

Original article

Surgical symptomatic knowledge among medical staff and community health workers in rural Cambodia: a descriptive study for workforce improvement

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Abstract

Objective: The surgical workforce needs to at least double by 2030. To increase the workforce, training for non-physician health-care professionals and community health workers (CHWs) in rural areas is promising to decrease the numbers of untreated surgical patients. Nevertheless, few studies have been conducted on surgical activities of non-physician healthcare professionals and CHWs in rural Cambodia. We sought to measure the level of knowledge of surgical symptoms, and identify factors associated with it. A questionnaire survey was administered to people in rural areas of Kratie Province to determine their knowledge of surgical symptoms, and to strengthen the surgical workforce among medical staff and CHWs.

Patient/Materials and Methods: To evaluate the knowledge of surgical symptoms among medical staff and CHWs, a self-reported questionnaire was administered to medical staff, CHWs, and villagers in a rural area of Kratie province, Cambodia. The rating score of the number of correct answers among medical staff, CHWs, and villagers was set as the primary outcome.

Results: A total of 91 participants, including 31 medical staff, 24 CHWs, and 36 villagers, completed the survey. The median scores for knowledge of symptoms indicative of surgery were 8 (7–8) [median (interquartile range)] in medical staff, 8 (7–8.5) in CHWs, and 8.5 (8–9) in villagers. There was no significant difference in the scores of surgical symptoms among each of the occupational groups. The group of people who recognized low subjective knowledge of surgical symptom by themselves had significantly higher objective score of knowledge of surgical symptom.

Conclusion: Knowledge of surgical symptoms among medical staff and CHWs was inadequate. To at least double the surgical workforce by 2030 successfully, accurate evaluation and improvement of surgical symptomatic knowledge among medical staff in rural areas is crucial.

Key words: urgency, global health, workforce, knowledge, community health workers

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Introduction

Surgery is one of the essential components of the health care system in all countries regardless of their economic status¹⁾. However, approximately two billion people worldwide are unable to undergo the most basic surgical treatments^{1, 2)}. In particular, non-communicable diseases (NCDs) and injuries which require surgical treatment, are increasing rapidly globally regardless of the country economic statuses¹⁾. To fulfill the increasingly urgent unmet needs related to surgical treatment, each component of health care systems- infra-

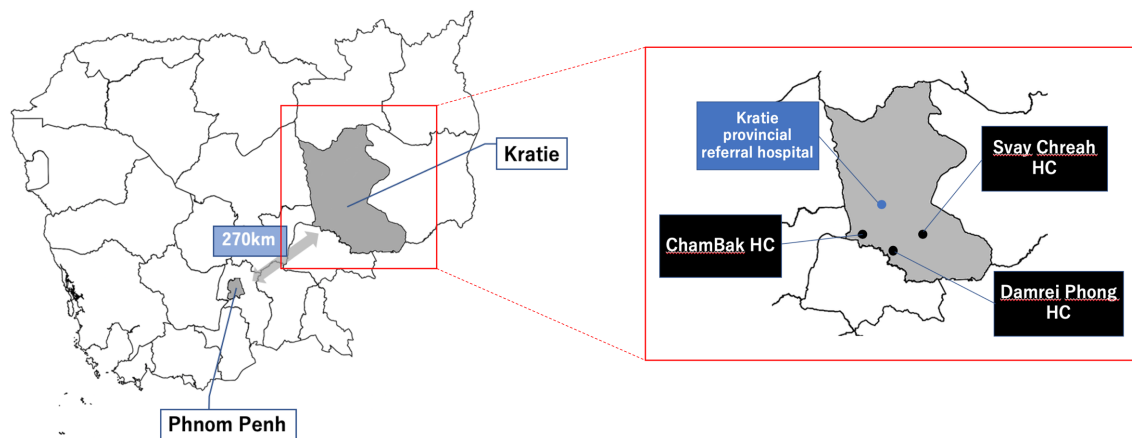


Figure 1 Area containing a provincial hospital and three health centers in Kratie province.

structure, workforce, service delivery, financing, and information management, must be strengthened effectively¹⁾. In particular, the workforce is a vital component because it is essential to all other elements in the health system³⁾. However, the workforce shortage has been found to be severe. To meet the urgent need of workforce, the surgical workforce needs to be at least doubled by 2030³⁾. People who are unable to access surgical care mainly live in rural areas²⁾. It is reported that the surgical health care system must be strengthened in the rural areas to effectively save people's lives¹⁻³⁾. Therefore, fostering a competent surgical workforce which includes; availability, accessibility, acceptability, and quality, in rural areas to strengthen health care systems is a significant public health issue³⁾.

Various efforts have been undertaken to keep up with the demand for a surgical workforce in rural areas. In particular, the use of community health workers (CHWs) has proved to be a promising strategy for addressing this issue, especially in low-income countries where there is strong evidence that CHWs can undertake activities that lead to improved health outcomes⁴⁾. Training medical staff and CHWs in rural areas to serve as a surgical workforce is also promising²⁾. It is reported that providing essential surgery at district hospitals in rural areas could reduce the number of untreated patients by half²⁾. However, there are fewer surgeons in rural areas compared to urban areas^{5, 6)}. Additionally, training surgeons requires considerable time and effort compared to training non-physician medical staff or CHWs^{7, 8)}. Thus, the role of non-physician medical staff and CHWs in rural areas is potentially significant. Previous research has shown that an increase in support for training, management, supervision, and logistics is necessary to reduce untreated surgical patients⁴⁾. As a first step in establishing a concrete strategy, evaluating the knowledge and skills of the current medical staff and CHWs in surgical procedures is necessary. Despite this, little research has been conducted in this area.

Kratie province, located 270 kilometers far from the capital city, Phnom Penh, is a mainly rural area⁹⁾. The Mekong River crosses the province and it occasionally overflows its banks during the monsoon into inhabited areas. Access to medical institutions is difficult in many areas. There are approximately 30 health centers (HC) in Kratie province, each with jurisdiction over approximately five to 40 villages⁹⁾ (Figure 1). Health center staff (HCSs), equal to non-physician medical staff, are mainly comprised of nurses and midwives¹⁰⁾. The Village Health Support Group (VHSG) similar to the CHWs, work to connect the community with HCs in each village. The VHSGs do not have formal medical training. A specific number of medical staff and CHWs are assigned to each district. Despite this, the population's unmet surgical needs continue in these areas. The number of surgeons is limited, therefore, medical staff and CHWs are vital to maintaining the quality of services in rural areas. However, few studies, such as the study by Kim O *et al.*¹¹⁾, have examined the activities of CHWs in Cambodia related to surgery. Kratie Province is a representative rural area in Cambodia, because, the province has complex landform for running Mekong River. Therefore, Kratie Province would be an advantageous area to survey the unmet needs of the medical staff and CHW workforce related to surgery in rural areas, which would provide important information to improve medical staff and CHW workforce with regard to carrying out surgery in rural areas.

Thus, to strengthen the surgical workforce among non-physician healthcare professionals and CHWs, we carried out a questionnaire survey in rural areas of Kratie Province on knowledge of surgical symptoms. "Knowledge" is one of the components of the quality of a workforce³⁾. We selected "knowledge" because it has been shown that an increased investment in the training of healthcare professionals improves health care, and it is necessary to assess the knowledge of the target population¹²⁾.

Materials and Methods

We conducted a descriptive study based on a questionnaire survey of HCSs (equal to non-physician medical staff), VHSGs (equal to CHWs), and villagers at three health centers to ascertain their knowledge of surgical symptoms. The survey was conducted in Kratie Province, which has a 29/km² population density. We selected the three health centers with convenient sampling, ChamBak HC, Damrei Phong HC, and Svay Chreah HC from all of the 30 HCs in Kratie Province. In selecting the HC, we considered the distance from the Kratie Provincial Referral Hospital, the need to cross the river to go to Kratie Provincial Referral Hospital, and the number of outpatients per year. A questionnaire was structured to investigate the knowledge of surgical symptoms. To evaluate the knowledge of the medical staff and CHWs, the score of the number of correct answers among the medical staff, CHWs, and villagers was set as the primary outcome.

Site details

The public healthcare system in Kratie Province consists of a provincial referral hospital, two referral hospitals, and approximately 30 HCs. Kratie Provincial Referral Hospital has 150 beds and 17 medical departments and employs approximately 100 staff. Five surgeons perform approximately 2,000 surgical procedures annually at Kratie Provincial Referral Hospital. This number was approximately 1,500 two years ago, showing that the demand has sharply increased. Most of the surgical operations are for severe, emergency cases. Therefore, surgeons have less time to go out from their one hospital, making it difficult for surgeons to see patients in rural areas frequently. The referral hospitals and several health centers have beds for inpatients. Approximately 10 to 15 staff are employed at each health center, which has jurisdiction over 5 to 40 villages, with 2 community health workers (CHWs) being assigned to each village. The medical staff and CHWs provide primary care in the rural areas.

Survey tools

A questionnaire developed for this study was used to determine the knowledge of surgical symptoms among three occupational groups. From the literature reviewed, approximately 10 of True/False questions had been used to investigate knowledge of surgical symptoms among different occupations^{13–15}. The questionnaires were based on guidelines or textbooks from past studies^{13–15}. We structured the questionnaire on knowledge related to surgery based on this format. The items in the questionnaire consisted of five internal medical symptoms and five surgical symptoms. The five surgical symptoms were chosen from 44 types of essential surgery in Disease Control Priorities 3rd Edition. The 44 essential surgery are the surgery which should be conducted

Table 1 True/False format questions to investigate the knowledge of symptoms indicative of surgery

Do the following symptoms indicate a need for surgery?		
1	Terrible coughing	FALSE
2	Continuing high fever	FALSE
3	Blood contained in stool	TRUE
4	Problems from burn scars	TRUE
5	Terrible diarrhea	FALSE
6	Severe injury due to road accident	TRUE
7	Red rash on body	FALSE
8	Ankle strain	FALSE
9	Cleft lip patient (Picture)	TRUE
10	Clubfoot patient (Picture)	TRUE

first of all in challenging situations². Table 1 shows the 10 of True/False questions. Each item asked whether the symptoms needed surgical care. Subsequently, the number of correct answers was calculated. The total possible score was 10 points. The participant characteristics included age, gender, the number of children in the respondents' family, subjective knowledge of surgery, and the number of pediatric surgical patients they had seen (Table 2). Among the medical staff, those with "much experience" treated more than one pediatric surgical patient per month; those with "less experience" treated less than one patient per year. Among the CHWs and villagers, those with "much experience" had seen more than five pediatric surgical patients at the time of the survey, while those with "less experience" had seen less than two pediatric surgical patients at the time of the survey.

Survey circumstances

The directors of the health centers gathered the medical staff, CHWs and the villagers as participants; and compared the results of the villagers with those of the medical staff and CHWs. The method of choosing the participants was determined by the directors of the health centers, who mainly contacted CHWs and villagers by telephone to ask whether they would be willing to participate in the survey. All the participants voluntarily completed the questionnaire. The questionnaire was administered to three groups, one of which consisted only of medical staff while the other included only CHWs and villagers. The groups were divided by job category to facilitate the survey and save time. The questionnaire was conducted in approximately 30 minutes. Local survey staff helped illiterate participants to answer the questionnaire. The questionnaires were filled anonymously.

Data analysis

To evaluate knowledge of surgical symptoms among medical staff and CHWs, the number of correct answers was set as the primary outcome. First, we performed a descriptive analysis of sociodemographic factors and scores

Table 2 Participant characteristics (N=91)

	Number (%)
Sex	
Male	28 (30.8)
Female	62 (68.1)
Did not specify	1 (1.1)
Age	
< 30	19 (20.9)
30–49	52 (57.1)
> 50	19 (20.9)
Did not specify	1 (1.1)
Occupation	
Health center staff	31 (34.1)
Village health support volunteer	24 (26.4)
Villager	36 (39.6)
Health center	
ChamBak Health Center	41 (45.1)
Damrei Phong Health Center	25 (27.5)
Svay Chreah Health Center	25 (27.5)
Experience	
Much	5 (5.5)
Normal	27 (29.7)
Less	59 (64.8)
Number of children	
None	7 (7.7)
1–3	58 (63.7)
Over 3	15 (16.5)
Did not specify	11 (12.1)
Subject knowledge	
Know very well	18 (19.8)
Know roughly	26 (28.6)
Do not know much	35 (38.5)
Do not know	12 (13.2)
Score of knowledge	
Median (interquartile range)	
All (N=91)	8 (7–9)
Health center staff (N=31)	8 (7–8)
Village health support volunteer (N=24)	8 (7–8.5)
Villager (N=36)	8.5 (8–9)

on knowledge of surgical symptoms. Second, to clarify the characteristics of low-scoring participants, demonstrating less knowledge of surgical symptoms, we constructed a logistic regression analysis for scores of knowledge of surgical symptoms. Most participants recorded a score of 8, so we set 7 as the cut-off score for our logistic regression model to identify characteristics of the less knowledgeable group. As covariates, we considered all factors with the backward stepwise variable selection method (inclusion criteria $P < 0.1$). Age, sex, occupation, and subjective knowledge were selected as variables for the final model for multivariate analysis, which was conducted using Excel and Stata 15 IC. The P -value of significance was set at 0.05.

Ethical considerations

We explained the purpose of the research to the participants on paper and orally, and indicated that the findings would only be used for this research. Participation in the survey was voluntary, and all the data were collected anonymously and digitized. Answering the questionnaire was regarded as indicating agreement. This study was approved by the Ethics Committee of the Ministry of Health Cambodia and Teikyo University. The approval number is 230NECHR (the Ministry of Health Cambodia) and 18-21 (Teikyo University).

Results

A total of 91 participants, including 31 Health center staff (non-physician healthcare professionals), 24 Village Health Support Volunteer (CHWs), and 36 villagers, completed the survey; there were 62 women (68%) in the sample. The participants with high subjective knowledge (the participants who answered that they know surgery very well and they know surgery roughly) made up 68% of the medical staff, 42% of the CHWs, and 36% of the villagers.

The median score for knowledge of surgical symptoms was 8 (7–8) [median (interquartile range)] among the medical staff, 8 (7–8.5) among CHWs, and 8.5 (8–9) among the villagers. Tukey's test for knowledge of surgical symptoms among each of the three occupations showed no significant difference between medical staff and CHWs, medical staff and villagers, CHWs and villagers ($P = 0.974$, $P = 0.057$, $P = 0.134$). The score did not differ significantly across different occupations, indicating that the medical staff and CHWs did not have sufficient knowledge of surgical symptoms even in comparison with villagers.

Table 3 shows the findings of multivariate logistic regression analysis for the groups with a low score for knowledge of surgical symptoms. First, we conducted a univariate analysis. Age, gender, and the location of the health center did not affect the score for knowledge of surgical symptoms. The group with low subjective knowledge who responded with “do not know surgery very well” or “do not know surgery at all” had a significant correlation with the high score group. (Unadjusted OR (95% CI): 0.22 (0.08–0.55), P -value=0.001). Second, subjective knowledge and occupation were added as variables with $P < 0.1$ on univariate analysis to multivariate logistic analysis as co-variables. Additionally, age and sex were added as essential variables to the multivariate logistic analysis as co-variables. The number of children also showed a significance level of $P < 0.1$ on univariate analysis; however, since the sample size was small, we did not add the variables to the model. Multivariate analysis revealed that the group who stated that they had low subjective knowledge of surgical symptoms, who responded with “do not know surgery very well” or “do not

Table 3 Determinants of factors associated with Score of knowledge of surgical symptoms

	Univariate analysis		Multivariate analysis (N=89)	
	Unadjusted OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Sex				
Male	Ref.		Ref.	
Female	0.92 (0.36–2.35)	0.87	1.00 (0.33–3.03)	0.99
Age				
< 30	Ref.		Ref.	
30–49	0.49 (0.17–1.45)	0.2	0.41 (0.12–1.38)	0.15
> 50	0.65 (0.18–2.37)	0.51	0.51 (0.10–2.51)	0.41
Occupation				
Health center staff	Ref.		Ref.	
Village health support volunteer	0.87 (0.30–2.55)	0.8	1.39 (0.38–5.11)	0.62
Villager	0.35 (0.12–1.00)	0.05*	0.47 (0.14–1.57)	0.22
Health center				
ChamBak Health Center	Ref.		Ref.	
Damrei Phong Health Center	1.69 (0.61–4.73)	0.32		
Svay Chreah Health Center	1.01 (0.35–2.95)	0.98		
Experience				
Much	Ref.		Ref.	
Normal	0.63 (0.09–4.53)	0.65		
Less	0.89 (0.14–5.76)	0.9		
Number of children				
None	Ref.		Ref.	
1–3	0.34 (0.07–1.67)	0.18		
Over 3	0.19 (0.03–1.33)	0.09*		
Subject knowledge				
Know	Ref.		Ref.	
Do not know	0.22 (0.08–0.55)	0.001**	0.22 (0.08–0.61)	0.003**

* $P < 0.1$, ** $P < 0.05$. OR: Odds ratio; CI: Confidence interval.

know surgery at all”, actually had a significant correlation with the group with a high score. (adjusted OR (95% CI): 0.22 (0.08–0.61), $P = 0.003$).

Discussion

The median score for knowledge of surgical symptoms was 8 (7–8) [median (interquartile range)] among the medical staff, 8 (7–8.5) among CHWs, and 8.5 (8–9) among the villagers. The score did not differ significantly across different occupations.

The findings suggested that knowledge of surgical symptoms among medical staff and CHWs in rural areas was inadequate as indicated by the lack of a significant difference in the score for surgical symptomatic knowledge across the three different occupational groups. Previous studies have shown that the educational levels of CHWs are inadequate, which was supported by this study¹¹. What is necessary is an accurate understanding and strengthening of the knowledge of medical staff, who are essential in promoting the health of rural residents in order to improve the quality of

the workforce is necessary for the future development of medical care in Cambodia. Besides, effective government ownership needs to create regionally oriented countermeasures to improve the workforce.

Those who stated that they did not have knowledge of surgery might have tried to obtain more information, thereby producing a significantly high score for knowledge of surgical symptoms. Recognition of inadequate knowledge about surgery was the only variable that significantly affected the score in this study. There could be several reasons for this. However, the most apparent reason is the recognition that less knowledge about surgery encourages people to acquire surgical information. The Internet and mobile phones are rapidly spreading throughout Cambodia, including rural areas, making access to information easier. The self-confidence of respondents regarding their knowledge about surgical symptoms could also be a deterrent to obtaining health information using the Internet. In particular, the stigma of having no knowledge about surgery among medical staff might be a hindrance to improving their knowledge.

The major limitations of this study are the inadequacies

in the evaluation of the reliability and validity of the questionnaire, the small sample size, and the assignment of the selection of participants to the director of the HCs. Selection bias might occur because the participants were selected by the director of the HCs. Furthermore, the median score for the knowledge of surgical symptoms was the highest among villagers although the intergroup difference was not significant. The ambiguity effect bias might have been strong among HCSs. Nonetheless, despite these limitations, as a pilot study, this research contributes to an improved understanding of the competencies of the medical workforce in rural areas of Cambodia.

Conclusions

Knowledge of surgical symptoms was insufficient among the medical staff and CHWs. More evaluation and improving surgical symptomatic knowledge among the medical staff in rural areas is urgently required.

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