A Need Assessment Study of Occupational Health Curriculum for Thai Medical Students

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Objective: *To assess and develop an appropriate occupational health curriculum for Thai medical students.*
Material and Method: *An assessment of existing occupational health curriculum in 12 Thai medical schools, questionnaire survey of occupational medicine experts, questionnaire survey of physicians practiced in industries and primary care hospitals in Pathumthani province, and questionnaire survey and public comments of medical education administration, academician, occupational physician, and medical students were performed.*
Results: *An appropriate occupational health curriculum for Thai medical students included 1) knowledge of occupational health hazards and their illnesses, occupational health hazard evaluation and control, clinical features and investigation of occupational disease, principles of occupational safety, emergency treatment of occupational injury, and principles of health promotion, education, and behavioral modification; 2) experience of occupational health and safety surveillance and occupational disease differential diagnosis; and 3) competence in occupational disease diagnosis, taking clinical history and examination, advise on provision of first aid facilities, physical hazards recognition and control, work related and environmental related disease differential diagnosis, performing a risk assessment, and risk communication.*
Conclusion: *The present study evaluated an occupational health curriculum needed for Thai medical students. Necessary topics for curriculum were developed. However, a future study of learning methods for each topic is needed.*

Keywords: *Occupational health, Curriculum, Thailand, Medical students*

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Occupational health covers physical, mental, social, and spiritual well-beings for workers related to their occupations. Occupational diseases and injuries in Thailand seem to be high; however, physicians do not have enough knowledge and skills about occupational health as indicated in the previous study[1]. There are 12 medical schools in Thailand at the time of the present study. There were varieties of occupational health contents in undergraduate medical curriculum among these medical schools. Times spent for occupational health contents varied from 10 to 80 hours. Occupational health contents included concepts of occupational health and occupational medicine, environmental health, environmental health laws, occupational health and safety laws, occupational health hazards, occupational diseases, occupational accidents, occupational health services in industries, aviation medicine, social security laws, worker compensation laws, prevention of occupational diseases and accidents, situation of occupational diseases and accidents in Thailand, occupational diseases among farmers, occupational health hazards among health care workers, diagnosis of occupational diseases, occupational health surveillance, roles of occupational medicine physicians, pre-placement and periodical medical exam, occupational epidemiology, risk assessment, occupational cancer, occupational lung diseases, occupational eye diseases, occupational skin diseases, heat stress, occupational audiopathy, occupational back disorders, organic solvents, pesticides, toxicology, heavy metal poisoning, ergonomics, basic principles of industrial

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hygiene, management of chemical disasters, field trips for occupational health in agriculture, field trips for occupational health in industries, field trips for occupational health in service sectors, and walkthrough survey practice. However, there has been no study of occupational health curriculum for the Thai undergraduate medical curriculum before. Objective of the present study was to assess and develop an appropriate occupational health curriculum for Thai medical students.

Material and Method

A questionnaire regarding knowledge, experience, and skill of occupational physicians was adapted from 1) American College of Occupational and Environmental Medicine (ACOEM)'s occupational and environmental medicine competencies guideline[2], 2) results from requirements for occupational medicine training in Europe: a Delphi study[3], and 3) Australasian Faculty of Occupational Medicine's competencies for training program of occupational physicians[4]. Then, the questionnaire was mailed to 25 occupational medicine experts who had Thai Board of Occupational Medicine and have worked in the field of occupational medicine in Thailand for more than 10 years. Twenty-one of them (84%) responded to questionnaire. They were asked to choose which subjects were suitable for medical students and which were suitable for postgraduate training. Another questionnaire was developed from topics that 50% of the experts (most of the experts) agreed to have for medical student curriculum. This questionnaire was a 5 Likert's scale type: strongly agree, agree, neutral, disagree, and strongly disagree. It was tested for reliability with 25 of 6-year-medical students at Thammasat University. Reliability coefficient of this questionnaire was 0.9665. The second questionnaire was mailed to 34 physicians who worked as part-time physicians in industries and 26 physicians who worked in governmental hospitals in Pathumthani. Physicians in Pathumthani were chosen as respondents because Pathumthani province is a populated industrial province near Bangkok (capital city of Thailand). There were three major industrial estates and 2,237 industries in Pathumthani. Nineteen of the part-time physicians in industries (55.9%) and 20 of physicians working in governmental hospitals (76.9%) responded to the questionnaire. Each topic from the second questionnaire was calculated for average scores and standard deviations. Topics that had an average score of 3.50 or more were selected as necessary topic of occupational health curriculum for Thai medical students. The third questionnaire was developed by using topics from the second questionnaire, but this questionnaire required respondents to grade the level of learning need for each topic. The third questionnaire was mailed to 36 people including administrators of all Thai medical schools, academicians, occupational health service providers, and students. The responded rate was 69.4% (25 questionnaires responded back). Data from both second and third questionnaires were analyzed and ranked. Finally, public comments, composed of 16 of medical school administrators, academicians, occupational health service providers, and medical students, were set up to look at the data from both questionnaires and brainstormed for final draft of occupational health curriculum for Thai medical students. The present study was performed from June 2003 to February 2004.

Statistical analysis

Frequency, tables with numbers and percentages, mean scores and standard deviation were summarized. The opinions from occupational medical experts about the necessary topics level of learning are need for medical students.

Results

Results from occupational medicine experts' questionnaire

The first questionnaire was mailed to 25 occupational medicine experts, 21 of them (84%) responded to the questionnaire. From the questionnaire, topics which had more than 50%of occupational medicine experts responded as suitable for medical students were as the following (Table 1).

Results from questionnaire for physicians in industries and hospitals

The second questionnaire was mailed to 34 physicians who worked as part-time physicians in industries and 26 physicians who worked in governmental hospitals in Pathumthani. Nineteen of the part-time physicians in industries (55.9%) and 20 of the physicians working in governmental hospitals (76.9%) responded to the questionnaire. From this questionnaire, topics which had mean score equaled or more than 3.50 were ranked from highest to lowest mean score as the following (Table 2).

Results from questionnaire for medical school administrators, academicians, occupational health service providers, and students

The third questionnaire was mailed to administrators of all Thai medical schools, academicians,

Table 1. Opinions from occupational medicine experts regarding necessary occupational medicine topics for medical students (n = 21)

Topics	Necessary for medical students	
	Persons	%
I Occupational hazards to health		
Knowledge:		
1. Hazards to health in the workplace and the illnesses which they cause	17	81
2. Evaluating and controlling risk from hazards	11	52.4
3. Principles of toxicology, occupational hygiene, and ergonomics	13	61.9
4. Clinical features and investigation of occupational disease	11	52.4
5. Sources of information in occupational health hazards	11	52.4
6. Principles of health surveillance	13	61.9
7. Occupational health standards	6	28.6
8. Biological monitoring	11	52.4
9. Principles of occupational safety	12	57.1
10. Emergency treatment of injury at work	12	57.1
Experience:		
1. Assess and advise on range of working environments	8	38.1
2. Surveillance of workers at risk of occupational injury and disease	11	52.4
3. Differential diagnosis of work related ill health	13	61.9
4. Liaison with other specialists on workplace assessment	5	23.8
5. Management of workers developing work related disease or injury	5	23.8
6. Use of basic occupational hygiene equipment	11	52.4
7. Experience in general clinical toxicology	11	52.4
8. Supervise health and safety training	6	28.6
9. Use of ILO classification of radiographs	5	23.8
Competence:		
1. Undertake workplace assessments and advise on control measures	5	23.8
2. Diagnose work related ill health	11	52.4
3. Take a clinical history and examination proficiently	15	71.4
4. Organize appropriate investigations for diagnosis of occupational disease	11	52.4
5. Recognize need for specialist assessment of environment	9	42.9
6. Organize health surveillance for workers exposed to occupational hazards	6	28.6
7. Advise on provision of first aid facilities	13	61.9
8. Select appropriate personal protective equipment	8	38.1
9. Advise on the use of equipment and the planning of working environment	4	19
10. Advise on the introduction of new working systems and techniques	3	14.3
11. Evaluate and interpret the results of occupational hygiene surveys	4	19
12. Evaluate the health effects of toxic chemical exposures, including mixtures	4	19
13. Apply ergonomic principles to optimize comfort and reduce risk at work	7	33.3
14. Recognize and reduce exposures to certain physical hazards	12	57.1
15. Explain health-related information on a material safety data sheet (MSDS) to workers and patients	8	38.1
16. Advise patients regarding occupational hygiene controls, such as work practices, respirator use, and engineering controls	6	28.6
17. Recommend and implement policies and control measures to reduce or mitigate safety and health hazards	3	14.3
18. Design and implement proactive systems of care that effectively reach all members of a population	3	14.3
19. Design and conduct surveillance programs in workplace and/or community settings	3	14.3

Table 1. continue

Topics	Necessary for medical students	
	Persons	%
20. Design and implement a medical response plan for mass casualty events in industry or in the general environment	2	9.5
II Assessment of disability and fitness for work		
Knowledge:		
1. Principles of assessing fitness for work	11	52.4
2. Statutory requirements for fitness for specific jobs	2	9.5
3. Methods of rehabilitation and redeployment at work	3	14.3
4. Factors effecting absence attributed to sickness	9	42.9
5. Assessment of fitness for work of older workers	2	9.5
6. Application of the stress or strain concept to disabled employees	2	9.5
7. Principles of ill health retirement	2	9.5
8. Disablement benefits	6	28.6
Experience:		
1. Clinical assessment of disability and fitness for work, both preplacement and after work related illness or injury	5	23.8
2. Assessment of impairment, disability, and handicap in relation to work	2	9.5
3. Clinical management in rehabilitation of disabled workers	2	9.5
4. Application of ergonomics to rehabilitation	2	9.5
5. Counsel employees regarding sickness absence	5	23.8
6. Management of workers with alcohol or drug problems	4	19
7. Monitoring sickness absence	3	14.3
8. Supervise training	2	9.5
Competence:		
1. Advise on impairment, disability, and handicap in relation to work	3	14.3
2. Advise on fitness for work in liaison with other professionals where appropriate	3	14.3
3. Advise on rehabilitation and redeployment	2	9.5
4. Advise managers, insurers, and employers on ill health retirement	2	9.5
5. Advise on sickness absence	6	28.6
6. Design and implement integrated systems of disability prevention and management	2	9.5
7. Develop a rehabilitation policy and advise on procedures to implement rehabilitation at a workplace	2	9.5
8. Evaluate the range and nature of the tasks at the workplace where rehabilitation is required and assess potential alternative jobs for injured or ill employees	2	9.5
9. Assess the psychosocial and/or cultural factors which may influence the return to work of an injured employee and use appropriate resources to deal with these factors	3	14.3
10. Apply the rehabilitation process to employees returning to work after an absence due to any illness or disability	2	9.5
11. Participate in case management in the role of a medical adviser and interpreter of medical opinion into workplace activities and restrictions	2	9.5
12. Apply the legislative requirements concerning rehabilitation of ill or injured workers	2	9.5
13. Assist in minimising the costs while maximising the benefits of rehabilitation to the organization	2	9.5
III Communications		
Knowledge:		
1. Organization of occupational health services and role of statutory authorities	14	66.7

Table 1. continue

Topics	Necessary for medical students	
	Persons	%
2. Ethical guidelines for communications with doctors, managers, and others	13	61.9
3. Role and organization of other occupational health professionals	5	23.8
4. Organization of other health services	9	42.9
5. Principles, techniques, and resources in communication	9	42.9
Experience:		
1. Preparation of written reports	7	33.3
2. Communications with other professionals about management of people	6	28.6
3. Oral presentations with audiovisual aids	11	52.4
4. Teamwork	12	57.1
5. Counseling	8	38.1
6. Participation in committees	3	14.3
7. Negotiating, influencing, and conflict resolution	3	14.3
Competence:		
1. Communicate with people of different backgrounds and technical understanding	7	33.3
2. Organize and write reports	8	38.1
3. Make clear oral presentations with use of audiovisual aids	9	42.9
4. Read, write, and converse proficiently	6	28.6
5. Apply legislative and ethical requirements for confidentiality in communicating with other professionals about people	8	38.1
6. Participate effectively as a member of a committee	3	14.3
7. Communicate current medical, environmental, and/or other scientific knowledge effectively to target groups	6	28.6
IV Research methods		
Knowledge:		
1. Sources of scientific information	11	52.4
2. Principles of epidemiology and medical statistics	13	61.9
3. Ethical considerations in research	11	52.4
4. Principles of social and qualitative research	11	52.4
Experience:		
1. Conduct a formal scientific investigation	6	28.6
2. Carry out a literature search and prepare a report	8	38.1
Competence:		
1. Carry out a literature search	11	52.4
2. Convert a problem into a researchable question	11	52.4
3. Interpret scientific data in journals and from own research	11	52.4
4. Plan simple surveys	11	52.4
5. Recognize limits of competence and liase with statisticians or other experts when appropriate	9	42.9
6. Recognize and initiate the investigation of disease clusters in the work force	11	52.4
7. Report on an investigation orally and in writing	11	52.4
8. Carry out simple statistical manipulations to summarize data	12	57.1
9. Analyze routinely collected data including sickness absence and accident data	11	52.4
10. Use a computer for the storage and analysis of data	11	52.4

Table 1. continue

Topics	Necessary for medical students	
	Persons	%
V Management		
Knowledge:		
1. Principles and practice of management	6	28.6
2. Techniques for needs assessments and marketing of occupational health services	3	14.3
3. How to manage a budget	2	9.5
4. Industrial relations	2	9.5
5. Management structures in different organizations	3	14.3
6. Principles of audit	4	19
7. Analysis of organizational behavior	2	9.5
8. Designing a training course	2	9.5
Experience:		
1. Personal responsibility for the management of a department or some aspect of a department of occupational health	3	14.3
2. Involvement with all elements of industrial organization	3	14.3
3. Experience in at least two organizations or businesses with different structures and styles of management	2	9.5
4. Collection and use of information in the management of health and safety at work	3	14.3
5. Participation in audit	2	9.5
6. Managing a budget	2	9.5
7. Selection, appointment, supervision, and appraisal of staff	1	4.8
8. Involvement in providing training	1	4.8
9. Attendance at a management training course	1	4.8
Competence:		
1. Identify the occupational health needs of an organization	3	14.3
2. Define the goals and objectives of an occupational health service	7	33.3
3. Define the roles of staff in providing an occupational health service and formulate job descriptions	7	33.3
4. Manage an occupational health department	1	4.8
5. Evaluate the quality of an occupational health service and carry out clinical audit	2	9.5
6. Negotiate and manage a budget	1	4.8
7. Team building and teamwork	3	14.3
8. Organize record keeping with computers if appropriate	3	14.3
9. Select, appoint, supervise and appraise staff performance	1	4.8
10. Market occupational health services	1	4.8
11. Negotiating and influencing skills	1	4.8
12. Design a training program	2	9.5
13. Apply principles of risk management to the practice of occupational medicine	1	4.8
14. Apply time-management principles	3	14.3
VI Occupational health law and ethics		
Knowledge:		
1. Acts, regulations, codes of practice and guidance governing occupational health including the reporting ofoccupational injury and disease	11	52.4
2. The legislative framework of occupational health	6	28.6
3. The interaction between the law and ethics in occupational health practice	8	38.1
4. Workers' compensation systems	13	61.9
5. The roles of the medical, professional, and expert witness	11	52.4
6. Organization of social and insurance services	7	33.3

Table 1. continue

Topics	Necessary for medical students	
	Persons	%
7. Employment law	8	38.1
8. Social compensation legislation	11	52.4
9. Environmental health law	11	52.4
10. Procedures in litigation	9	42.9
Experience:		
1. Advising on, supporting, and monitoring the implementation of occupational health and safety legislation	3	14.3
2. Application of occupational health law and ethics to the individual case	3	14.3
3. Advising on, supporting, and monitoring the implementation of environmental law	3	14.3
4. Evaluation of compliance with new legislation	1	4.8
Competence:		
1. Advise managers of their legal obligations under health and safety law	3	14.3
2. Advise managers on the implementation of health and safety and environmental law	3	14.3
3. Recognize and address ethical dilemmas in the practice	7	33.3
4. Interact with patients, employees, employers, and other clients to achieve health-related goals	5	23.8
5. Maintain current medical, scientific, and regulatory knowledge, recognizing one's limits and seeking additional resources as needed	5	23.8
6. Document patient encounters accurately and completely	7	33.3
7. Develop and implement a personal lifelong learning plan	8	38.1
VII Environmental medicine		
Knowledge:		
1. Physical, chemical, and biological hazards to health arising from industrial activities	13	61.9
2. Methods for assessing and controlling environmental hazards	5	23.8
3. Sources of information on environmental epidemiology	8	38.1
4. Control of major industrial accidental hazards	2	9.5
5. Environmental sources of hazards to health other than industry	6	28.6
6. The role of other professional groups with an interest in environmental health	5	23.8
7. Principles of integrated pollution control	8	38.1
Experience:		
1. Advising on management of known and suspected environmental hazards to health	7	33.3
2. Liaison with other specialists responsible for environmental and community health	6	28.6
3. Involvement in the planning of building or processes with the potential to cause environmental hazards	3	14.3
4. Participation as a team member of emergency incident planning	5	23.8
Competence:		
1. Recognize and advise on hazardous exposure in the general environment arising from industrial activities	8	38.1
2. Differential diagnosis of work related and environmental related disease	11	52.4
3. Recognize and advise on hazardous exposure in the general environment arising from other sources or activities	7	33.3
4. Perform a risk assessment	11	52.4
5. Communicate to target groups the levels of risk from real or potential hazards and the rationale for selected interventions	5	23.8
6. Interpret and explain the results of environmental monitoring studies	4	19

Table 1. continue

Topics	Necessary for medical students	
	Persons	%
VIII Health promotion		
Knowledge:		
1. Principles of health promotion, education, and behavioral modification	14	66.7
2. Major health risks relevant to working populations	11	52.4
3. The workplace health promotion process	11	52.4
4. Health needs analysis of working populations	6	28.6
5. Ethical aspects of population screening	6	28.6
6. Cost-benefit analysis of health promotion activities	4	19
7. Health promotion agencies and sources of information	8	38.1
Experience:		
1. Participation in health promotion and education programs	11	52.4
2. Experience with intervention techniques	7	33.3
3. Advocating workplace health promotion	7	33.3
Competence:		
1. Assess needs for health promotion	6	28.6
2. Organize, provide, and evaluate health promotion programs	5	23.8
3. Development and implementation of prevention programs	5	23.8
4. Achieve high participation in health promotion programs	7	33.3
5. Audit or evaluation of existing programs	5	23.8
IX Clinical		
Competence:		
1. Identify the potential relationship between patient symptoms and occupational/ environmental exposures	11	52.4
2. Diagnose and manage occupational/environmental illnesses and injuries, with the use of consultants in related disciplines when indicated	11	52.4
3. Identify non-occupational/environmental factors that may contribute to occupational/ environmental disease or injury	11	52.4
4. Refer and follow up or manage patients with serious occupational or environmental injuries and illnesses	8	38.1
5. Elicit patients' concerns about exposures and establish a therapeutic alliance incorporating risk communication	11	52.4
6. Report all findings to affected individuals and pertinent information to organizations and employers as appropriate (considering medical confidentiality issues), advocating for the health and safety of patients and employees	11	52.4
7. Prevent, identify, diagnose, treat and/or refer occupational/environmental lung disorders	9	42.9
8. Prevent, identify, diagnose, treat and/or refer occupational/environmental skin disorders	9	42.9
9. Prevent, identify, diagnose, treat and/or refer occupational/environmental musculoskeletal disorders	9	42.9
10. Prevent, identify, diagnose, treat and/or refer occupational/environmental cancers	8	38.1
11. Prevent, identify, diagnose, treat and/or refer occupational/environmental eye disorders	9	42.9
12. Prevent, identify, diagnose, treat and/or refer occupational/environmental ear disorders	9	42.9
13. Prevent, identify, diagnose, treat and/or refer occupational/environmental cardiovascular disorders	8	38.1
14. Prevent, identify, diagnose, treat and/or refer occupational/environmental neurological disorders	8	38.1
15. Prevent, identify, diagnose, treat and/or refer occupational/environmental reproductive disorders	8	38.1

Table 1. continue

Topics	Necessary for medical students	
	Persons	%
16. Prevent, identify, diagnose, treat and/or refer occupational/environmental liver disorders	8	38.1
17. Prevent, identify, diagnose, treat and/or refer occupational/environmental renal disorders	7	33.3
18. Prevent, identify, diagnose, treat and/or refer occupational/environmental heavy metal poisoning	8	38.1
19. Prevent, identify, diagnose, treat and/or refer occupational/environmental pesticide toxicity	8	38.1
20. Prevent, identify, diagnose, treat and/or refer occupational/environmental stress disorders	8	38.1
X Toxicology		
Competence:		
1. Determine the nature and extent of potential occupational and environmental chemical exposures, considering routes of exposure and routes of absorption	7	33.3
2. Detect, insofar as possible, pre-clinical or clinical effects arising from chemical exposure and implement appropriate preventive measures	11	52.4
3. Evaluate, treat, and/or properly refer persons whose health may be affected by acute or chronic contact with occupational and environmental chemicals	8	38.1
4. Assess clinical, worksite, and environmental data, along with literature reviews in the performance of patient evaluations	8	38.1
5. Understand, explain, and be able to apply toxicokinetic data (including absorption, metabolism, storage, and excretion) to clinical and employment-related decision-making	5	23.8
6. Determine if a person has a health condition that increases risk from the effects of exposure to chemical, physical, or biological agents	7	33.3
7. Distinguish health effects of exposure to chemicals from other etiologies	7	33.3
8. Manage an effective therapeutic alliance with the patient whose health is affected by toxic	6	28.6
XI Social sciences		
1. Identify social, cultural, and ethnic issues that relate to policies, risks, research, and interventions in occupational and environmental medicine	6	28.6
2. Recognize the effects of cultural, ethnic, and social factors, including health beliefs and practices, on the health and safety of workers	9	42.9
3. Accommodate cultural, ethnic, educational, and language variations among workers when providing information on occupational hazard prevention, disease prevention, and health promotion	7	33.3
4. Provide clinical care and health counseling with an awareness of how cultural and social beliefs influence patient knowledge, attitudes, and behaviors	6	28.6

occupational health service providers, and students for the total of 36. The responded rate was 69.4% (25 questionnaires were responded back). From this questionnaire, topics were categorized based on levels of learning need and kept only must and should levels as the following (Table 3).

Results from public comments of medical school administrators, academicians, occupational health service providers, and medical students

Public comments, composed of 16 of medical school administrators, academicians, occupational health service providers, and medical students, were set up to look at the data from both questionnaires and brainstormed for final draft of occupational health curriculum for Thai medical students. The final draft of occupational health curriculum for Thai medical students from the public comments was as the following:

Knowledge

Must know

1. Hazards to health in the workplace and the illnesses which they cause

2. Evaluating and controlling risk from hazards

3. Clinical features and investigation of occupational disease

Table 2. Means and standard deviations of occupational medicine topics needed for medical students based on physicians in industries and hospitals' opinions (n = 39)

Topics	Means	Standard deviation
Knowledge:		
1. Hazards to health in the workplace and the illnesses which they cause	3.97	1.04
2. Evaluating and controlling risk from hazards	3.85	1.09
3. Principles of toxicology, occupational hygiene, and ergonomics	3.79	1.06
4. Clinical features and investigation of occupational disease	4.03	1.01
5. Sources of information in occupational health hazards	3.67	1.03
6. Principles of health surveillance	3.59	1.29
7. Biological monitoring	3.67	1.08
8. Principles of occupational safety	3.90	1.02
9. Emergency treatment of injury at work	4.13	0.80
10. Principles of assessing fitness for work	3.62	0.99
11. Organization of occupational health services and role of statutory authorities	3.28	1.07
12. Ethical guidelines for communications with doctors, managers, and others	3.54	0.97
13. Sources of scientific information	3.31	0.95
14. Principles of epidemiology and medical statistics	3.28	0.97
15. Ethical considerations in research	3.31	1.08
16. Principles of social and qualitative research	3.13	1.03
17. Acts, regulations, codes of practice and guidance governing occupational health including the reporting ofoccupational injury and disease	3.49	1.30
18. Workers' compensation systems	3.56	0.85
19. The roles of the medical, professional, and expert witness	3.59	1.21
20. Social compensation legislation	3.46	0.91
21. Environmental health law	3.41	1.14
22. Physical, chemical, and biological hazards to health arising from industrial activities	3.69	0.95
23. Principles of health promotion, education, and behavioral modification	3.79	0.92
24. Major health risks relevant to working populations	3.97	0.87
25. The workplace health promotion process	3.85	0.81
Experience:		
1. Surveillance of workers at risk of occupational injury and disease	3.77	1.09
2. Differential diagnosis of work related ill health	3.95	1.00
3. Use of basic occupational hygiene equipment	3.33	1.03
4. Experience in general clinical toxicology	3.49	1.10
5. Oral presentations with audiovisual aids	3.08	0.90
6. Teamwork	3.59	0.91
7. Participation in health promotion and education programs	3.64	0.87
Competence:		
1. Diagnose work related ill health	3.87	1.06
2. Take a clinical history and examination proficiently	3.95	1.02
3. Organize appropriate investigations for diagnosis of occupational disease	3.59	1.21
4. Advise on provision of first aid facilities	3.67	0.96
5. Recognize and reduce exposures to certain physical hazards	3.85	0.90
6. Carry out a literature search	3.13	0.92
7. Convert a problem into a researchable question	3.08	0.96
8. Interpret scientific data in journals and from own research	3.18	1.00
9. Plan simple surveys	3.18	0.91
10. Recognize and initiate the investigation of disease clusters in the work force	3.59	0.94
11. Report on an investigation orally and in writing	3.31	0.92
12. Carry out simple statistical manipulations to summarize data	3.26	0.97
13. Analyze routinely collected data including sickness absence and accident data	3.23	1.01

Table 2. Continue

Topics	Means	Standard deviation
14. Use a computer for the storage and analysis of data	3.56	0.94
15. Differential diagnosis of work related and environmental related disease	3.82	1.10
16. Perform a risk assessment	3.64	0.96
17. Identify the potential relationship between patient symptoms and occupational/ environmental exposures	3.54	0.97
18. Diagnose and manage occupational/environmental illnesses and injuries, with the use of consultants in related disciplines when indicated	3.46	1.14
19. Identify non-occupational/environmental factors that may contribute to occupational/ environmental disease or injury	3.44	1.05
20. Elicit patients' concerns about exposures and establish a therapeutic alliance incorporating risk communication	3.62	0.88
21. Report all findings to affected individuals and pertinent information to organizations and employers as appropriate (considering medical confidentiality issues), advocating for the health and safety of patients and employees	3.41	1.12
22. Detect, insofar as possible, pre-clinical or clinical effects arising from chemical exposure and implement appropriate preventive measures	3.56	1.14

4. Principles of occupational safety

5. Emergency treatment of injury at work

6. Principles of health promotion, education, and behavioral modification

Should know

1. Principles of toxicology, occupational hygiene, and ergonomics

2. Principles of health surveillance

3. Biological monitoring

4. Sources of information in occupational health hazards

5. Principles of assessing fitness for work

6. Ethical guidelines for communications with doctors, managers, and others

7. Workers' compensation systems

8. The roles of the medical, professional, and expert witness

9. Physical, chemical, and biological hazards to health arising from industrial activities

10. Major health risks relevant to working populations

11. The workplace health promotion process

Experience

Must have experience

1. Surveillance of workers at risk of occupational injury and disease

2. Differential diagnosis of work related ill health

Should have experience

1. Teamwork

2. Participation in health promotion and education programs

Competence

Must have competence

1. Diagnose work related ill health

2. Take a clinical history and examination proficiently

3. Advise on provision of first aid facilities

4. Recognize and reduce exposures to certain physical hazards

5. Differential diagnosis of work related and environmental related disease

6. Perform a risk assessment

7. Elicit patients' concerns about exposures and establish a therapeutic alliance incorporating risk communication

Should have competence

1. Detect, insofar as possible, pre-clinical or clinical effects arising from chemical exposure and implement appropriate preventive measures

2. Organize appropriate investigations for diagnosis of occupational disease

3. Recognize and initiate the investigation of disease clusters in the work force

4. Use a computer for the storage and analysis of data

Table 3. Level of learning need of occupational medicine topics for medical students based on opinions of medical school administrators, academicians, occupational health service providers, and students (n = 25)

Knowledge	Must know (%)	Should know (%)	Might know (%)
1. Hazards to health in the workplace and the illnesses which they cause	21 (84)	4 (16)	0
2. Evaluating and controlling risk from hazards	15 (60)	7 (28)	3 (12)
3. Principles of toxicology, occupational hygiene, and ergonomics	13 (52)	10 (40)	2 (8)
4. Clinical features and investigation of occupational disease	22 (88)	3 (12)	0
5. Sources of information in occupational health hazards	10 (40)	13 (52)	2 (8)
6. Principles of health surveillance	17 (68)	7 (28)	1 (4)
7. Biological monitoring	10 (40)	10 (40)	5 (20)
8. Principles of occupational safety	11 (44)	11 (44)	3 (12)
9. Emergency treatment of injury at work	17 (68)	7 (28)	1 (4)
10. Principles of assessing fitness for work	2 (8)	16 (64)	7 (28)
11. Ethical guidelines for communications with doctors, managers, and others	9 (36)	12 (48)	4 (16)
12. Workers' compensation systems	8 (32)	12 (48)	5 (20)
13. The roles of the medical, professional, and expert witness	8 (32)	11 (44)	6 (24)
14. Physical, chemical, and biological hazards to health arising from industrial activities	5 (20)	17 (68)	3 (12)
15. Principles of health promotion, education, and behavioral modification	12 (48)	10 (40)	3 (12)
16. Major health risks relevant to working populations	11 (44)	14 (56)	0
17. The workplace health promotion process	8 (32)	15 (60)	2 (8)
Experience	**Must have experience (%)**	**Should have experience (%)**	**Might have experience (%)**
1. Surveillance of workers at risk of occupational injury and disease	13 (52)	10 (40)	2 (8)
2. Differential diagnosis of work related ill health	16 (64)	8 (32)	1 (4)
3. Teamwork	8 (32)	15 (60)	2 (8)
4. Participation in health promotion and education programs	2 (8)	17 (68)	6 (24)
Competence	**Must have competence (%)**	**Should have competence (%)**	**Might have competence (%)**
1. Diagnose work related ill health	18 (72)	6 (24)	1 (4)
2. Take a clinical history and examination proficiently	23 (92)	2 (8)	0
3. Organize appropriate investigations for diagnosis of occupational disease	8 (32)	14 (56)	3 (12)
4. Advise on provision of first aid facilities	16 (64)	9 (36)	0
5. Recognize and reduce exposures to certain physical hazards	11 (44)	9 (36)	5 (20)
6. Recognize and initiate the investigation of disease clusters in the work force	10 (40)	13 (52)	2 (8)
7. Use a computer for the storage and analysis of data	5 (20)	14 (56)	6 (24)
8. Differential diagnosis of work related and environmental related disease	15 (60)	9 (36)	1 (4)
9. Perform a risk assessment	13 (52)	9 (36)	3 (12)
10. Identify the potential relationship between patient symptoms and occupational/environmental exposures	11 (44)	11 (44)	3 (12)
11. Elicit patients' concerns about exposures and establish a therapeutic alliance incorporating risk communication	15 (60)	8 (32)	2 (8)
12. Detect, insofar as possible, pre-clinical or clinical effects arising from chemical exposure and implement appropriate preventive measures	18 (72)	6 (24)	1 (4)

5. Identify the potential relationship between patient symptoms and occupational/environmental exposures

Discussion

From the present study, occupational health curriculum for Thai medical students must include 1) knowledge of occupational health hazards and their illnesses, occupational health hazard evaluation and control, clinical features and investigation of occupational disease, principles of occupational safety, emergency treatment of occupational injury, and principles of health promotion, education, and behavioral modification; 2) experience of occupational health and safety surveillance and occupational disease differential diagnosis; and 3) competence of occupational disease diagnosis, taking clinical history and examination, advise on provision of first aid facilities, physical hazards recognition and control, work related and environmental related disease differential diagnosis, performing a risk assessment, and risk communication.

The present study was the first one assessing occupational health curriculum for medical students in Thailand; however, there were several limitations of the present study. First, there were a small number of respondents, which could cause random error. Second, occupational health in Thailand was not widely understood by physicians, they might misunderstand some of topics in questionnaires, which could cause information bias. Occupational health topics in the present study were quite similar to studies from other countries[5-9]. Compared to current occupational health contents in each Thai medical school, only some topics are provided in some medical schools. Therefore, each medical school should consider the present study as a guideline to adapt occupational health contents into the medical curriculum in the future. However, there was a difference in degree of need due to the limited time of the study for the whole medical curriculum. In the present study, there was no detail about learning methods for each topic. Some topics could be integrated into existing curriculum. Therefore, future study might focus into learning methods for occupational health curriculum for medical students.

Conclusion

The present study evaluated occupational health curriculum needed for Thai medical students. The necessary topics for the curriculum were developed. However, future study of learning methods for each topic is needed.

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การศึกษาความต้องการการจัดหลักสูตรอาชีวอนามัยในการศึกษาแพทย์ระดับปริญญาบัณฑิตในประเทศไทย

สุรศักดิ์ บูรณตรีเวทย์

วัตถุประสงค์*: เพื่อประเมินและพัฒนาการจัดหลักสูตรอาชีวอนามัยในการศึกษาแพทย์ระดับปริญญาบัณฑิตในประเทศไทยที่เหมาะสม*

วัสดุและวิธีการ*: ดำเนินการสอบถามเนื้อหาการสอนอาชีวอนามัยสำหรับการศึกษาแพทย์ระดับปริญญาบัณฑิตในคณะแพทยศาสตร์ทั้ง 12 แห่ง ในประเทศไทย สอบถามความคิดเห็นของผู้เชี่ยวชาญถึงเนื้อหาที่จำเป็นในการเรียนการสอนอาชีวอนามัยสำหรับการศึกษาแพทย์ระดับปริญญาบัณฑิต สอบถามความคิดเห็นของแพทย์ที่ปฏิบัติงานในโรงงานอุตสาหกรรมและสถานพยาบาลสังกัดกระทรวงสาธารณสุขถึงเนื้อหาหลักสูตรอาชีวอนามัยที่จำเป็นต้องใช้ในเวชปฏิบัติ สอบถามความคิดเห็นและจัดประชุมประชาพิจารณ์ของผู้บริหารการศึกษา นักวิชาการ ผู้ให้บริการอาชีวอนามัย และนักศึกษาเพื่อหาเนื้อหาหลักสูตรอาชีวอนามัยสำหรับการศึกษาแพทย์ระดับปริญญาบัณฑิตที่เหมาะสม*

ผลการศึกษา*: หัวข้อที่จำเป็นต้องจัดการเรียนการสอนประกอบด้วยความรู้เกี่ยวกับสิ่งคุกคามต่อสุขภาพจากการประกอบอาชีพในสถานที่ทำงานและผลกระทบต่อสุขภาพ การประเมินและควบคุมความเสี่ยงจากสิ่งคุกคามต่อสุขภาพ ลักษณะทางคลินิกและการสืบค้นของโรคจากการประกอบอาชีพ หลักการด้านความปลอดภัยในการประกอบอาชีพ การรักษาฉุกเฉินอุบัติเหตุในที่ทำงาน และหลักการสร้างเสริมสุขภาพ สุขศึกษา และการปรับเปลี่ยนพฤติกรรม ประสบการณ์การเรียนรู้เกี่ยวกับเฝ้าระวังสุขภาพคนงานที่เสี่ยงต่อการเกิดโรค และอุบัติเหตุจากการประกอบอาชีพ และวินิจฉัยแยกโรคที่เกี่ยวเนื่องกับการประกอบอาชีพ และสามารถปฏิบัติได้เกี่ยวกับวินิจฉัยความเจ็บป่วยอันเกี่ยวเนื่องจากการประกอบอาชีพ ซักประวัติและตรวจร่างกายผู้ป่วยโรคจากการประกอบอาชีพ แนะนำการจัดการปฐมพยาบาลในที่ทำงาน ตระหนักถึงและลดการสัมผัสต่อสิ่งคุกคามต่อสุขภาพด้านกายภาพ วินิจฉัยแยกโรคระหว่างโรคอันเกี่ยวเนื่องจากการทำงาน และโรคอันเกี่ยวเนื่องจากสิ่งแวดล้อม ประเมินความเสี่ยงผลกระทบจากสิ่งแวดล้อมที่มีต่อสุขภาพ และให้การสื่อสารความเสี่ยงโรคหรืออุบัติเหตุกับผู้ป่วย*

สรุป*: การศึกษานี้ทำให้ได้หัวข้อเนื้อหาที่จำเป็นสำหรับการจัดการสอนอาชีวอนามัยในการศึกษาแพทย์ระดับปริญญาบัณฑิตในประเทศไทย ซึ่งคณะแพทยศาสตร์แห่งต่าง ๆ สามารถนำไปพิจารณาปรับใช้ตามความเหมาะสมของแต่ละสถาบัน*