working effectively with the health team and use of informatics. In addition, it has indicated that the development of milestones defining the competencies of ACGME and Canada Meds and trust-based assessment using the concept of entrusted professional activities (EPAs) have begun to better define this continuum[13-15].

Regarding medical knowledge, there are two levels of competencies[13], namely the first-level competencies for primary care doctors who focus on family medicine and offer holistic community-based healthcare in which doctors, patients and their families act as one family; and the higher-level competencies for specialists who also need deep academic knowledge such as neurosurgeons and cardiac surgeons. Physicians who have completed specialist training as specified by the Medical Council, e.g., 3-year training as an ophthalmologist and 5-year training as a surgeon are already acquired desirable specialist skills. Knowledge and understanding of medical diseases, whether infectious diseases, non-communicable diseases, genetic disorders, environmental diseases, emerging diseases, and re-emerging diseases, require sufficient knowledge and specific skills for each work[14]. By now, the physician also needs to know medical law.

In terms of patient care, after medical school, they want to become a good doctor to provide public health care without expecting prosperity. Doctors need responsibility, honesty, self-sacrifice, self-confidence, diligence, and initiative in their work. The most important medical competence is to be a good person who thinks and acts well, be moral, and not think of selfishness, as these are the foundations that lead to other competencies[15].

For professionalism, physicians must have management skills to foster collaboration with co-workers and manage administrative resources to achieve tangible results efficiently and effectively. Physicians must have a sound academic knowledge of the medical profession, which includes showing leadership at work while being good followers by being rational and recognizing their roles. In addition, good leadership in medical practice must be observed[16].

System-based learning, to optimize performance, it is necessary to have collaboration among doctors from different specialties, such as internal medicine, obstetrics & gynecology, surgery, and pediatrics, to

work together as a team to guarantee holistic and systematic care, as well as to create a network of patient service that covers all aspects of treatment includes[17]. General practitioners need to make diagnoses for a referral from primary care to secondary care; for example, if eye-related complications arise in diabetes, referral to an ophthalmologist is one way to resolve immediate problems effectively.

Practice-based learning, the doctors need to better understand the culture and lifestyle of patients in each region, apply the comprehensive strategy of learning, contact, and development, and be able to use innovative technologies, be modern and adapt to social changes so that they can perform their duties within the framework of government policy, including the ability to adapt to the social environment[18].

Interpersonal and communication skills, the doctors must have the ability to communicate both between physicians themselves and with patients so that all parties recognize this and are open to the patient's freedom to treatment, and work with other professionals to provide comprehensive services, including the disclosure of information about illnesses such as the disease prevention, basic health knowledge to reduce the workload of the physicians[19].

As for the model for Thai physician competency development, the result coincided with the American Hospital Association's work on the physician competency development study for lifelong and another clinician practiced[20]. Hospitals must create an environment that encourages and continuously supports skill development so that it is not an isolated activity but anchored in every transaction and exchange. In the future, there is a need to be established as the Association of American Medical College (AAMC) as The Physician Competency Reference Set (PCRS), which is a list of general learner expectations used in the training of doctors and other health professionals. PCRS will serve as an aggregation tool that will allow the AAMC to use the curriculum inventory to collect and analyze data on competency-based education and the use of expectations (competencies, goals, milestones, EPAs, etc.) in medical education[21].

To nurture individual development, the key model for competency development is specialized training followed by continuing education to learn about management and medical law so that physicians can use this knowledge to protect themselves. Essential competency development should start after graduation when physicians are required to do a medical internship in rural areas for a certain period of time to learn the way of life as well as develop their mind while pursuing academic training[22]. In addition to skill development, the process of medical competency development must also include moral development. Moreover, physicians must be evaluated according to ethical standards[23]. Scholarships for further education in other countries should be encouraged, but only in selected essential and appropriate areas for Thai society. Medical competency development should promote knowledge of communication and interpersonal skills.

To empower organizational development culture, capacity building for medical schools should be a priority. Continuing education for doctors should begin with the promotion of doctors teaching in medical schools. Moral and ethical development for doctors should be implemented at the beginning of medical training and formulated in a clear strategic plan, which should then be further implemented[24]. In-depth research should be carried out on a model for skill development for Thai doctors, and the research results summarized to show the precise steps and processes for such development. To enable doctors to develop their skills, specialty areas needed by Thai society should be considered. The entire system should be improved, including doctors, hospitals, work environments, and other relevant medical facilities. In addition, congresses and workshops should be organized on an ongoing basis to promote medical knowledge to keep pace with the changing diseases. An organization should establish a measure to review and evaluate doctors' moral standards periodically[11]. At the organizational level, the patient referral system should be improved along with the development of medical competence. An organization should establish a model for developing medical literacy in the form of a clear public policy. In the meantime, the curriculum should be developed in accordance with the needs of Thai society based on the diseases that the Thai population suffers most in each region. Doctors should be dispatched who have an excellent knowledge of the respective illnesses to treat them accordingly in this particular area. There should be a standardized, systematic, and accountable process in the release of doctors, and a committee should be established to monitor and remove disqualified doctors from the system. At the same time, policies should encourage medical teamwork to achieve a comprehensive approach to treatment and avoid overlapping treatments[10]. A process of physician development should be formulated in a clear policy that is continuous and systematic according

to an international standard. The curriculum for physician development should be revised, removing unnecessary topics and adding general knowledge to expand their external knowledge.

To promote network development, another development approach is to encourage experienced physicians to become trainers to teach the next generation of doctors. Medical treatment system development should focus on teamwork, including nurses, medical assistants, equipment, and sufficient human resources[12].

To enable environmental development, skills development should include complementary knowledge in law, economics and management. The development of medical competence should be organized in such a way that skills are acquired through on-the-job training, congresses, internet research, and knowledge sharing between doctors. In addition to developing medical knowledge, doctors should also know the external environment by examining all opportunities and changes in society, economy, politics and culture[25,26]. The government should fully support the work of doctors, e.g., by allocating a sufficient budget and developing medical skills at the same time, while taking appropriate measures to punish doctors who make mistakes in their work[4].

Recommendations
Policy recommendations

In order for doctors to work efficiently, current issues affecting doctors' job performance should be brought to the attention of the government and all organizations that formulate policies and promote the work of health care and public health to stimulate problem-solving processes, both of processes at the macro-level of the policymaking process and a process of overall policy implementation at the micro-level. Public health policies should be research-based to introduce a multisectoral approach involving the public and aiming for maximum benefit.

Academic recommendations

Further studies should be conducted to build on the key themes of the Thai Physician Competency Development Model derived from the present study to identify approaches, steps and practices for each topic. The purpose of such research is to establish a tangible and ongoing process for the development of medical competence in terms of knowledge, skills and experience that is compatible with the social conditions in each area in Thailand; For example,

further research into the appropriate proportion of health professionals in each particular area will be incorporated in order to effectively and efficiently deliver better services. Researchers should be encouraged to investigate each location where the various diseases and community lifestyles are present. The results of the present research can then be used to pave the way for integrated and comprehensive medical treatment involving local interdisciplinary professionals with experience in both disease prevention and treatment. The aim is to create a health services platform that actually meets the conditions and needs of each community.

Operational recommendations

After the doctors have completed their individual competence development, specialists for the various diseases should be available in every health facility on-site to create teamwork for integrated prevention and treatment of diseases. This will result in efficient healthcare and reduce the risks of patient transportation and referrals to specialists in other areas.

Conclusion

The present study proved to be valid and reliable for measuring medical competence in Thailand. The results of the competency-based tool can be used from health policy onwards to encourage and guide health authorities to change their competencies according to the assessment criteria, and doctors with strong knowledge and skills, innovation and redesign of the curriculum in medical schools inevitably. These measurements and findings will increase the overall level of desirable competence of doctors in Thailand.

What is already known on this topic?

To become competent doctors in the 21st century, Thai physicians face many challenges, including litigation and the need to improve their competence. They have to adapt by increasing their competency in their professional development physically, mentally and socially. These doctors will provide timely treatments, reduce the risk of errors, and contribute to the effective referral of patients to specialists with the appropriate skills.

What this study adds?

This study focuses on establishing three areas: first, examining the problematic factors influencing the performance of Thai doctors; second, identifying desirable job skills for Thai doctors; and third,

identifying a model for developing competence development of Thai doctors in various aspects to achieve superior performance. The present study identified five current problems that affect the job performance of Thai doctors. Medical knowledge, patient care, professionalism, adherence to system-based learning, practice-oriented learning, as well as interpersonal relationships, and communication skills are desirable competencies of Thai doctors. The final competency development model for Thai doctors has been developed, combining individual, organizational, networked, and environmental development. The results of the present study can be used in shaping public policies to correctly solve problems and make a positive contribution to the quality of life of both doctors and the public, thus achieving sustainable and tangible development of the country, as stated in the policy statement.

Conflicts of interest

The authors declare no conflict of interest.

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