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Occupational Hazards in the Thai Healthcare Sector

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Abstract

Healthcare personnel work in vulnerable conditions that can adversely impact physical and/or mental health. This paper aims to synthesize the state of knowledge on work-related illnesses, injuries, and risks experienced by Thai healthcare workers. We found that Thai healthcare personnel, like others worldwide, are at risk for injury related to needle sticks and sharp instruments; infectious diseases due to biological hazards exposure such as airborne pathogens and patient secretions; muscle pain due to workload and long duration of work; and psychological disorders related to stressful working conditions. Because detailed surveillance data are limited for the Thai healthcare workforce, we recommend that additional surveillance data on Thai healthcare workers' health outcomes be collected. Future research efforts should also focus on evidence-based interventions in order to develop methods to prevent and treat occupational health injuries and illnesses acquired in the workplace for Thai healthcare sector workers.

Keywords

Thailand; occupational hazards; healthcare workers; occupational safety

Introduction

As a result of their occupation, healthcare workers (HCWs) are exposed to significant health risks including exposures to infectious diseases, musculoskeletal strain, latex products, workplace stress, violence, and hazardous substances.[1–3] HCWs are on the forefront of emerging disease outbreaks and are called upon to provide services under difficult situations including man-made conflicts and natural disasters. In 2013, 19 percent of all reported work-related illnesses in the United States occurred among healthcare sector workers.[4]

To develop improved surveillance, prevention, and control policies for occupational health hazards in the Thai healthcare sector, a better understanding of work-related health risks is needed. This paper provides a review of identified Thai healthcare sector risks using a variety of sources. We reviewed published articles from the past two decades (1993–2015).

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In addition, we integrated the results from Thai hospital survey reports, Thai governmental reports, and Thai occupational health handbooks. We also used the 2013 Thai Healthcare Occupational Health and Safety Workshop Report, which was sponsored by the U.S. National Institute for Occupational Safety and Health and the Fogarty International Center, which is part of the U.S. National Institutes of Health. Keywords used in the literature search included various combinations of the search terms: Thailand, work hazards, healthcare sector, worker risks, healthcare worker, occupational health risks, occupational safety, and injury prevention. Databases included Medline, PubMed, Cochrane, Health Reference Academic Center, and CINAHL. This review synthesizes what is known about work-related illnesses, injuries, and risks experienced by Thai HCWs. It will help to identify research gaps and suggest recommendations for policies to improve the health and working environments of Thai HCWs.

Overview of Thai Healthcare System

The healthcare industry in Thailand comprises a large sector of the economy. More than 300,000 workers are employed in approximately 2,627 public and 321 private hospitals.[4] Nearly 75 percent of these workers provide direct patient care. These workers include physicians, nurses, nursing assistants, medical technologists, and other paramedical staff. Twenty percent of workers in this industry work in departments that do not give direct medical care to patients, including staff employed in the laundry, nutrition, and dietetics units; additionally, 5 percent work as administrators or clerical staff in hospital administrative units.[4]

The Ministry of Public Health in Thailand established a healthcare system notable for its comprehensive administrative structure at the village, sub-district, district, province, regional, and national levels. At the sub-district level, there are approximately 9,768 healthcare centers/clinics in Thailand that until recently were called primary care units. The primary care units were renamed health promoting hospitals in 2009 under the Prime Minister Abhisit Vejjajiva. The services of health-promoting hospitals include health promotion, disease prevention, treatment, rehabilitation, and consumer protection. The health-promoting hospitals do not have inpatient services or primary care medical doctors; they use a referral system to send patients to the community hospitals as needed.[5] In addition, each village within the sub-districts has health volunteers. The health promoting hospitals' aim is to promote health and prevent illness. At the district level, 774 community hospitals with approximately thirty to forty hospital beds and 284 municipal health centers have been established around the country.[5] At the provincial level, eighty-three public general hospitals with 200 hundred to 400 hundred beds have been established as referral centers for the community hospitals. At the regional level, thirty-three public regional hospitals act as centers of excellence to provide leadership for approximately five to eight public provincial hospitals and forty-eight specialized hospitals were established in 2010.[5] The overall number of private hospitals in Thailand is 322, including ninety-eight hospitals in Bangkok and 224 hospitals in other provinces.[5] The number of private hospitals is from 2013, which is the most recent available published information.[5]

It is well known that hospital personnel in both developed and developing countries have been challenged with several occupational hazards that include biological hazards (bacteria, viruses), physical hazards (heat, dust, radiation, and noise), chemical hazards (toxic cleaning solutions, chemotherapy drugs), ergonomic hazards (heavy lifting),[6] stress[7,8], and violence[8] in the workplace. The magnitude and frequency of the hazards and their impact on health may vary within and across countries due to the working culture, context of services, and economic resources. These occupational hazards must be examined within the context of local and regional resources in order to develop appropriate regulations to prevent adverse health outcomes on hospital personnel.

Thailand is moving forward to be a medical hub for Asia in order to serve its own citizens as well as millions of visitors and “medical tourists” (those who travel to Thailand specifically for medical care). The Ministry of Public Health reported over two million medical tourist trips to Thailand per year in the past two years. Thai hospital personnel have significant exposures to occupational hazards compared to other countries in this region due to the high demand for a multitude of healthcare services.[9]

Worker Protection Laws Addressing Healthcare

In 2011, the Thai Ministry of Labor enacted the Occupational Safety, Health, and Environment Act (BE 2554). The aim of this act was to reduce occupational hazards in the workplace and prevent work-related morbidity and mortality. This Act created administrative offices at the central administration, regional provincial administration, and local government administration levels. The responsibility of these varied levels of administrators was to promote safe and hygienic working conditions in order to prevent physical and mental work-related conditions. It also required healthcare facilities to provide proper personal protective equipment (PPE) to all employees. This Act also identified the obligation of the employee to cooperate with the employer in the promotion and implementation of occupational health and safety regulations.[10]

According to the Occupational Safety, Health, and Environment Act, hospitals in Thailand must implement occupational health and safety programs for HCWs. However, the Bureau of Occupational and Environmental Diseases in the Ministry of Public Health has also developed a manual for risk assessment and management for health workers in hospital settings.[11] This manual identifies occupational hazards including psychosocial hazards and physical hazards. It recommends activities to improve working conditions and to prevent the hazards and their adverse outcomes. The recommended activities include annual walkthrough surveys, environmental risk assessment and management, and surveillance for occupational hazards, vaccinations, occupational diseases, and injuries. The manual emphasizes health promotion in the workplace, ongoing worker training programs, and accessibility to PPE.[11]

Although occupational health and safety regulations in Thailand cover all hospitals, the financial resources and trained personnel allotted to health and safety in the hospital vary significantly among Thai hospitals.[12] In the past, compliance with Thai laws and regulations was not always required in government- sponsored organizations. Since the Occupational

Safety, Health, and Environment Act of 2011, both private and government supported hospitals are required to follow regulations designed to prevent occupational illness and injuries. However, due to a lack of resources, there are different levels of compliance with the legislative mandate. Most hospitals do not have safety officers. In addition, although most hospitals have implemented an Occupational Safety, Health, and Environment Committee, the composition of the committee does not always follow the mandated recommendations.

When the law was first in effect in 2011, the enforcement was so weak in the government-sponsored healthcare agencies that many of the hospitals were not even aware of the mandates. Thai hospitals are interested in the attainment of a hospital accreditation status however, as this is a widely recognized and sought after distinction which is associated with a higher quality of care and work environment. One study found that hospitals that were associated with medical schools have only been capable of implementing two-thirds of the recommended occupational health activities identified in the 2011 Occupational Safety, Health, and Environment Act.[12] Barriers to the implementation of a safe and healthy workplace included: lack of funds and higher patient loads than expected resulting in high workload demands for doctors, nurses, and other direct care providers. Additional research is needed to improve the working conditions and reduce work-related injuries and illnesses in the healthcare sector in Thailand.

Thai Work-Related Illnesses and Injuries

The occupational risk factors of HCWs in Thailand were explored by the Bureau of Occupational and Environmental Diseases in the Ministry of Public Health for 253 hospitals in Thailand.[13] Hospital administrators were asked to fill out a survey about the presence of occupational health risk factors in their hospitals. The percentage of hospitals that reported the presence of ergonomic risk factors was 90.9 percent; 88 percent identified the presence of biological risk factors, 83 percent reported chemical risk factors, 78 percent identified the presence of psychosocial risk factors, and 81 percent of the hospitals reported having unsafe working conditions. For physical factors, 79 percent of the hospitals reported having excessive heat, 77.5 percent identified noise as a risk factor, and 76 percent noted low light as an occupational risk factor.[13]

When individual HCWs (88,667) in these hospitals were surveyed the frequency with which risks were experienced on the job was less than that reported by the hospitals overall. Thirty-two percent of HCWs reported experiencing ergonomic risk factors on the job; 26 percent identified biological risk factors, 12 percent noted the presence of chemical risk factors in their job, 18 percent reported psychosocial risk factors on their job, and 18 percent of the HCWs reported unsafe working conditions. For physical hazards, 5.9 percent of HCWs identified excessive heat as a risk factor on their job, 7.1 percent identified noise, and 12.4 percent noted low light as a job-related risk factor. The discrepancy in the reporting of occupational risk factors by direct line HCWs compared to the hospital administrators is most likely due to the unit of analysis, the hospital overall versus individual HCWs. However, it could also be related to lack of awareness of the contribution of the hazards of

various working conditions by HCWs or concern about the impact of reporting on job security.

The majority (91.5 percent, *n*=81,146) of HCWs in this study reported that they had annual physical checkups. Some reported illnesses including hypertension (3.6 percent), diabetes mellitus (3.8 percent), high triglycerides (9.6 percent), and pulmonary tuberculosis (TB; 0.1 percent). Health examinations conducted as part of the survey revealed that 26.6 percent of the HCWs had vision impairment, 15.6 percent had lung function impairment, and 5 percent suffered from hearing loss. Occupationally related diseases and injuries reported by these HCWs included stress (3.5 percent), musculoskeletal disorders (1.8 percent), needle stick injuries (1.5 percent), skin diseases (0.1 percent), and other unspecified injuries (0.3 percent).[13]

Musculoskeletal Disorders

Unlike the Bureau of Occupational and Environmental Diseases survey reported above,[13] which found that among all HCWs, 1.8 percent reported musculoskeletal disorders, a survey in a public hospital in Bangkok reported that 61.5 percent of the nurses experienced pain and/or muscle strain of the lower back.[14] This is likely due to differences in job requirements across healthcare jobs. For example, nurses are expected to lift and move heavy objects, which can include debilitated, unconscious, or obese patients. Similar to the results of Sopajareeya's et al.'s study, Sinsongsuk[15] surveyed Thai nurses and found that 56.3 percent of nurses reported pain, with the majority (33.6 percent) identifying the low back area as the major source of pain. Also Dajpratham et al.[16] reported a 69.8 percent prevalence of low back pain among HCWs in dental offices. Factors related to back pain included bending the body for two hours continually per shift, lifting patients without assistance, and improper posture during work.[16–18] Studies of musculoskeletal disorders in Thai HCWs have concluded that the major causes of muscular pain include individual behaviors such as improper posture during heavy lifting, long duration of work activities, and the lack of muscular exercise.[15–21] No studies have identified systemic issues related to management policies (mandatory overtime, limited break time) or work design (no mechanical aids when lifting, poor work station design) that contributed to the risk of musculoskeletal injuries. A systematic analytic epidemiological approach is needed to identify the workplace factors that increase the risk of musculoskeletal disorders and pain and the impact on the quality of working life for HCWs in Thailand. In addition, intervention studies that evaluate the benefits of changes in work design and management policies are needed.

Airborne Infectious Disease

It is well recognized that Southeast Asia is endemic for many infectious diseases. [22] Because of poor ventilation, crowded waiting areas and close contact with infectious patients, airborne infectious diseases such as TB and influenza pose serious health risks for HCWs. Pipitsangjan et al.[23] reported relatively higher levels of bacterial and fungal counts in the ambulance compartment air during ambulance services as compared to prior to the patient entrance in the vehicle. Although protective equipment, such as N95 respirators, is available to ambulance personnel, this study reported only 64 percent compliance. The ambulance

workers reported that this lack of compliance was due to the relatively short time the potentially infected patients are in the ambulance, making the risk seem less threatening.[23] In addition, some infected patients may not have been perceived as high risk due to their presenting complaints.

Although Thailand has faced several pandemics of airborne infectious diseases, such as H5N1 influenza, severe acute respiratory syndrome and H1N1 influenza, the literature has documented H1N1 as a particular threat to healthcare personnel.[24] During the 2009 H1N1 pandemic, HCWs who provided initial care to influenza patients in regional hospitals reported high levels of infection. At a seven-month follow up period, 74 percent of H1N1 exposed healthcare staff had evidence of H1N1 infection. HCWs in the emergency departments in the general hospitals had a higher risk of getting the infection; these staff reported that they did not fully apply protective equipment.[25] In addition, flu vaccination rates among HCWs are reportedly lower than recommended. From 2010 to 2012, only 19 percent of HCWs and poultry cullers received the flu vaccine.[26] Tracking HCWs' flu vaccination rates is difficult to assess due to reporting of HCWs and poultry cullers' flu vaccination rates in the same group; thus these industry sectors should be reported separately. In addition, investigation into the barriers to effective PPE use (availability, training, workload) is essential to ensure that HCWs are more effectively protected during the next pandemic.

Pulmonary TB is another major occupational risk for HCWs in Thailand.[27,28] A cohort study in Bangkok reported that the risk of developing TB among HCWs was 188/100,000 person-years.[28] The estimated TB incidence in the country of Thailand was 132/100,000/in 2010, according to the most recently reported data.[29] The Jiamjarasrangsi et al. study found that working in emergency departments resulted in the highest risk of developing TB (1610/100,000 person-years). Nurses who worked closely with patients had many opportunities to develop TB disease (239/100,000 persons-year). This study found that healthcare staff, nurses, and emergency unit personnel have an increased risk of acquiring TB.[30]

Similarly, two studies in northern Thailand reported high risk of TB infection among HCWs, particularly among new staff.[27,28] Two studies in northern Thailand reported that 61 percent–71 percent of HCWs presented with TB infection, which is higher than the general population (124 per 100,000 population). [27,28,31,32] These studies confirmed the high occupational risk of TB in direct HCWs with an increased risk for non-direct care workers in this sector as well, including medical laboratory personnel. All newborns in Thailand must be vaccinated by BCG to prevent disseminated TB and meningitis TB. To prevent work-related TB among healthcare personnel, the National Tuberculosis Program recommends the use of PPE such as an N95 mask when dealing with actual or potential TB cases and an annual chest radiography screen for healthcare personnel.[33]

The literature includes many studies that report an elevated risk of acquiring TB on the job primarily because either HCWs were not well educated about protection measures or the protective equipment was not available.[28,31,32,35] Two studies conducted in public hospitals in Thailand reported a high risk of developing TB and other airborne infections among

HCWs due to the lack of proper protection devices, ventilation and specific infection prevention, and control policies.[34,35] Unahalekhaka et al.[36] conducted a survey of Thai hospitals to examine TB prevention activities and unmet TB prevention needs. They also concurred that while the majority of hospitals (97 percent) had TB policies in place, more than half did not have adequate isolation rooms and/or had trouble with implementing adequate TB screening in outpatient departments. These HCWs had received proper training for using approved PPE at least one time during their working hours. Approximately 50 percent reported that they did not use PPE during routine work; but they reported that they did regularly use PPE in case of suspected TB, HIV, or other infectious diseases.[36] Nevertheless, closer examination of the barriers to proper PPE use (availability, training, workload) is needed as many healthcare personnel continue to often rely on a surgical mask rather than the N95 mask.[33]

Another disease that is transmitted via inhalation of infected particles or direct contact is diphtheria. A recent prospective study by Wiboonchutikul et al.[37] examined the risk of baseline immunity with subsequent immune response after a tetanus-diphtheria booster among Thai HCWs. They concluded that Thai HCWs are at risk for this infection in the workplace and recommended that tetanus-diphtheria booster immunizations should be implemented as a standard policy for Thai HCWs.

The occurrences of airborne infection such as TB and influenza among HCWs in Thailand were similar to countries in Latin America but higher than other developing countries in Asia, such as India.[38] Even though infectious diseases from all types of airborne transmission in Thai healthcare sectors have decreased due to the implementation of nosocomial infection control policies,[39] they are still not well controlled. The incidence of airborne infections among healthcare staff is continually reported despite the implementation of nosocomial infection control policies.[27]

Healthcare personnel’s protection from airborne infectious diseases such as influenza and pulmonary TB has become a priority in Thailand for the last several decades. In 2009, the Advisory Committee on Immunization Practice of Thailand expanded its recommendation for influenza vaccination to healthcare personnel and added a recommendation for annual seasonal influenza vaccination management thereafter. However, as noted, the influenza vaccine had not yet adequately covered all health personnel because the Thai Ministry of Health has only been able to provide vaccines to a limited number of people in the high risk population of Thailand.[26] In addition, some HCWs have doubts about the benefits of the vaccine.[25] A systematic evaluation of compliance of nosocomial infection control policies in Thailand is needed with a deeper understanding of barriers to adherence.

Blood-borne Infections

Blood-borne infection is another risk for HCWs. The pathogens, including HIV and hepatitis, can be transmitted percutaneously, via mucous membranes and through non-intact skin exposures in the context of work. Characteristics of the work environment in the healthcare sector, particularly during patient care contact, create numerous opportunities for such infections. Luksamijarulkul et al.[40] reported a high occupational risk of blood-borne infection among HCWs in Bangkok, Thailand. They reported that 48.7 percent of HCWs in

a public hospital tested positive for the hepatitis B virus. This study also reported a high risk for other hospital staff that work in units that frequently used sharp medical instruments, such as the medical laboratory unit and hemodialysis unit. In contrast, another study found no relationship between the frequency of blood exposure and hepatitis B virus infection, however, 5.3 percent of HCWs from high-risk units such as hemodialysis units and obstetric/gynecologic units were positive for hepatitis B virus infection.[41] According to the national sentinel surveillance of blood-borne diseases, the prevalence of hepatitis B virus infection in HCWs is higher than the Thai population.[40–44]

Blood-borne infections such as hepatitis B and HIV infection are closely related to sharp instrument injuries and needle sticks. Due to a comprehensive system of strong prophylaxis treatment for needle stick injuries and awareness of HIV prevention among HCWs, there are no reported occupationally acquired HIV infections among HCWs in Thailand.[45,46]

Blood-borne infection remains an important work-related health illness in HCWs because the job characteristics of these occupations provide a high risk of exposure. The development of a registry for exposures at work with long-term follow-up to investigate the relationship between occupational injuries and outcomes is needed. Table 1 summarizes the literature on selected studies of Thai workers related to inhalation and blood-borne exposures.

Chemical and Other Exposures

Chemical exposures in the workplace can result in both acute and chronic illness among HCWs.[8] There is a notable gap in the literature related to the epidemiology of such exposures among HCWs in Thailand. This may be related to the difficulty of measurement and the expense of ongoing surveillance. This gap speaks to the identified priority need to examine this aspect of workplace exposure in order to improve the health of the healthcare workforce.

Chemical exposures to pharmaceuticals, cancer treatment drugs, anesthetic gases, sterilizing chemicals or gases, and disinfectant chemicals are well-recognized health hazards for HCWs.[2,3,8,47] This segment of the workforce is often exposed to these noxious substances routinely in the work setting. The effects may be mild (skin rashes) to severe (infertility or serious, potentially fatal illnesses such as leukemia).[47] Operating room staff members who are exposed to anesthesia have been noted to have slower reaction times compared to staff who do not have this occupational exposure.[47,48]

Supapvanich et al.[49] also examined the health issue of latex sensitization among nurses in Thailand. They reported that the sensitization in Thai governmental hospitals is higher than previously reported, from 3 percent to 5 percent. They found that both respiratory and dermal exposures were reported and recommended replacement with gloves that are latex-free or, if that is not feasible, at least a decrease in the protein content of gloves used in the healthcare settings.[49]

Psychological Problems

In Thailand, the shortage of healthcare staff, including dentists, registered nurses, and physicians, is a national problem, particularly in the remote rural areas. The number of public health staff in each province fulfills only 60 percent to 70 percent of the staffing needs.[50] On average, the discrepancy between the numbers of HCWs to the total population is quite large; this creates a large work burden on healthcare staff (Table 2). This can lead to workplace stress, depression, and anxiety.[51]

The recommended working period for healthcare personnel in Thailand is no longer than eight hours per day with no more than forty hours per week. These recommendations were made to improve the health and safety for both patients and healthcare personnel.[52] However, the shortage of HCWs often requires an extended working period for nurses, physicians, and dentists. The long duration of shift-work may contribute to either mental or physical health problems, both acute and chronic.[53] For example, insufficient sleep and lack of exercise due to required overtime work may be linked with low immunity and a higher risk of infection if exposed to TB or other airborne infectious agents.[34,35]

Moreover, the fast-paced work environment and the significant responsibility for patients' lives can be major sources of psychological disturbances for HCWs.[54] Psychological issues are commonly encountered with people who routinely work with patients who are experiencing a life crisis, including the process of dying.[54] Compounding this stress among workers is the limited time and lack of staff resources to finish the work within an eight-hour day or forty-hour week.[55–57] Relatives of sick and dying patients are also stressed and may add to the seeming incessant demands of the job. In addition, stress from colleagues can be another source of psychological problems.[58]

Two surveys conducted among Thai physicians and nurses found that 7.4 percent (physicians) and 10.3 percent (nurses) of respondents reported poor mental/psychological health. In addition, approximately half of them reported job stress.[59,60] Visanuyothin et al.[59] examined eighteen suicides among physicians who had a depressive disorder and work-related problems. They concluded that job stress combined with mental health problems could have severe consequences. Mental health problems among HCWs have also been reported in many countries in Asia, America, and Europe.[55,56,59–61] One recent review examined mechanisms to prevent occupational stress in HCWs[7] and found only low quality evidence to support cognitive-based therapies or mental and physical relaxation techniques in the workplace to reduce workplace stress. Thus this is one area where additional intervention research is needed to evaluate best practices to prevent workplace stress.

The healthcare industry is responsible for providing healthcare for those in need and thus it must be available to service the population twenty-four hours per day, seven days per week. It is an unavoidable condition that some HCWs must work rotating shifts. Shift work has been reported to have a negative effect on mental health and can lead to burnout among HCWs, according to a cross-sectional study in northern Thailand.[62] Shift work may lead to a negative impact on the safety of patients and HCWs themselves.[63] The adverse effects of shiftwork on health among healthcare professionals have been reported in many countries.

[56,57,61] Appropriate management of adequate sleep for persons working the nightshift is also critical and needs further investigation in Thailand.

Occupational Health and Safety Programs in Thailand

Currently all general public hospitals in Thailand have established an occupational health and safety section to provide surveillance, prevention and control of work-related risks, and exposures under supervision of Ministry of Public Health.[10] For example, the prevention of TB transmission in health-care settings requires three strategies; administrative control, environmental control, and the use of personal respiratory protective equipment.[64] A study in Thailand demonstrated that a two-day training program in addition to the management of the ward environment could improve TB infection-control practices. It was noted to reduce the microbial counts in air samples collected from the studied wards.[35] Another study on laboratory personnel reported a moderate level of biosafety practice scores and low scores related to the use of appropriate protective barriers. They recommended the implementation of a biological safety cabinet to minimize exposures to hazardous biological materials or aerosols generated by many microbiological procedures.[65]

Occupational health and safety have drawn the attention of policy makers and healthcare administrators. The Ministry of Public Health and the Bureau of Occupational and Environmental Diseases have promoted occupational health risk and safety guidelines in hospitals.[11] These guidelines can promote a safe environment in healthcare settings through various strategies such as healthy workplace initiatives, occupational risk assessment, and management systems. These initiatives mostly focus on management within the facility to create a low-risk workplace. These projects provide information that aims to achieve improved health status, knowledge, and skills.[11] However, resources are scarce in some hospitals and thus the guidelines are not followed to the full extent, since the Ministry of Health has no power to enforce compliance. The hospitals also have oversight by hospital accreditation agencies and the International Organization for Standardization, however, most of these groups focus on patient safety rather than HCWs safety.

Even though the number of occupational health risk and safety policy declarations has increased in the last two decades, problems remain with the management of these risks from a systems level as well as from the individual behavioral perspective. According to this review, a major cause of illness and injury for HCWs is related to inadequate prevention practices, lack of knowledge, and inadequate facility-level protective equipment. This review identified a gap in epidemiologic studies that focus broadly on occupational injuries as well as specific surveillance on the impact of chemical exposures, sleep deprivation, and the psychological stressors in the healthcare sector. While prevention policies exist for many of the identified workplace risks, they are limited in that they do not include all potential chemical exposures and psychosocial stressors. Additional resources such as product information for all chemical exposures in the workplace and programs to decrease stressors in the workplace are needed to support current and future regulations. Stronger mechanisms for enforcement in the workplace also need consideration.

Research Gaps: Stakeholders' Views

In order to identify knowledge gaps related to Thai HCWs' health and safety, the authors of this paper conducted a focus group during a Workshop for Occupational Health and Safety among Informal and Healthcare sectors in 2013. The researchers conducted these workshops as part of a planning grant. The National Institute for Occupational Safety and Health and the Fogarty International Center, National Institutes of Health, funded this planning grant. It was a joint effort by an interdisciplinary research team from the Faculty of Public Health at Mahidol University, Bangkok, Thailand, and the University of Massachusetts Lowell, Lowell, MA, USA.

Twelve stakeholders from the healthcare sector and academic sector participated in the planning grant's focus group in January 2013. Participants included Thai occupational health and safety administrators such as members of the Bureau of Occupation and Environmental Diseases, Ministry of Labor, International Labor Organization members from the occupational health and safety hospital network, occupational health staff members in general and regional hospitals, and researchers representing various disciplines and professions (medicine, nursing, work environment). Notes were taken during the focus groups and reviewed by team members. The results of this focus group were analyzed by qualitative content analysis procedures by the research team members who identified four major categories of concern:

1. Lack of research to confirm the relationship between occupational exposures and health risks and outcomes

The group concurred that even though there are many reports of infectious and non-communicable diseases in Thai HCWs, few reports have confirmed the work-related exposure as a causative agent. They concluded that improved policies that address prevention and control measures, compensation and a strengthening of existing procedures to track occupational illnesses in the healthcare sector are needed.

2. Lack of standardized criteria for prevention and control measures for HCWs during disease outbreaks

Previous studies and expert reports have documented HCWs' health and safety risks during infectious disease outbreaks due to inadequate prevention measures including low vaccination rates or improper use of personal protection equipment, such as N95 masks. Although there is debate about whether N95 masks provide sufficient protection, widespread implementation of their use among Thai HCWs would be an important improvement in the prevention of infectious diseases that are spread via inhalation. Further systematic disease tracking mechanisms need to be developed for new epidemics as well as re-emerging diseases.

3. Insufficient knowledge about occupational health risk and safety among HCWs

The results from the literature suggest that personal knowledge may be a factor in terms of HCWs not implementing protective behaviors. The focus group discussion concurred that the lack of protective behaviors by healthcare personnel may be related to a knowledge

deficit. However, its members did not include direct line HCWs who may have contributed additional insight. Although the majority of attendees identified the need for improved occupational safety and health training for HCWs, including emergency responders, additional input from direct line HCWs is needed to examine the most effective means of reducing occupational risks.

4. Lack of epidemiologic research on non-direct care workers in the healthcare sector

The knowledge about health and safety risks faced by HCWs has focused on direct care workers who provide therapeutic and/or diagnostics services. None of the studies in Thailand have explored work-related illnesses and injuries among workers in other non-direct care roles including administrators or assistants working in various informational services in the healthcare sector. These areas include personnel working in admissions, billing and collection services, medical records, computer information systems, human resources, support services, central supply, housekeeping, maintenance, dietary, and transportation. There has been no research to examine the risks of these workers in Thailand even though they work in an environment with potential biological, physical, chemical, and psychological health hazards. The findings from this focus group and the review of the literature helped to frame the recommendations in the conclusion section.

What Have We Already Learned From the Global Community?

This paper has focused on the research on health and safety in Thai HCWs as well as data from key stakeholders in Thailand. Thailand is a developing country and as such, cannot be expected to have comparable levels of occupational health and safety resources to those in the high income, more economically developed countries. However, according to the World Bank, Thailand is considered to be an upper middle-income economy in the global community.[66] What can Thailand learn from the global community about mechanisms to protect HCWs' health and safety? How can the knowledge be translated to a culturally acceptable and fiscally reasonable level?

A recent guide to controlling health hazards among hospital workers focused on specific exposure control methods "including design elimination, substitution, engineering controls, and PPE…" ([8, p. 2]). One example is the control of TB. Thailand is considered one of the twenty-two countries considered to have a high TB burden.[30] The recommendation for control of TB includes a multi-focused approach, which consists of administrative measures, environmental controls, and as a "last line of defense"—respirators such as the N95 respirator.[8] Although difficulties in implementation were acknowledged, as an upper middle-income country with a relatively good quality medical care system; Thailand has the infrastructure and the economy to implement many of these recommendations.

The U.S. Centers for Disease Control is also actively working, in collaboration with Thai colleagues, to help develop better methods to detect TB using new diagnostic measures as well as innovative ways to stop the transmission of the disease.[30] The Centers for Disease Control also is actively involved in helping to develop programs to detect emerging infectious diseases, controlling the spread of malaria and HIV, treating non-communicable diseases, and evaluating health problems at the borders of Thailand.

The U.S. Occupational Safety and Health Administration has developed an interactive website with several guidebooks and hospital self-assessment tools related to safety and health management systems.[67] However, these recommendations need to be translated and edited to address the Thai healthcare sector. As a start, we have developed a set of factsheets for Thai HCWs on common hazards, compiled from publicly available documents (Centers for Disease Control, National Institute for Occupational Safety and Health, World Health Organization, Occupational Safety and Health Administration, and others). These are available in English on our website and Thai versions can be requested (www.geohealthseasia.org).

Conclusion

In conclusion, the epidemiologic research in the healthcare sector in Thailand is limited. Studies suggest that ThaiHCWs who have direct contact with patients are at increased risk for infectious diseases as a result of blood-borne or respiratory exposures. In addition, while it is known that other chemical, physical, and psychological risks can lead to illness and injury in the healthcare sector, little research has been conducted in these arenas among Thai HCWs. What is needed is an understanding of the administrative and resource barriers, the high risk work procedures, and available training which can affect the organization and design of work in the health care setting. In addition, a better surveillance system for Thai HCWs' occupational illnesses and injuries would provide data to motivate changes in prevention and compensation systems. Thailand's healthcare workforce needs healthy and safe working conditions. The ability of these workers to provide effective healthcare services depends on the development and implementation of evidence-based best practices in healthcare workplace health and safety.

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Table 1

Risk of Pulmonary Tuberculosis and Selected Blood-Borne Infections Among Thai Healthcare Workers.

Healthcare workers	Blood-borne infection	Air-borne/droplet infection
Hospital personnel	Risk wards: Ob/Gyn, ICU, Hemodialysis, and Laboratory[35]	Risk wards: Male medical ward; Female medical ward; OPD; and ER[28]
Ambulance personnel and Medical first responder	Moderate to high risk for blood-borne infections[40,41] High risk for NSI/sharp injury (42.4 percent in one month working)[36] Moderate to high risk for blood-borne infections[40]	Moderate to high risk for droplet and airborne infections[23]
Hospital laboratory	Moderate to high risk for blood-borne infection, especially HBV infection[23]	High risk for droplet and airborne infections during dental procedures[23]

Ob/Gyn = obstetric/gynecologic units; ICU = intensive care unit; OPD = outpatient department; ER = emergency room; NSI = nosocomial infection; HBV = hepatitis B virus.

Table 2

Ratio of Healthcare Personnel and Thai Residents.

Type of healthcare personnel	Ratio (healthcare personnel: Thai residents)
Physician	1:2535
Dentist	1:11,244
Registered nurse	1:498
Technical nurse	1:7472
Pharmacist	1:6425