KNOWLEDGE, ATTITUDES AND PRACTICES REGARDING VACCINATION AMONG HEALTHCARE WORKERS IN LAO PDR

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Abstract. Lao healthcare workers (HCW) are at risk of infection with vaccine-preventable diseases (VPD) and onward transmission to patients because of low vaccination coverage and the low vaccine seroconversion rate in the general population of the Lao People's Democratic Republic (Lao PDR). This study aimed to determine the knowledge, attitudes and practices of HCW in Lao PDR regarding vaccination in order to inform VPD control programs. We conducted a survey of 400 Lao HCW from 4 hospitals in Vientiane and 4 provincial hospitals in Lao PDR. Each subject was asked to complete a questionnaire about their knowledge, attitudes and practices regarding vaccination. The results of the questionnaires were double-entered into EpiData and statistical analyses were done using STATA. Among the 400 study subjects, 74.7% were female. The mean age was 38 years. Forty point five percent of subjects were nurses, 12.7% were administrators, 11.5% were internists, and the rest were other health care personnel. Regarding knowledge about vaccinations, 95.5% of subjects knew vaccinations can prevent diseases, 88.7% knew hepatitis B can be prevented with a vaccine, 88.2% knew polio is vaccine preventable. However, there were some problems regarding the knowledge of subjects: 36.5% thought hepatitis C is vaccine preventable, 95.8% thought vaccines can cause epistaxis and 64.5% thought vaccines always give lifelong protection. Regarding attitudes, 97.0% of subjects felt HCW should be vaccinated, 86.2% believed vaccines were effective in preventing disease and 88.2% felt they would recommend vaccination to their patients. However, only 48.5% stated they intended to be vaccinated in the future. Regarding practices, 90.0% of subjects reported having previously received vaccination; of those who had not received vaccinations the most common reason given was fear of adverse reactions. Eighty point five percent of subjects stated they received vaccination information from their colleagues but only 43.7% from their professional studies. Factors associated with a good knowledge regarding vaccines were working in a clinical field and working for at least 10 years. Having a positive attitude about vaccination was associated with getting information about vaccination from a colleague. Working in a hospital providing free vaccinations and having a favorable attitude about vaccination were associated with practices regarding vaccination. Our findings show a mixed knowledge, fair attitudes and fair practices regarding vaccination. Vaccination promotion programs for HCW should include peers, education and cost when developing programs to improve vaccination coverage among HCW.

Keywords: vaccination, knowledge, attitude, practice, healthcare workers, Lao PDR

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INTRODUCTION

Health care workers (HCW) are at increased risk for infection due to vaccine-preventable diseases (VPD) because of their contact with infected patients and contaminated equipment and environments (Sepkowitz, 1996). HCW may also transmit infection to other staff and patients.

Outbreaks of VPD are common in health-care settings, even in countries with well-established immunization programs (Chen *et al*, 2011). Vaccination of HCW is important to prevent some nosocomial infections. The World Health Organization recommends HCW be vaccinated against hepatitis B, polio, diphtheria, measles, rubella, meningococcal, influenza and varicella (WHO, 2017).

In Lao PDR, hepatitis B virus (HBV) infection is endemic; approximately 45% of the general population has been exposed to HBV and 8-10% of the adult population is chronically infected (Jutavijittum *et al*, 2007; Black *et al*, 2014; Jutavijittum *et al*, 2014). Outbreaks of other VPD continue to occur (WHO, 2015) due to a combination of low vaccine coverage and poor vaccine immunogenicity (Evdokimov *et al*, 2017). A previous study found Lao HCW had low levels of protective antibodies against VPD (Black *et al*, 2015).

Given the low vaccination coverage and rate of people with vaccination induced protective antibodies among the general population in Lao PDR, HCW vaccination is important. Several knowledge, attitudes and practices (KAP) studies among HCW have been done in the USA, UK and China to evaluate the relationship between knowledge and influenza vaccination (Seale *et al*, 2010; Zhang *et al*, 2011; Johansen *et al*, 2012).

We aimed to determine the KAP regarding vaccination among HCW in Lao PDR in order to inform VPD control programs to improve vaccination rates among HCW.

MATERIALS AND METHODS

Study sites

We conducted this cross-sectional study from April to June 2016. The hospitals selected for this study were those located in provinces with recent polio, diphtheria or measles outbreaks. These consisted 4 hospitals in Vientiane (Settathirat, Mitthaphab, Mahosot and Children's Hospital) and four provincial hospitals (Khammouan, Bolikhamxay, Vientiane and Houaphan). Serology data for VPD were available for the HCW at all the study hospitals apart from Mahosot and Vientiane provincial hospital.

Study subjects

A total of 400 subjects was determined to be necessary for this study based on the equation $N = 10*k/p$, where k = the number of independent variables and p = the smallest proportion of the two categories of the dependent variable (Peduzzi *et al*, 1996). Twelve independent variables (hospital, gender, age, profession, department of work, number of years of work

in the hospital, education level, getting information from a professional school/university, getting information from colleagues, the hospital organizes informational meetings about vaccines, the hospital informs workers when there is an outbreak and the hospital provides vaccinations for free) were used for the original logistic regression model assuming 30% of subjects had a good knowledge, attitude and/or practices regarding vaccination.

The number of HCW enrolled from the hospitals was based on the number of registered HCW at each study hospital. The HCW were randomly selected and asked to participate in the program. When potential subjects refused to participate, other subjects were randomly selected until a total of 400 subjects was achieved. Subjects recruited for the study were physicians (internists, pediatricians, surgeons, obstetricians), midwives, nurses, dentists, lab technicians, administrators and pharmacists.

Questionnaires

A self-administered questionnaire was distributed to each study subject. The questionnaire asked about socio-demographic data (hospital, age, gender, marital status, profession, department of work, number of years worked in a hospital, highest educational level, date of highest diploma, and number of years worked in the current department), about the KAP regarding vaccination and where the subjects received information about vaccination.

Questions were asked to each subject testing their general knowledge about vaccinations, such as the role of vaccinations, the side effects and the contraindications of vaccination. To assess the attitudes about vaccination, subjects were asked to write the reasons why they would or would not be vaccinated, whether they believed in the efficacy of vaccinations, concerns about vaccine side effects and identification of vaccines that they wanted to receive in the future. Study subjects were asked if they had been vaccinated since starting to work in the hospital and the reasons why they were vaccinated or not and the number of doses of vaccination against HBV received. Confirmation of HBV immunization status was sought. Subjects were also asked about how they got information about vaccination, about hospital training programs regarding vaccination, about outbreaks of diseases and the vaccination policy at each hospital.

Data analyses

The results of each questionnaire were quantified and double entered into EpiData, version 3.1 (EpiData Association, Copenhagen, Denmark). Statistical analyses were done using Stata, version 13 (StataCorp, College Station, TX). Descriptive statistics were used for socio-demographic variables (hospital, age, gender, profession, department of work, number of years worked in the hospital, highest educational level, date of highest diploma, and how many years worked in the current department) and external factors (information sources and hospital policies). Continuous variables were described using means, standard deviations and ranges. Categorical and dichotomous variables were described using frequencies and percentages. Bivariate and multivariate analyses were used to examine the relationship between selected socio-demographic variables, external factors and the dependent variable (knowledge, attitude, or practice). Odds ratios (OR) and their 95% confidence intervals (CIs) were used to determine the strength of associations. For all statistical analyses, a p-value < 0.05 was considered statistically significant.

Ethical considerations

This study was approved by the ethics review board of the Institut Pasteur du Laos and the National Institute of Public Health (NIOPH)/National Ethics Committee For Health Research (NECHR), Ministry of Health, Lao PDR (ethics approval number 2016/025 NIOPH/NECHR). All participants voluntarily gave written informed consent prior to participating in the study.

RESULTS

Socio-demographics characteristics

The mean age (range) of study subjects was 38 (21 to 64) years; 74.7% were female. Forty point five percent of study

Table 1
Socio-demographic characteristics of study subjects.

Variables	*n* (%)
Gender	
Female	299 (74.7)
Age in years	
21-40	246 (61.5)
41-61	154 (38.5)
Profession	
Nurse	162 (40.5)
Administrator	51 (12.7)
Internist	46 (11.5)
Anesthesiologist	22 (5.5)
Pharmacist	21 (5.2)
Dentist	19 (4.7)
Lab technician	19 (4.7)
Pediatrician	16 (4.0)
Surgeon	16 (4.0)
Physical therapist	8 (2.0)
Obstetrician/ Gynecologist	8 (2.0)
Radiologist	6 (1.5)
Otolaryngologist/ophthalmologist	6 (1.5)
Duration of work (years)	
1-10	191 (47.7)
>10-41	209 (52.3)
Education	
Vocational training	198 (49.5)
Graduate or higher	202 (50.5)

subjects were nurses. The mean number of years worked at a hospital was 14. Forty-nine point five percent of subjects had completed vocational training without further studies (Table 1).

Knowledge regarding vaccination

Eighty-eight point seven percent of study subjects were aware of the existence of a HBV vaccine and 88.2% of a polio vaccine. Eighty-four percent of subjects knew vaccines can have side-effects. Thirteen point five percent of subjects believed vaccines can be replaced by traditional medicine. Sixty-four point five percent of subjects believed a single vaccine dose provides life-long immunity (Table 2).

Awareness of diseases and attitudes about vaccination

Seventy-nine percent of subjects were concerned about contracting a disease while at work; 63.6% of subjects were concerned about contracting HBV infection, 61.0% were concerned about contracting tuberculosis and 56.6% were concerned about contracting HIV infection. Fifteen point five percent of subjects were uncon-

Table 2
Knowledge about vaccination among study subjects.

Knowledge about vaccination	*n* (%)
Vaccination can prevent some diseases	382 (95.5)
Which diseases can be prevented by vaccination	
Hepatitis B[a]	355 (88.7)
Hepatitis C[b]	146 (36.5)
Polio[a]	353 (88.2)
Malaria[b]	39 (9.7)
HIV[b]	19 (4.7)
It is recommended not to administer a vaccine to a child if they have:	
A severe allergic reaction to a previous dose[a]	355 (88.7)
Malnutrition[b]	26 (6.5)
A fracture[b]	18 (4.5)
None of above[b]	1 (0.2)
Vaccination can have side-effects	336 (84.0)
If yes, which side-effects	
Fever[a]	303 (90.2)
Headache[a]	98 (29.2)
Paralyze[b]	246 (73.2)
Rash[a]	24 (7.1)
Epistaxis[b]	322 (95.8)
Some vaccines cause disease	151 (37.7)
One dose of vaccine provides life-long immunity	258 (64.5)

a, correct answer; b, incorrect answer.

cerned about contracting infection from their patients; of these, 93.5% said they knew how to protect themselves but only 6.5% of them mentioned vaccination as a method of protecting themselves.

Ninety-seven percent of subjects stated HCW should be vaccinated; but only 70.3% stated HCW should be vaccinated against HBV. Eighty-six point two percent of subjects believed vaccinations were effective in preventing disease, 7.8% were not sure and 6.0% believed vaccinations were not effective in preventing disease; of those, 50.0% stated the reason for this belief was they felt vaccines were not stored correctly. Ninety-five percent of the subjects would recommend vaccinations for their colleagues and 88.2% would recommend vaccinations for their patients. However, only 48.5%of subjects stated they intended to get vaccinations in the future.

Practices

Ninety-eight point four percent of subjects reported having been vaccinated against at least one disease since starting work in the hospital with the main motivation being self-protection. Among those who had not been vaccinated, the most frequent reason given for not being vaccinated was fear of adverse reactions (Table 3). Of those who had been vaccinated, 73.5% had been vaccinated against HBV. Sixty-six point nine percent of subjects knew their HBV immunity status. Some subjects had been previously vaccinated against polio virus, tetanus, diphtheria or seasonal influenza; these depended on the availability of vaccines and presence of epidemics where they lived.

Information sources and hospital policies

Eighty point five percent of study subjects recieved information about vaccinations from their colleagues and 43.7% received information via their professional studies. Seventy-one point seven percent of study subjects stated their hospitals held information seminars about vaccines and 89.7% stated they always received information from their hospitals during an outbreak.

Table 3
Reasons given by study subjects for receiving or avoiding vaccinations.

Reasons given	*n* (%)
Reasons given for receiving a vaccination (*n* = 367)	
Self-protection	361 (98.4)
Protection of patients	121 (33.0)
Protection of family	149 (40.5)
Reasons given for avoiding a vaccination (*n* = 31)	
Fear of an adverse reaction	10 (32.2)
Never offered a vaccine	9 (29.0)
Disease not perceived to be serious	7 (22.6)
Fear of the injection	3 (9.7)
Belief vaccine does not provide sufficient protection	1 (3.2)
Received a vaccine before coming to work at the hospital	1 (3.2)

Eighty-one percent of study subjects stated some vaccinations were provided free at their hospitals, including the influenza vaccine, HBV vaccine, diphtheria vaccine, polio vaccine, tetanus vaccine, measles vaccine, pertussis vaccine, Japanese encephalitis vaccine and rubella vaccine; this varied by hospital.

Factors associated with a good knowledge about vaccinations after multivariate analysis were: working in a clinical field rather than working in administration (OR=2.0; 95% CI: 1.2-3.4; $p>0.05$) and duration of hospital work >10 years (OR=1.7; 95% CI: 1.1-2.5; $p>0.05$). Receiving information about vaccinations from colleagues was significantly associated with a favorable attitude toward vaccination (OR=3.2; 95% CI: 1.4-7.7; $p>0.01$). Working in a hospital providing free vaccinations was significantly associated with vaccination practice (OR=3.5; 95% CI: 1.4-8.5; $p<0.01$). Having a positive attitude about vaccination was significantly associated with practices regarding vaccination (OR=2.4; 95% CI:1.1-5.5; $p<0.05$).

DISCUSSION

The results of this study must be understood in the context of vaccinations among HCW in the Lao PDR. There is currently no national policy in Lao PDR regarding HCW vaccinations, unlike many other countries (Maltezou *et al*, 2011). A previous study found 53% of HCW in Lao PDR had protective antibodies against HBV infection, the immunity was derived mostly from previous infection, rather than vaccination. Only 21% had anti-HBs antibodies without anti-HBc antibodies, indicative of HBV vaccination (Black *et al*, 2015). Childhood HBV vaccination was only introduced into Lao PDR in 2001.

Vaccination rates among HCW in Lao PDR can be improved by focusing on factors in our study significantly associated with HCW vaccination uptake, such as following the recommendation of their colleagues to be vaccinated and receiving the vaccine for free.

Having a good attitude about vaccination was significantly associated with being vaccinated in our study, similar to a study from Shropshire, United Kingdom that found that the most common reason for being vaccinated against influenza among HCW was believing vaccination to be effective (Hothersall *et al*, 2012).

A statistically significant association was seen between receiving information about vaccinations from their colleagues and being vaccinated. Colleagues played an important role in vaccination decisions. A study from the United States reported 95% of surveyed parents of children aged ≤18 months accepted advice about vaccination decisions from their "people network" (friends, physician and family) (Brunson, 2013). This suggests giving HCW the opportunity to discuss vaccination with colleagues along with receiving information though seminars may improve vaccine uptake among HCW. Discussing the potential side effects and benefits of vaccination may also improve uptake among HCW. Misconceptions can be corrected, such as the belief that traditional medicine is as effective in disease prevention as vaccination or a single dose of a vaccine provides life-long protection.

Free vaccination and convenient vaccination should help improve vaccination uptake by HCW. The hepatitis B vaccine costs about USD5-15 per dose in Lao PDR, where many worker receive an income of only about USD200 per month.

Vaccination is the most effective way to prevent VPD among HCW. Attitudes

about vaccination affect vaccination practices. Receiving advice from colleagues and having a free vaccine can improve vaccine uptake. Vaccine promotion programs for HCW should take these factors into consideration. Further studies are needed to determine if implementation of programs considering these factors can improve VPD morbidity among HCW in Lao PDR.

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