Nursing & Health Sciences

Nursing and Health Sciences (2012), **14**, 32–37

Research Article

Nurse preparedness for the non-communicable disease escalation in Thailand: A cross-sectional survey of nurses

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Abstract Chronic diseases are now the largest cause of mortality in Thailand, and form an increasingly large portion of the healthcare landscape. In the Thai health system, many patients with chronic conditions receive care and disease management services from nurses, yet specialized training in chronic diseases is not currently part of standard nursing degree programs. Given the evolving epidemiology of the Thailand population, we questioned whether practicing nurses remain confident in their knowledge and skills in chronic disease management. We conducted a cross-sectional, self-efficacy survey of nurses in eight randomly-selected provinces in Thailand, receiving 468 responses. Nurse self-efficacy was analyzed in prominent chronic disease types, including cancer, hypertension, diabetes, heart disease, cerebrovascular diseases, and pulmonary diseases. Factors, such as geographic location, education level, continuing education experience, and hospital size, were found to significantly affect nurse self-efficacy levels; nurses highly prioritized additional training in heart diseases and cerebrovascular diseases, followed by hypertension, cancer, and diabetes.

Key words chronic disease, health workforce development, nursing education, Thailand.

INTRODUCTION

In recent decades, chronic, non-communicable diseases have emerged as a leading cause of death in Asia, and across the South–East Asian region, in particular (World Health Organization, 2005; Asia Pacific Cohort Studies Collaboration, 2007). In Thailand, many previously urgent health problems and communicable diseases have now been successfully brought under control, as a result of sustained investment in the health system and health programs (Bureau of Policy and Strategy, 2008). From 1964 to 2006, life expectancy at birth increased from 55.9 years to 69.9 years for males, and 62 years to 77.6 years for females (Rukumnuaykit, 2006), the infant mortality rate (per 1000 live births) declined from 84.3 to 11.3, and the maternal mortality rate (per 100 000 live births) declined from 317.6 to 9.8 (Bureau of Policy and Strategy, 2008). Yet over the same period, there is strong evidence that the burden of chronic diseases is continuing to grow rapidly (Sritara *et al*., 2003; Bureau of Policy and Strategy, 2008; Bureau of Epidemiology, 2007; World Health Organization, 2009; Porapakkham *et al*., 2010; Kaufman *et al*., 2011), and a comparison of mortality statistics from 1977 to 2008, as reported by the Thai Ministry of Public Health, shows the reported rate of cancer rising from 19.4 to 87.6 per 100 000 population, and diseases of the heart and circulatory system rising from 15.2 to 56 per 100 000 population (Bureau of Policy and Strategy, 2011). The World Health Organization estimates that in the South–East Asia region, a 2% annual reduction in deaths due to chronic disease could save over eight million lives over the next 10 years (World Health Organization, 2005).

In recent years, Thailand has benefited from sustained commitment to financing and building a robust public health system, with total health expenditures in 2001 amounting to 3.2% of total GDP, and it is estimated that total national health expenditures will increase to 3.88% of GDP by 2020 (Patcharanarumol *et al*., 2006). This compares with health expenditures as a proportion of GDP of 8.8% in Australia, 3.7% in Singapore, 3.8% in Malaysia, and 3.4% in the Philippines in 2005 (Australian Institute of Health and Welfare, 2005). The Thai health authorities are responding to the burden of chronic disease through emphasizing prevention, behavior change, and control of risk factors, with larger secondary and tertiary hospitals performing highly-sophisticated clinical procedures and treatments (Bureau of Non-Communicable Diseases, 2008).

A cornerstone of Thailand's health system development has been an innovative strategy involving task shifting and a

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Received 8 May 2011; accepted 18 October 2011.

doi: 10.1111/j.1442-2018.2011.00657.x

more sophisticated role for professional nurses than had previously existed, with enhanced education, assessment, and clinical skills enabling nurses to deliver primary care and treatment at the community level (Potempa *et al*., 2009). Professional nurses now constitute the largest group of public healthcare personnel in Thailand, with a ratio of nurse/population of one/619 in 2006, with 70.4% of nurses in Thailand employed by the Ministry of Public Health public hospital system (Bureau of Policy and Strategy, 2008). This is substantially greater than most recently-available World Bank data showing a regional average for developing countries in East Asia and the Pacific of one/1022 nurses per population in 2001 (World Bank Group, 2011). The Thai Ministry of Public Health is directly involved in training and producing nurses and other components of the health workforce through its Praboromarajchanok Institute for Health Workforce Development (PIHWD), a public college system administered by the Ministry of Public Health, comprising 39 nursing and public health colleges across Thailand. An estimated 80% of professional nurses working in Thailand are graduates of PIHWD nursing colleges. In many parts of Thailand, particularly in rural areas and in smaller health service delivery points, nurses are often the most important provider of health care and health information, and are encouraged to develop and maintain strong ties with the communities in which they work.

Study aims and rationale

Given the growing burden of chronic disease in Thailand, this study investigated the preparedness of the Thai nursing workforce for providing chronic care, and aimed to understand factors that affect nurse preparedness. The typical nursing curriculum in Thailand includes information and skill building in general chronic disease epidemiology, risk identification, and treatment management; however, specialized training in chronic diseases is not currently part of the regular 4-year Bachelor of Nursing curriculum. Recent results from the national exam nurses must take upon graduation suggest nurses are less well prepared for chronic diseases then for other types of care, although nationally-aggregated results are not reported on different chronic disease types, and do not capture nurses' views about their own preparation and training (Praboromarajchanok Institute for Health Workforce Development, 2007). Because healthcare emphasis has shifted in practice over the past decade to chronic diseases, we questioned whether practicing nurses remain confident in their knowledge and skills in chronic disease management.

METHODS

This is a cross-sectional survey of nurses in Thailand to determine nurse preparedness for caring for chronic non-communicable diseases.

Population and sample

The population of interest was all practicing nurses in Thailand. The sample was derived by first randomly selecting eight provinces in Thailand out of 75 total provinces at the time of the study, excluding the Bangkok metropolitan area, with the inclusion criterion of having a secondary level (provincial) hospital. All provinces in Thailand meet this criterion. Bangkok was excluded because of its unique characteristics as the largest urban center, and because its hospital system is administered separately from the rest of the country. Randomization was achieved using a using a random number generator (accessed at http://www.random.org).

A convenience sample of nurses was obtained within each province by soliciting nurses meeting the inclusion criteria to participate in the study. The inclusion criteria for nurses were: presently working in outpatient, inpatient, family medicine, or special clinic departments ("special clinic" is a translation from Thai, and includes the emergency room and other specialized units where chronic disease patients are seen). Nurses in these units see chronic diseases patients as part of their regular work, whereas nurses in other departments, such as midwifery or pediatric units, do not generally encounter chronic disease patients. There are approximately 70 000 professional nurses working in Thailand, so to have a 95% confidence interval around an estimate of a percentage of +/–5% requires a sample size of 382 respondents. This sample size also provides over 95% power to detect medium-sized differences in means between ratings of different diseases, and over 90% power to detect differences among subgroups of respondents (e.g. with different levels of education). Our survey had 468 respondents out of 800 questionnaires sent out, giving a response rate of 58.5%, and even more precision than that described above.

Survey instrument

The study used a survey with 21 self-report items. Six items were forced-choice questions related to type of work setting, years of work experience, type of education preparation, and amount of continuing education in the prior 3 years. Fifteen items related to confidence level in caring for patients with non-communicable diseases in general, and those with specific diseases (cancer, pulmonary disease, hypertension, cerebrovascular disease, heart related diseases, and diabetes) and perceived need for continuing education in these disease categories. We selected a modified Bandura Self-Efficacy Scale design (Bandura, 1977) for the 15 items related to nurse confidence, to allow nurses to describe their level of confidence in their knowledge and skills for the chronic disease types. This design was selected for its strengths in measuring efficacy expectations, and self-processes in relation to learning and performance of complex knowledge-application processes. Each self-efficacy scale used five-point, Likert-type response choices ranging from "very uncertain" to "very confident" in caring for patients.

The survey was reviewed for face validity by a panel of nurses from the Praboromarajchanok Institute of Thailand, and pilot tested with a convenience sample of nurses ($n = 40$) attending a week-long workshop at the Ministry of Public Health. Pilot testing involved an initial application of the survey at the beginning of the workshop, and a retest 1 week

later. Mean scores for each item were compared using SPSS 17.0 software (SPSS, Chicago, IL, USA), and the responses of each individual were compared between the first and second tests. No significant differences were discovered, and it was concluded that the survey tool had test–retest reliability.

Data collection

The survey questionnaire, information letter, and consent forms were designed in English and then translated into Thai. The surveys were coded so that the patients were anonymous, and numbered to assure unique, non-duplicated responses. Results were kept strictly confidential. The researchers had no direct interaction with the study participants. Packets including information letters, consent forms, and survey questionnaires were sent by mail to PIHWD staff designated as research assistants in each province, who distributed them to hospitals and placed them where nurses could choose to pick them up. Nurses were requested to anonymously return completed surveys to the research assistants in the province, who returned the package of completed surveys to the researchers at PIHWD. The survey took place from March to May 2010.

Data analysis

The survey results were analyzed using SPSS version 17.0 software. Characteristics of the sample were determined using descriptive statistics. Data on survey items were first tabulated, and means were calculated for each item. One-way repeated-measures ANOVA procedures were used to test how the level of confidence and priority of training differs across the six diagnoses. One-way ANOVA procedures were then used to evaluate which factors measured in the survey (e.g. province, type of hospital, type of unit where nurses work, interval from completing education, type of nursing education, experience of training activities) affect nurse confidence in providing treatment for chronic non-communicable diseases in general, nurse confidence in knowledge and skill about six diseases, and nurse priority for receiving training about the six diseases.

Ethical considerations

The study was approved by the University of Michigan Institutional Review board for Human Subjects Research, and was given ethical review and approval by senior administrators at the Ministry of Public Health of Thailand. Participants' confidentiality and anonymity were strictly protected in the methodology through the use of an anonymous survey distribution and return system.

RESULTS

Sample characteristics

Of the 468 respondents, the most common type of unit where respondents worked was the inpatient unit ($n = 226$, 48.3%), followed by the outpatient unit ($n = 111$, 23.7%), family medicine ($n = 88$, 18.8%), and special clinic ($n = 31$, 6.6%). The majority of nurses had a 4-year bachelor degree in nursing ($n = 256$, 54.7%). The next most common education type was a 2-year diploma in technical nursing ($n = 151$; 32.3%), followed by a master degree or above ($n = 32$, 6.8%), and a 2-year diploma in community health/public health/midwifery nursing ($n = 27$; 5.8%). Thirty-six respondents (7.7%) had completed their education less than 2 years ago, 50 (10.7%) between 2 and 5 years ago, 79 (16.9%) between 6 and 10 years ago, 174 (37.2%) between 11 and 20 years ago, and 127 (27.1%) more than 20 years ago. The majority of nurses had undertaken zero to two training activities in the past 3 years ($n = 292$, 62%), with 125 (26.7%) having undertaken three to four training activities in the past 3 years, and 39 (8.3%) having undertaken five or more training activities in this time. Of the respondents, 54 nurses worked at rural health centers (11.5%), 184 worked in community hospitals (39.3%), 156 worked in provincial hospitals (33.3%), and 65 worked in central tertiary care hospitals (13.9%). The sample geographic characteristics were: two northern provinces, one north–eastern province, two central provinces, and three southern provinces.

Survey results

Overall, 34–42% of nurses felt themselves to be confident or very confident in their general skills and ability to provide information and counseling about chronic diseases. Nurses felt least well prepared in cancer, with only 19.2% of nurses reporting either confident or very confident, and most well prepared with hypertension and diabetes, with 50.6% and 48.7% considering themselves to be either confident or very confident. The results are summarized in Table 1.

We then used one-way repeated-measures ANOVA to test for differences in levels of confidence among the six diagnoses. In this analysis, $F(5, 458) = 66.635$, indicating that there is a highly significant difference ($P < 0.001$) in nurses' confidence levels between the six diseases, with nurses most confident in hypertension and diabetes, and least confident in cancer.

We then used one-way ANOVA procedures to investigate which factors in the survey affect nurse confidence levels, in order to understand whether variation in confidence levels

Table 1. Nurses expressing confident and very confident

	Nurses who are confident and very confident (%)	95% confidence interval	
		Lower	Upper
General knowledge	34.2	29.9	38.5
General skills	37.7	33.3	42.1
Counseling abilities	41.7	37.2	46.2
Hypertension	50.6	46.09	55.19
Diabetes	48.7	44.16	53.27
Pulmonary disease	33.5	29.25	37.84
Cerebrovascular diseases	28.4	24.32	32.52
Heart disease	25.3	21.41	29.35
Cancer	19.2	15.65	22.81

Table 2. Factors effecting nurse confidence

Factor	*P*-values
Province	Highly-significant effect ($P < 0.01$) for all 9 measures of confidence
Training experience in the past 3 years	Highly-significant effect ($P < 0.001$) for all 9 measures of confidence
Type of nursing education	Significant effect ($P < 0.05$) for general knowledge, general skills, counseling abilities, pulmonary diseases, hypertension, cerebrovascular diseases, and diabetes No significant effect ($P > 0.05$) for cancer and heart disease
Type of hospital where nurses work	Highly-significant effect ($P < 0.01$) for counseling abilities and cancer Significant effect ($P < 0.05$) for diabetes, hypertension, and general knowledge No significant effect ($P > 0.05$) for pulmonary disease, cerebrovascular disease, heart disease, and general skills
Type of unit where nurses work	Significant effect ($P < 0.05$) for hypertension, diabetes, general knowledge, and counseling abilities No significant effect ($P > 0.05$) for all others

exists between nurses with different characteristics. Factors that were found to have a significant impact on the Bandura scales are presented in Table 2. These results indicate that several factors significantly affect nurse confidence in chronic disease skills and management. The most important factors are province and experience of training activities within the past 3 years, with these two factors affecting all measures of nurse confidence and self-efficacy. The highly-significant effects of province on nurse confidence levels, ranging from $F(7, 457) = 2.708$ ($P = 0.009$) for heart disease, to $F(7, 460) = 8.741$ ($P < 0.001$) for cancer, indicates that confidence differs notably across provinces. Greater experience of training corresponds with higher confidences in various aspects of chronic disease care.

We then analyzed the effect of training activity experience within the past 3 years on nurses' confidence. The effect of exposure to training activities is highly significant on all the measures of confidence, with all tests at least $F(2, 450) = 9.129$ ($P < 0.001$), with higher exposure to training resulting in higher confidences levels.

We also looked at the effect of type of nursing education on confidence by disease type. The type of nursing education is significant on most measures, with significant tests ranging from $F(3, 462) = 2.817$ ($P < 0.05$), to $F(3, 462) = 6.34$ ($P < 0.001$). Nurses with master degrees and higher were more confident in their abilities, followed by nurses with 4-year bachelor degrees; those with 2-year diplomas in either technical nursing or in community health/midwifery/public health nursing were the least confident.

We particularly questioned whether the type of hospital where nurses work would have a significant effect on their confidence in chronic diseases. There are four categories of hospitals in Thailand. The smallest are rural health centers at the subdistrict (*tambon*) level, which are often staffed by just one or two nurses. All nurses expressed higher confidence in hypertension and diabetes and lower confidence in cancer, cerebrovascular disease, and heart disease ($P < 0.001$). Nurse confidence levels for pulmonary diseases, cerebrovascular diseases, and heart diseases, which are low, did not vary significantly across the four different hospital types. Yet nurse confidence in responding to cancer, diabetes, and hypertension did vary significantly among the different hospital types, with *F*-tests at least $(3, 453) = 2.731$ ($P < 0.05$). Nurses in large central hospitals tended to be more confident than nurses in provincial hospitals, who were more confident than nurses in primary care community hospitals. Nurses in rural health centers, the smallest care delivery point, rated the highest confidence in hypertension, cerebrovascular diseases, heart diseases, and diabetes, yet were the least confident in pulmonary diseases, and the second least confident in cancer.

Table 3. Mean nurse training priority level scores

Disease Type	Mean	Standard deviation
Heart diseases	4.29	0.843
Cerebrovascular diseases	4.15	0.887
Pulmonary diseases	4.00	0.902
Diabetes	3.92	1.043
Cancer	3.91	0.985
Hypertension	3.91	1.001

We used a similar design to examine nurses' training priorities in the six disease types. The mean scores for priority level for each disease type are shown in Table 3:

Mean overall scores range from 3.91 for cancer, to 4.29 for heart diseases. We then used one-way repeated-measures ANOVA to test whether disease type was significantly related to training priority. From this analysis, $F(5, 399) = 17.351$ ($P < 0.001$), indicating that there is a highly-significant variability in training priorities by disease type, with heart disease and cerebrovascular diseases the highest priorities, and cancer, diabetes, and hypertension the lower priorities.

We then used one-way ANOVA to investigate which factors in the survey affect nurse training priorities, in order to understand whether variation in training priorities exists between nurses with different characteristics. The factors that had an effect are shown in Table 4.

Province was the only factor with an effect on all disease types, which is expected based on known geographic disparities in the strength of the health system, with other factors having an isolated effect on one or two specific diseases.

Nurses working in rural health centers expressed the highest priority levels for training in cerebrovascular disease

Table 4. Factors effecting nurse training priorities

Factor	*P*-values
Province	Highly-significant effect ($P < 0.05$–0.001) for all 6 disease types
Hospital type	Highly-significant effect ($P < 0.01$) for cerebrovascular disease Significant effect ($P < 0.05$) for hypertension No significant effect for all other disease types
Years since completing education	Significant effect for pulmonary disease ($P < 0.05$) No significant effect for all other disease types
Type of education	Significant effect ($P < 0.05$) for pulmonary disease Significant effect ($P < 0.05$) for heart disease No significant effect for all other disease types

and hypertension, the only diseases types with a statistically-significant variance, with *F*-test at least $(3, 411) = 2.673$ ($P < 0.05$). For these two disease types, nurses in community hospitals expressed the second highest priority levels, followed by provincial hospital, then large central hospitals.

DISCUSSION

Rates of confidence are low, particularly for cancer and heart disease. For more common diseases, such as hypertension and diabetes, it is concerning that just half or slightly less than half of the nurses surveyed feel confident or very confident with these diseases, and this indicates a need for increased training in these areas. Yet for each disease type, a much larger proportion of nurses rated their level of confidence as "moderate".

The significant effect of province on nursing confidence levels is expected, and corresponds with Ministry of Public Health statements regarding the ongoing challenge of reducing regional disparities in the distribution of health are goods and services, and geographic imbalances in the quality, quantity, and accessibility of health care in different parts of Thailand (Bureau of Policy and Strategy, 2008). The variance we found in nurse confidence levels by province highlights one facet of this imbalance, and indicates that continued efforts are needed to reduce this.

Our results suggest that increasing the number and availability of training activities for nurses is an effective strategy for improving chronic disease treatment and patient care capacities and competencies. Moreover, our results provide evidence that general training activities enhance nurse confidence across all types of diseases evenly, indicating that wide-ranging benefits might be yielded from generalized training activities.

As a step to reducing geographic and regional disparities in nursing skills and competencies in chronic diseases, the Ministry of Public Health should continue its current policy orientation toward improving continuing education and training activities for nurses, as well as focusing on ensuring consistent and even delivery of nursing curricula at nursing colleges throughout all regions in Thailand. The level and quality of chronic disease content in the nursing curricula should be reviewed and strengthened. Continuing education activities for nurses in provinces known to have weaker health systems; for example, having limited resources or low ratios of health-care personnel to population, should be expanded. Similar approaches might be useful in other countries facing similar challenges.

Interestingly, based on our findings, nurses working at rural health centers, which are the smallest health delivery points staffed by just a few nurse practitioners, were the most confident of all nurses in hypertension, cerebrovascular diseases, heart diseases, and diabetes, yet where the least confident in pulmonary diseases, and the second least confident in cancer. Larger towns and districts in Thailand have primary care hospitals, which usually have < 30 beds, and are staffed by one to five general practitioners, and a staff of nurses and pharmacists. Provincial hospitals are considered secondary-level hospitals, generally having between 30 and 90 beds, and are often the main hospital in each province. In larger provinces, there may be several secondary-level hospitals. Central hospitals are tertiary-level hospitals with several hundred beds, which provide the highest level of care, and the most complex procedures at a region level covering several provinces. This is perhaps due to the higher level of responsibility that nurses in rural health centers have for their patients, where they are often the only health professional on site. These nurses are more likely to be the sole person responsible for the care and management of patients with certain chronic conditions in their communities, whereas nurses at larger hospitals have more referral pathways available and more specialized medical staff available. In addition, for complex diseases, such as cancer and pulmonary disorders, nurses at rural health centers will refer patients up to higher-tiered hospitals, whereas they might be more likely to have patients with other chronic conditions, such as diabetes and hypertension, transferred back into their long-term care at the community level. While these data are not conclusive and face limitations in not offering evidence about the quality or scope of the care available at rural health centers, they nonetheless suggest that rural health centers continue to be effective and important delivery points for chronic care and management, particularly for rural populations in Thailand.

Our results also support the findings of a recent study by Sindhu *et al.* (2010) of a nurse-led community care intervention in southern Thailand to promote the coordination and continuity of care for patients with various chronic illness, where participants experiencing significantly improved scores on disease severity measurements. Importantly, this model showed the effectiveness of a generic approach to chronic disease management rather than a disease-specific specialist approach, and demonstrated that nurse-coordinated *trans*-disciplinary care that is culturally and locally appropriate has the potential to deliver improvements across a range of chronic conditions in Thailand.

Limitations of the study

The scope and design of this study has some limitations. The quantitatively assessed the self-efficacy and preparedness of the Thai nursing population with chronic non communicable diseases; however, it did not evaluate specific knowledge or task performance. Despite our best efforts to construct a randomized methodology, some limitations exist, based on the fact that nurses were not randomly selected from the total population of nurses within each randomly-selected province; rather, nurses from each randomly-selected province were asked to self-select to participate in the survey. This is a weakness of the study design, and might affect generalizations of the findings.

Conclusion

This study seeks to evaluate a dimension of Thailand's preparedness for the escalation of chronic non-communicable diseases, which have become the leading cause of death and most significant health burden on the Thai population. As an emerging middle-income country, Thailand has invested heavily in its public health system in recent decades, and has successfully resolved many of its previous health threats, such as communicable diseases, malnutrition, and child and maternal mortality. The current challenge for Thailand and for other emerging middle-income countries globally, is to find ways of building on and adapting their existing health system and infrastructure advances to meet evolving health concerns that accompany longer life spans and changing lifestyles, particularly the escalation in chronic diseases taking place globally. A more robust role for professional nurses in providing chronic disease patient management is one important facet of an overall strategy that should also include population level prevention and behavior-change interventions, longer-term patient management capabilities at the community or local level, and advanced clinical procedures and treatments. Our study suggests that nurses in Thailand are currently more comfortable with diabetes and hypertension, yet remain less confident in their skills and knowledge with more complex diseases, such as cancer, heart disease, cardiovascular disease, and pulmonary disease. Offering training and continuing education activities for practicing nurses is shown to be an effective means of boosting chronic disease preparedness, as measured by self-efficacy assessments, and improves nurse confidence in both cross-cutting aspects of chronic disease care, as well as for specific disease types.

CONTRIBUTIONS

Study Design: NK, BR, ST, KP
Data Collection and Analysis: NK, BR, ST, DR, KP
Manuscript Writing: NK, BR, ST, DR, KP

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