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ORIGINAL RESEARCH

The Differences in Necessary Competencies, Skills, and Performance Abilities Among Thai Board-Certified Occupational Medicine Physicians and Basic Occupational Medicine Certified Physicians

Pachara Sasanawin[1], Vithawat Surawattanasakul[2,3], Shewarat Prasan[1], Kitipong Banomyong[1]

[1]Occupational and Environmental Medicine Excellent Center, Nopparat Rajathanee Hospital, Bangkok, Thailand; [2]Department of Community Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand; [3]Environmental and Occupational Medicine Excellence Center, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand

Correspondence: Vithawat Surawattanasakul, Department of Community Medicine, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand, Tel +66-539-35472, Email vithawat.surawat@cmu.ac.th

Background: Occupational physicians in Thailand are classified into two groups: Thai board-certified occupational medicine physicians (TBOMPs) and Basic occupational medicine certified physician (BOMCPs). Variations in training duration result in differences in professional competencies. Although national regulations allow both groups to perform similar duties, disparities in training have raised concerns regarding competency, necessitating further investigation.

Purpose: To explore the necessary competencies, skills, and abilities to perform in occupational medicine in TBOMPs and BOMCPs.

Patients and Methods: An analytic cross-sectional survey was conducted using an anonymous online questionnaire distributed via the Redcap platform to TBOMPs end BOMCPs across institutions. The questionnaire was developed based on several standardized sources of core competencies, is divided into three sections, which include: demographic and working conditions, necessary competencies and skills, and abilities to perform in occupational medicine.

Results: A total of 216 respondents participated in the study, comprising 58 TBOMPs and 158 BOMCPs. The TBOMPs had a slightly higher proportion of males than the BOMCPs (67.2% vs 53.2%) and a marginally lower mean age (34.84 ± 8.59 vs 37.67 ± 8.69 years). As regards necessary competencies, TBOMPs significantly rated four areas higher than BOMCPs which include diagnosis of work-related diseases (4.57 vs 4.43, p = 0.032), ergonomics (4.38 vs 4.10, p = 0.005), medical surveillance and prevention (4.63 vs 4.48, p = 0.034), and communication skills (4.81 vs 4.57, p = 0.001). Additionally, as regards the abilities to perform, TBOMPs rated all areas higher than BOMCPs except for diagnosing work-related diseases (93.1% vs 81.7%, p = 0.053), and leadership and teamwork (91.4% vs 87.3%, p = 0.481).

Conclusion: HRM, communication, teamwork, and leadership are essential competencies and skills. Enhancing training in environmental medicine, revising research methodology instruction, and introducing refresher training sessions in the The Residency Training Program of Occupational Medicine (ROM) and Basic occupational medicine (BOM) curricula are recommended to improve professional practice.

Keywords: competencies, abilities to perform, occupational medicine

Introduction

Occupational Medicine[1–6] is a preventive medicine specialty that promotes workers' health and addresses work-related illnesses through prevention, diagnosis, treatment, and rehabilitation. According to the American College of Occupational and Environmental Medicine (ACOEM), Occupational and Environmental Medicine (OEM) encompasses

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both occupational and environmental factors. ACOEM introduced OEM competencies to guide professional practice by outlining the essential expertise and attitudes required of practitioners. These ten core competencies are categorized into knowledge, skills, and general competencies to support comprehensive professional development. In Europe,[4] a framework of 12 core competencies for occupational physicians has been established, encompassing 91 sub-competencies. Similarly, Japan[7] has defined 18 core competencies with a total of 61 sub-competencies. Although both frameworks exhibit similarities with the core competencies outlined by ACOEM, certain contextual variations exist.

In Thailand,[8,9] Thai board-certified occupational medicine physicians (TBOMPs) complete a three-year specialization program. During the first year, trainees focus on foundational clinical knowledge. In the second and third years, they undertake specialized studies and clinical rotations. Although curricula may vary slightly, most align with the occupational medicine standards of the United States (US).[10,11] With only 276 certified TBOMPs, the country faces a shortage of specialists.[12–16] To address this, a basic occupational medicine (BOM) course was introduced for general practitioners managing occupational health. The course includes lectures and practical training, such as walk-through surveys (WTS) and reports, and typically requires 240 hours to complete.[17] Approximately 1,600 basic occupational medicine certified physicians (BOMCPs) have completed the program.[12–14] TBOMP trainees must complete the BOM course to be eligible for the board examination.[8]

The competencies for TBOMPs in Thailand, as outlined by the Association of Occupational and Environmental Diseases of Thailand (AOED),[2,18] are divided into five core areas: 1) managing workplace medical emergencies, 2) conducting exposure assessments, 3) implementing health and medical surveillance, 4) evaluating fitness for duty and managing return-to-work processes, and 5) diagnosing work-related diseases. A sixth category includes supplementary competencies. The 26 sub-competencies[2] align with the 10 core competencies established by ACOEM. TBOMPs and BOMCPs share three key competencies:[18] 1) workplace emergency medicine for incident response; 2) health and medical surveillance, including pre-employment assessments, periodic exams, risk communication, and diagnostic tools such as audiometry, vision tests, and spirometry; and 3) diagnosing occupational diseases, including screening for work-related illnesses, managing hazards, and conducting preventive surveillance. Additionally, these competencies include education, interdisciplinary collaboration, and adherence to professional and ethical standards. However, TBOMPs must demonstrate greater expertise than BOMCPs in exposure assessments and fitness-for-duty evaluations.

In B.E. 2563, a ministerial regulation was enacted to establish standards for health examinations of employees exposed to hazardous factors, ensuring consistency in occupational health practices.[19] The regulation mandates that health assessments address specific hazards and requires the examining physician to be either a TBOMP or a graduate of a BOM program recognized by the Ministry of Public Health (MOPH). As a result, BOMCPs are recognized as equally qualified to conduct these assessments. Despite this regulatory provision for equivalent qualification, significant differences exist in the duration of training and practical experience. Consequently, the emphasis placed on competencies, skills, and performance abilities may vary among practitioners. This study aims to examine the competencies, skills, and performance abilities required for occupational medicine tasks among TBOMPs and BOMCPs.

Materials and Methods

Participants, Study Design, and Data Collection

An analytic cross-sectional study was carried out between June 17 and July 16, 2023. An anonymous online survey, accessible via a QR code generated by the REDCap program, was used for data collection. The survey was promoted via LINE, Facebook, and Email to ensure broad participation. A total of 58 TBOMPs and 158 BOMCPs participated in the survey. Participants were required to have at least six months of relevant professional experience to be eligible.

Sample Size

Sample size calculation formula[20]

$$n = \frac{N\sigma^2 z^2{}_{1-\frac{\alpha}{2}}}{d^2(N-1) + \sigma^2 z^2{}_{1-\frac{\alpha}{2}}}$$

The required sample size was calculated using the finite population formula via the n4studies application, assuming a confidence level of 95% (Z=1.96), a margin of error of 5% (d=0.05), and a standard deviation of the population[4] (σ=0.3). Given the total population size (N) of approximately 1,600 occupational medicine physicians[13] the calculated sample size (n) was 128 participants.

Questionnaire Development

The questionnaire is based on the 2021 core competencies for OEM physicians[1] established by ACOEM, the International Delphi study from the United Kingdom[4,21] (UK), and the competencies for specialist occupational physicians in Japan.[7] It also incorporates competencies identified by AOED[2,18] for both TBOMPs and CPBOMs. Further details are provided in Supplement 1. Competencies from various fields were reviewed, and related questions were developed.[3,8–11] Similar topics were grouped, while distinct ones were preserved. Since the studies we referenced were originally in English, the competencies were translated into Thai and subsequently back into English using the forward-backward translation method by two expert bilingual translators. To better align the tool with the Thai context, cultural adaptation was conducted.

The content quality of the questionnaire was assessed using the Content Validity Index (CVI). Six experts from diverse institutions evaluated the items using a rating scale of 0, 1, 2, and 3, ranging from "not relevant" to "highly relevant." The results indicated that most items achieved an Item-Level CVI (I-CVI) of 0.83 or higher, with all items scoring above 0.65. The final version of the questionnaire consists of 51 sub-items organized into 15 main items, covering 11 competencies and 4 skills. Reliability was assessed among 30 participants from the target group, with Cronbach's alpha analysis yielding a reliability coefficient of 0.95.

Questionnaire

The questionnaire is divided into three sections:

1) Demographic and Working Conditions (9 items): sex, age (years), educational level in occupational medicine (TBOMP, CPBOM, residency training), work experience (years and months), primary workplace affiliation (MOPH or others), province of primary work (77 provinces), certification in other specialties (yes/no), currently working in occupational medicine (yes/no), and primarily working in occupational medicine (yes/no). Primarily working in occupational medicine means that when the total working hours, both in and out of working hours, are combined, the hours related to Occupational Medicine exceed 50% of the total. Other specialties, such as Internal Medicine, Ophthalmology, Emergency Medicine, and Family Medicine, that are not considered Occupational Medicine.

2) Necessary Competencies, Skills in Occupational Medicine

Necessary Competencies

(11 items): Diagnosis of work-related diseases (8 sub-items), health risk management (5 sub-items), ergonomics (2 sub-items), medical surveillance and prevention (5 sub-items), health promotion (2 sub-items), fit-to-work evaluation and assessment of disability/impairment (4 sub-items), disaster preparedness and emergency management (4 sub-items), toxicology (2 sub-items), environmental medicine (5 sub-items), research methodology (4 sub-items), and ethics and legal issues (3 sub-items).

Necessary Skills

(4 items): Management skills/administrative skills (4 sub-items), communication skills (2 sub-items), teamwork and leadership (2 sub-items), and teaching and education (1 sub-item). For each of the 51 sub-items, respondents will evaluate them using a Likert scale, which is assumed to have equal weight and equal intervals, with a maximum score of 5 points: 5 points (Extremely necessary), 4 points (Necessary), 3 points (Somewhat necessary), 2 points (Not very necessary), and 1 point (Not necessary). The average score for each of the 15 main topics will be calculated by averaging the scores of all sub-items within that topic.

3) Abilities to Perform in Occupational Medicine

(15 items; 51 sub-items): Respondents will evaluate their abilities to perform each task by selecting either "Yes" or "No" for each of the 51 sub-items. A "Yes" response will be assigned 1 point, while a "No" response will receive 0

points. The total score for each sub-item will be summed, and the average score for each of the 15 main items will be calculated by averaging the scores of its sub-items.

Statistical Analysis

STATA version 16 was used for analysis. Descriptive demographic and working condition data, along with qualitative data, were presented as frequencies and percentages, with chi-square tests employed to compare differences between groups. Quantitative data were expressed as mean ± SD, and independent t-tests were conducted to compare the means of two independent groups, with statistical significance set at 0.05.

Competencies and skills were reported as mean ± SD, based on a 5-point Likert scale for each item, assuming equal weight and intervals. Under this assumption, independent t-tests were used to analyze data from both groups, while chi-square tests were applied to compare differences in performance abilities, with statistical significance set at 0.05.

Results

Demographic and Working Conditions of TBOMPs and BOMCPs

Results from Table 1 indicate that the study included 216 respondents, comprising 58 TBOMPs and 158 BOMCPs. The proportion of male participants was 67.2% among TBOMPs, compared to 53.2% among BOMCPs. The mean duration of professional experience was 6.57 years among TBOMPs, compared to 3.85 years among BOMCPs. TBOMPs were primarily employed within the MOPH (51.7%), In contrast, BOMCPs were predominantly employed in private hospitals or clinics/private sectors (43.7%). At the time of the survey, 94.8% of TBOMPs were currently working in occupational medicine, compared to 81% of BOMCPs. The proportion of those primarily working in occupational medicine was 91.4% among TBOMPs, compared to only 33.5% among BOMCPs. Statistically significant differences in demographic

Table 1 Descriptive Demographic and Working Conditions of Thai Board-Certified Occupational Medicine Physicians (TBOMPs) and Basic Occupational Medicine Certified Physicians (BOMCPs) Across Thailand (June to July 2023)

Demographic and Working Conditions	TBOMPs # (n = 58)	BOMCPs (n = 158)	p-value
	n (%)	n (%)	
• **Sex, male**	39 (67.2)	84 (53.2)	0.088
• **Age (year), mean (S.D.)**	34.84 (8.59)	37.67 (8.69)	0.035*
• **Working experience in the occupational field (year), mean (S.D.)**	6.57 (8.58)	3.85 (4.47)	0.003*
• **Primary workplace affiliation:**			<0.001*
Ministry of Higher Education, Science, Research and Innovation	12 (20.7)	10 (6.3)	
Ministry of Public Health	30 (51.7)	55 (34.8)	
Private hospital or clinic/Private company or factory	7 (12.1)	69 (43.7)	
Military	5 (8.6)	8 (5.1)	
Thai Red Cross Society/Self-employed/Others	4 (6.9)	16 (10.1)	
• **Work regions:**			0.639
Bangkok	23 (39.7)	58 (36.7)	
Central, Eastern, and Western	21 (36.2)	59 (37.4)	
Northern	3 (5.17)	10 (6.3)	
Northeastern	5 (8.62)	7 (4.4)	
Southern	6 (10.34)	24 (15.2)	
• **Certification or approval in other specialties:**			<0.001*
Family medicine	2 (3.5)	30 (19.0)	
Other boards	2 (3.5)	33 (20.9)	
• **Currently working in occupational medicine**	55 (94.8)	128 (81.0)	0.011*
• **Primarily working in occupational medicine**	53 (91.4)	53 (33.5)	<0.001*

Notes: #Thai board-certified occupational medicine physicians (TBOMPs) include occupational medicine residents. *Chi-square test was used to compare the data between both groups, and independent *t*-test was used to compare means; p-value < 0.05 indicates statistical significance.

characteristics and working conditions were observed between the two groups, with the exception of sex (p-value = 0.088) and work regions (p-value = 0.639).

Necessary Competencies and Skills Compared Between TBOMPs and BOMCPs

Both groups rated the same top three competencies: communication skills, HRM, and leadership and teamwork, while research methodology ranked the lowest for both. TBOMPs significantly rated four areas of competencies higher than BOMCPs, which include diagnosis of work-related diseases (4.57 ± 0.36 vs 4.43 ± 0.45, p = 0.032), ergonomics (4.38 ± 0.55 vs 4.10 ± 0.69, p = 0.005), medical surveillance and prevention (4.63 ± 0.41 vs 4.48 ± 0.49, p = 0.034), and communication skills (4.81 ± 0.35 vs 4.57 ± 0.51, p = 0.001). These results are summarized in Table 2, with further details on all 51 competencies available in Supplement 2.

Comparison of Abilities to Perform in Occupational Medicine Between TBOMPs and BOMCPs

The top two abilities to perform effectively in occupational medicine among both groups were communication skills and health promotion. On the other hand, environmental medicine was the lowest-ranked competency for both groups. TBOMPs rated themselves significantly higher in their abilities to perform all areas of competency than BOMCPs, except for 1) the diagnosis of work-related diseases (93.1% vs 81.7%, p = 0.053) and 2) leadership and teamwork (91.4% vs 87.3%, p = 0.481). These findings are presented in Table 3, with all 51 items detailed in Supplement 3.

Discussion

In Thailand, both TBOMPs and BOMCPs are legally authorized to perform the same tasks. Despite the regulatory provision for equivalent qualification, notable differences exist in the duration of training and practical experience.

Table 2 Comparison of Necessary Competencies and Skills Between Thai Board-Certified Occupational Medicine Physicians (TBOMPs) and Basic Occupational Medicine Certified Physicians (BOMCPs) Across Thailand (June to July 2023)

Necessary Competencies and Skills	TBOMPs [#] (n = 58)	BOMCPs (n = 158)	p-value
	Mean (SD)	Mean (SD)	
Competencies			
1. Diagnosis of work-related disease	4.57 (0.36)	4.43 (0.45)	0.032*
2. Health risk management	4.68 (0.51)[b]	4.55 (0.47)[b]	0.068
3. Ergonomics	4.38 (0.55)	4.10 (0.69)	0.005*
4. Medical surveillance and prevention	4.63 (0.41)	4.48 (0.49)	0.034*
5. Health promotion	4.45 (0.61)	4.47 (0.60)	0.828
6. Fit to work evaluation and assessment of disability/impairment	4.52 (0.48)	4.45 (0.55)	0.345
7. Disaster preparedness and emergency management	4.33 (0.59)	4.36 (0.60)	0.705
8. Toxicology	4.35 (0.72)	4.29 (0.63)	0.618
9. Environmental medicine	4.08 (0.76)[y]	4.15 (0.67)	0.462
10. Research methodology	4.02 (0.84)[z]	4.00 (0.85)[z]	0.895
11. Ethics and legal issue	4.43 (0.58)	4.40 (0.55)	0.669
Skills			
12. Management skill and administrative skill	4.13 (0.76)	4.20 (0.60)	0.489
13. Communication skill	4.81 (0.35)[a]	4.57 (0.51)[a]	0.001*
14. Team work and leadership	4.66 (0.56)	4.49 (0.63)	0.063
15. Teaching and education	4.31 (0.78)	4.09 (0.91)[y]	0.100

Notes: [#]Thai board-certified occupational medicine physicians (TBOMPs) include occupational medicine residents. *Independent *t*-test was used to compare the means of both groups; p-value < 0.05 indicates statistical significance.a, b, y, z Ranking of average scores in the TBOMP or BOMCP groups, a refers to the competency with the highest score, b refers to the competency with the second highest score. In contrast, z refers to the competency with the lowest score, y refers to the competency with the second lowest score.

Table 3 Comparison of Abilities to Perform Competencies and Skills Between Thai Board-Certified Occupational Medicine Physicians (TBOMPs) and Basic Occupational Medicine Certified Physicians (BOMCPs) Across Thailand (June to July 2023)

Abilities to Perform	TBOMPs[#] (n = 58)	BOMCPs (n = 158)	p-value
	n (%)	n (%)	
Competencies			
1. Diagnosis of work-related disease	54 (93.1)	129 (81.7)	0.053
2. Health risk management	56 (96.6)[b]	121 (76.6)	<0.001*
3. Ergonomics	55 (94.8)	91 (57.6)[y]	<0.001*
4. Medical surveillance and prevention	54 (93.1)	111 (70.3)	<0.001*
5. Health promotion	56 (96.6)[b]	131 (82.9)	0.007*
6. Fit to work evaluation and assessment of disability/impairment	53 (91.4)	107 (67.7)	<0.001*
7. Disaster preparedness and Emergency management	51 (87.9)	100 (63.3)	<0.001*
8. Toxicology	54 (93.1)	106 (67.1)	<0.001*
9. Environmental medicine	45 (77.6)[z]	90 (57.0)[z]	0.007*
10. Research methodology	50 (86.2)[y]	106 (67.1)	0.006*
11. Ethics and legal issue	45 (77.6)[z]	96 (60.8)	0.024*
Skills			
12. Management skill and administrative skill	51 (87.9)	109 (69.0)	0.005*
13. Communication skill	57 (98.3)[a]	132 (83.5)[b]	0.002*
14. Team work and leadership	53 (91.4)	138 (87.3)[a]	0.481
15. Teaching and education	52 (89.7)	113 (71.5)	0.006*

Notes: [#]Thai board-certified occupational medicine physician (TBOMP) includes occupational medicine residents. *Chi-square test was used to compare both groups; p-value < 0.05 indicates statistical significance.a, b, y, z Ranking of frequency in the TBOMP or BOMCP groups, a refers to the competency with the highest frequency, b refers to the competency with the second highest frequency. In contrast, z refers to the competency with the lowest frequency, y refers to the competency with the second lowest frequency.

Consequently, the emphasis placed on competencies, skills, and abilities to perform may vary among practitioners. This study aims to explore the competencies, skills, and abilities to perform occupational medicine tasks among TBOMPs and BOMCPs. As regards necessary competencies, TBOMPs significantly rated four areas higher than BOMCPs which include diagnosis of work-related diseases (4.57 vs 4.43, p = 0.032), ergonomics (4.38 vs 4.10, p = 0.005), medical surveillance and prevention (4.63 vs 4.48, p = 0.034), and communication skills (4.81 vs 4.57, p = 0.001). Additionally, as regards the abilities to perform, TBOMPs rated all areas higher than BOMCPs except for diagnosing work-related diseases, and leadership and teamwork.

Necessary Competencies and Skills Compared Between TBOMPs and BOMCPs

Both TBOMPs and BOMCPs identified communication skills and health risk management (HRM) as their primary competencies, reflecting essential needs in occupational medicine. HRM comprises key elements, including hazard identification, exposure assessment, dose-response evaluation, risk characterization, and risk communication.[1–7,10,11,21,22] Effective communication is essential for developing WTS reports that meet workplace needs and effectively convey risk assessments to stakeholders.[4,7,18,21] Verbal communication[1,3,7,21] is vital for conveying risk assessments and summarizing WTS findings for managerial review. Collaboration with occupational nurses, safety officers, and industrial hygienists during WTS emphasizes the importance of teamwork and leadership. These findings align with UK[4] and US[6] studies, which also rate communication, HRM, and teamwork as critical competencies.

Both groups rated environmental medicine and research methodology as deficient, indicating a need for targeted improvements. International studies[4,6,7] report similar deficiencies in these competencies. In the US, research design and initiation scored low (2.74), while Japan[7] reported similar challenges in research planning (3.61). UK medical schools rated research highest (4.01), whereas administrators and practicing physicians gave it lower ratings (3.81 and 3.87, respectively). Conversely, the Thai modified Delphi study[3] placed high priority on research, with experts assigning scores between 4 and 5 in knowledge, experience, and skills. This reflects the disparity between the perspectives of medical

schools and the experiences of professionals in actual practice. The 2021 ACOEM competencies excluded research, whereas the Accreditation Council for Graduate Medical Education[10] and the American Board of Preventive Medicine[11] emphasized research for residents, likely reflecting a reduced emphasis on research in non-academic settings. The Residency Training Program of Occupational Medicine[8,9] (ROM)'s concurrent two-year master's program may contribute to lower ratings of research methodology among TBOMPs and BOMCPs, despite training in epidemiology and statistics.[4,6,7,22] Revising the ROM's focus on research methodology and the concurrent master's degree may better align with professional needs. Environmental medicine received lower ratings, unlike in the US, where it is integrated into the OEM training.[1,10,11] In Thailand, where 51.7% of TBOMPs are employed by the MOPH, environmental issues such as pollution significantly impact public health.[2,3,12] PM2.5 pollution is particularly concerning in northern Thailand and Bangkok, stemming from agricultural burning and vehicle emissions, respectively. Despite its importance, environmental medicine receives limited attention in the ROM curriculum, likely due to a shortage of experts.[13]

According to Table 2, TBOMPs rated diagnosing work-related diseases as significantly more essential than BOMCPs (p-value < 0.05). TBOMPs, often based in government institutions or medical schools, diagnose work-related diseases after screenings detect abnormalities, such as hearing loss. In contrast, BOMCPs, primarily based in the private sector, focus on pre-placement and pre-employment examinations. Both ROM and BOM curricula have limited ergonomics instruction, though TBOMPs frequently address ergonomic issues during WTS. Businesses often hire TBOMPs or BOMCPs for legally required assessments,[19] which may include ergonomics-focused health promotion. TBOMPs frequently conduct medical surveillance and prevention following WTS, whereas BOMCPs primarily handle health check-ups. TBOMPs rated communication skills as significantly more essential than BOMCPs. They coordinate WTS, diagnose work-related diseases, and oversee health risk management. Additional responsibilities include health promotion, disaster preparedness, and emergency management.

Comparison of Abilities to Perform in Occupational Medicine Between TBOMPs and BOMCPs

Both TBOMPs and BOMCPs identified communication skills, teamwork, and leadership as essential competencies for occupational medicine practice. Most BOMCPs work in private hospitals, hold additional specialty qualifications, and routinely apply these competencies in their daily practice. Their primary responsibilities, including conducting pre-employment and pre-placement exams,[13] require proficiency in communication and teamwork. Studies from the UK[4] and the US[6] similarly underscore the importance of these competencies. Thai occupational medicine experts[3] similarly assign communication a high rating of 5. Japanese[7] studies emphasize communication with employers, unions, safety officers, and human resources over public resources and the community. Both groups conduct workplace assessments and WTS to develop hazard-specific surveillance programs, requiring collaboration.[18] Thai regulations align with the American Osteopathic College of Occupational and Preventive Medicine's Basic Course in Occupational Medicine, designed to prepare primary care physicians to manage occupational and environmental medicine and qualify for the Certificate of Added Qualification exam. Graduates of this course are expected to develop workplace WTS strategies as a key component of their competency development.[23] A recent Thai study recommended implementing clear laws and guidelines to ensure TBOMPs and BOMCPs are qualified to perform their duties effectively.[22]

Despite their strengths, both groups rated ergonomics, environmental medicine, and research methodology as weak areas, citing challenges in selecting tools and recommending solutions. These challenges are further compounded by a shortage of ergonomics specialists and minimal curriculum instruction in Thailand, with limited data on physicians with ergonomics expertise. Environmental medicine is less relevant for BOMCPs, as these responsibilities fall under the MOPH rather than private hospitals.[13] In contrast to TBOMPs, BOMCPs are not required to complete a master's degree, which may explain their lower proficiency in research methodology. Similarly, a UK[4] study recommends more comprehensive training in environmental impact and suggests further exploration into why priorities differ between academia and practicing physicians in research methodology.

According to Table 3, TBOMPs rated their performance higher than BOMCPs in all but two competencies, one being diagnosing work-related diseases, where no significant difference was found. This similarity may reflect the shared BOM

curriculum[17] completed by both groups, resulting in similar competencies in diagnosing work-related diseases. Alternatively, the result may reflect data variation if both groups were already proficient. No differences were found in teamwork and leadership abilities, potentially due to BOMCPs being older and more likely to hold additional specialty certifications, suggesting they already possess strong leadership and teamwork skills.

Recommendations for the ROM and BOM

In the light of the study findings, the ROM and BOM curricula should strengthen training in environmental medicine, disaster preparedness, and emergency management to better support TBOMPs and BOMCPs. The role of research methodology in the curriculum should also be reassessed, as reducing its emphasis may allow for a greater focus on clinical occupational medicine training. Regular refresher training is essential for BOM professionals to stay updated on new legislation and international standards, with periodic educational modules used to maintain or renew OEM certification, highlighting the need for continuous professional development.[24]

Strength and Limitation

Questionnaires on competencies and skills were designed according to international standards, emphasizing the context of Thailand. The questionnaires were rigorously evaluated by experts, ensuring availability to all target groups. This study identified specific limitations. First, the response rate was lower than expected,[25] which may limit the generalizability of the findings. Second, this study does not comprehensively cover all aspects of knowledge, attitudes, and practices as outlined in educational theory. Instead, the study focused on performance in occupational medicine within practical work environments, a topic rarely addressed in previous research. Future studies are encouraged to comprehensively explore all aspects of knowledge, attitudes, and practices. Additionally, the perspectives of other multidisciplinary professionals, such as nurses, safety officers and factories should be explored to determine the desired skills for occupational health doctors. This will help ensure a comprehensive understanding from various viewpoints.

Conclusion

Both TBOMPs and BOMCPs recognize HRM as a core competency and identify communication, teamwork, and leadership as critical skills, reflecting confidence in their practical application. However, research methodology and environmental medicine were considered the least necessary competencies. TBOMPs rated four areas significantly higher than BOMCPs: diagnosis of work-related diseases, ergonomics, medical surveillance and prevention, and communication skills. Additionally, TBOMPs rated their performance higher in all areas except diagnosing work-related diseases, leadership, and teamwork. Future studies should further investigate knowledge, attitudes, and practices in occupational medicine. Exploring perspectives from other multidisciplinary professionals would also help define the competencies required for occupational health physicians.

Abbreviations

ACOEM, The American College of Occupational and Environmental Medicine; OEM, Occupational and Environmental Medicine; EASOM, European Association of Schools of Occupational Medicine; TBOMPs, Thai board-certified occupational medicine physicians; BOM, Basic occupational medicine training course; BOMCPs, Basic occupational medicine certified physicians; AOED, Association of Occupational and Environmental Diseases of Thailand; MOPH, Ministry of Public Health; ROM, The Residency training program of occupational medicine; ACGME, Accreditation Council for Graduate Medical Education; ABPM, American Board of Preventive Medicine.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process

During the preparation of this work the author(s) used ChatGPT in order to check coherent, readable, paraphrase, trimming, modify tone. After using this tool/service, the author(s) reviewed and edited the content as needed and take(s) full responsibility for the content of the published article.

Data Sharing Statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethics Approval and Informed Consent

This study was conducted following the Declaration of Helsinki guidelines and the protocol was approved by the Research Ethics Committee of Nopparat Rajathanee Hospital, Thailand (046/2023, date of approval 17 March 2023). All research participants read the Inform Consent form carefully before starting to complete the questionnaire.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no competing interests.

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