

Knowledge and attitude of mandatory infectious disease notification among final year medical students

Htoo Htoo Kyaw Soe¹, Nan Nitra Than¹, Htay Lwin¹, Khine Lynn Phyu²,
Mila Nu Nu Htay¹, Soe Moe¹, Adinegara Lutfi Abas¹

Departments of ¹Community Medicine and ²Paediatrics, Melaka-Manipal Medical College (Manipal Academy of Higher Education (MAHE)), Melaka, Malaysia

ABSTRACT

Background: Disease surveillance is one of the major components to combat against infectious diseases. As health-care professionals are indispensable to mandatory notifiable disease surveillance, their knowledge and attitudes toward infectious disease notification played an important role for timely and effective reporting to the surveillance system. Therefore, we aimed to determine the knowledge of mandatory notifiable infectious diseases in Malaysia and attitude towards infectious disease reporting among final year medical students. **Methods:** A cross-sectional study was conducted from May to June 2017 in the private medical college in Malaysia. **Materials and Methods:** We purposively selected the final year (semester 10) medical students and a total of 124 students participated in this study. We collected data using a self-administered, structured questionnaire. Data were analyzed using descriptive statistics, independent *t*-test, and one-way analysis of variance. **Results:** Among the final year medical students, 47.5% had moderate knowledge but 4.2% had good knowledge of mandatory infectious disease notification. Only 3.2% of the students correctly answered all the notifiable diseases listed in the questionnaire. Most of the students had positive attitude toward communicable diseases reporting, rewards, and penalty for notification. There was no significant relationship between sociodemographic characteristics and knowledge and attitude of infectious disease notification. **Conclusions:** The majority of the final year medical students had moderate level of knowledge and positive attitude of infectious disease notification; however, there were some deficiencies. Better instruction and training on infectious disease notification procedures of Malaysia should be provided to the final year medical students which could not only reduce underreporting but also improve timely and effective reporting in future.

Keywords: Attitude, disease notification, knowledge, students

Introduction

Disease surveillance is one of the major components to combat against infectious diseases and is important for early detection of outbreaks and effective control of the spread of the communicable diseases.^[1] There are several infectious disease surveillance systems in Malaysia such as mandatory notifiable diseases surveillance, laboratory surveillance, clinical-based surveillance, community-based surveillance, and surveillance by other agencies which include the Department of Veterinary

Services and Foreign Workers Medical Examination Monitoring Agency.^[2] Among these systems, the mandatory notifiable diseases surveillance involves statutory notification of 26 infectious diseases under prevention and Control of Infectious Diseases Act 1988.^[2,3] This system requires health professionals from multidisciplines in government and nongovernment health facilities to report cases of notifiable infectious diseases to the district health authorities when the clinical diagnosis is made.^[3]

Even though notification and reporting of infectious diseases are vital in prevention and control of the spread of infection,^[4] underreporting, and incompleteness of notifiable infectious

Address for correspondence: Dr. Htoo Htoo Kyaw Soe,
Department of Community Medicine, Melaka-Manipal Medical College, Jalan Batu Hampar, Bukit Baru 75150, Melaka, Malaysia.
E-mail: htoo2ks@gmail.com

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

For reprints contact: reprints@medknow.com

How to cite this article: Soe HH, Than NN, Lwin H, Phyu KL, Htay MN, Moe S, *et al.* Knowledge and attitude of mandatory infectious disease notification among final year medical students. *J Family Med Prim Care* 2018;7:756-61.

Access this article online

Quick Response Code:



Website:
www.jfmpc.com

DOI:
10.4103/jfmpc.jfmpc_300_17

disease were documented in many countries.^[5-12] Many studies have shown that major barriers to reporting include the health professional's knowledge of notifiable diseases^[5-18] and attitude toward infectious diseases reporting.^[5,6,11] Learning on disease surveillance at undergraduate level provides the knowledge and attitude which is essential to fulfil the future role in country's disease surveillance system. In our college, lectures on communicable diseases surveillance and outbreak investigation were given to the students during the 3rd year of the medical curriculum. The aim of these lectures is to introduce principles and functions of communicable diseases surveillance, mandatory notification and reporting, surveillance mechanisms in Malaysia, and principles of an outbreak investigation. However, knowledge on Malaysia's infectious disease surveillance system by medical students and their attitude toward infectious disease notification has never been evaluated before their graduation from medical college. To the best of our knowledge, there is limited information regard to this topic among medical students. Therefore, we conducted this study to determine knowledge of mandatory notifiable infectious diseases in Malaysia and attitude toward infectious disease reporting among final year medical students.

Materials and Methods

We conducted a cross-sectional study among final year (semester 10) medical students in the private medical college in Malaysia from May to June 2017. There were 150 students attending final year at the time of our study. The sample size was calculated using the formula for single population proportion with the margin of error 5%, the assumption of 95% confidence level,^[19] and 89.8% of awareness on disease surveillance and notification.^[17] The minimum sample size required was 141. Therefore, we employed purposive sampling and invited all students who were attending final year to participate. A total of 124 students provided written informed consent, and they were included in this study.

Three authors (HHKS, NNT, and HL) distributed the questionnaire to the final year students during their clinical posting. Before data collection, the purpose of the study was explained to the respondents. Participation was strictly voluntary, and autonomy of the respondents was respected. Written informed consent was taken from each participant. We used self-administered method for data collection, and the students were given instruction if they agreed to participate in this study.

We used the structured questionnaire and collected knowledge and attitude of infectious diseases notification, and sociodemographic characteristics including age, gender, ethnicity, nationality, and scholarship status. Knowledge refers to the medical student's ability to answer about mandatory infectious disease surveillance and notifiable diseases in Malaysia. We defined attitude as the medical student's opinion of agreement or disagreement to the statement concerning communicable diseases reporting. In knowledge part of the questionnaire, we included twelve

multiple choice and true/false questions about infectious disease surveillance. We listed 18 infectious diseases in which thirteen were correct answer of notifiable diseases required by law. We also listed 12 diseases for notification by phone within 24 h and nine of 12 diseases were notifiable within 24 h in Malaysia. The respondents were asked to choose whether the disease was notifiable, not notifiable, or dont know. We scored one mark for the correct answer and score zero mark for the wrong answer. The maximum possible score for knowledge was 44 and the minimum was zero. Regards to the attitude of infectious disease reporting, we adopted and modified the questionnaire used in the previous study.^[6] As English is the language of instruction in our college, we did not translate the original English questionnaire to local language. We included 16 items including nine positive and seven negative statements, and five-point Likert scale (strongly agree, agree, neutral, disagree, and strongly disagree) was used. For positive items, strongly agree was scored five and strongly disagree was scored one while for negative items, strongly agree was scored one, and strongly disagree was scored five. The maximum possible score for attitude was 80 and the minimum was 16.

We carried out a pilot study with convenience sample to check for reliability, clarity, and understanding of the questionnaire. Content validity was checked with eight experts, and face validity was checked for clarity and understanding of the questionnaire. The Cronbach's alpha coefficient of knowledge questions was 0.479 and attitude questions were 0.533.

After checking and coding the questionnaire, we used SPSS version 12 (SPSS Inc., Chicago, IL, USA) for data entry and data analysis. Two authors (MNNH and KLP) entered data and two authors (HHKS and ALB) analyzed the data. Regards to knowledge and attitude, the total score was computed by taking the sum for all of the items (higher score indicates better knowledge and attitude). We categorized knowledge and attitude into three levels such as good (>80% of the maximum possible total score), moderate (60%–80% of the maximum possible total score), and low (<60% of the maximum possible total score).

For quantitative variables, mean and standard deviation (SD) were calculated and for categorical variables, frequency, and percentage were described. We used Independent *t*-test and one-way analysis of variance to determine the relationship between sociodemographic characteristics and knowledge and attitude of infectious diseases reporting. All the statistical tests were two-sided, and the level of significance was set at 0.05.

In our study, confidentiality was maintained, and anonymity of respondents was ensured. In addition, data were kept secured and available only to the statistician. This study was approved by Research Ethics Committee of our college.

Results

A total of 124 final year medical students participated in this study, and the response rate was 82.67%. The mean age was

25.01 years (SD 0.77) and 62.9% of the students were female. 36.3% of them were Malay while 24.2% were Chinese and 28.2% were Indian. Majority of the participants (96.8%) were Malaysian nationality while only four students (3.2%) were from foreign countries. About half of the students (50.8%) received scholarship while 48.2% were self-funded. Table 1 also shows the knowledge and attitude of infectious disease reporting with respects to sociodemographic characteristics. There was no significant difference of knowledge and attitude of mandatory infectious disease reporting between different genders, races, nationalities, and scholarship status [Table 1].

Table 2 shows the knowledge and attitude of mandatory infectious disease surveillance and reporting among students. Nearly 47.5% of the students had moderate knowledge and 48.3% had low knowledge while only few of them (4.2%) had good knowledge. However, the majority of the students (83.3%) had moderate attitude and 10.8% had good attitude while only 5.8% had low attitude. Majority of the students (92.7%) were aware of mandatory surveillance for infectious diseases in Malaysia and 81.5% of them correctly respond about the objective of country's surveillance system. Only 3.2% and 5.6% of the students correctly answered all of the mandatory notifiable diseases and diseases to be reported within 24 h from the list given. Most of the students were able to identify the notifiable diseases, but only 25% and 32.3% knew tetanus, and food poisoning should be reported. Regards to the notifiable diseases within 24 h after diagnosis, about half of the students were correct for most of the diseases listed such as cholera, dengue, diphtheria, plague, and poliomyelitis while 74.2% correctly identified Ebola. However, only 28.2% and 29.8% of the students knew food poisoning and yellow fever should be reported within 24 h after diagnosis [Table 2].

Sociodemographic characteristic	n (%)	Knowledge		Attitude	
		Mean (SD)	P	Mean (SD)	P
Age ^a	25.01 (0.77)				
Gender					
Male	46 (37.1)	27.9 (5.3)	0.441 ^b	57.4 (5.8)	0.148 ^b
Female	78 (62.9)	27.2 (4.6)		59.0 (5.9)	
Ethnicity					
Malay	45 (36.3)	25.9 (4.6)	0.071 ^c	58.0 (6.9)	0.912 ^c
Chinese	30 (24.2)	28.2 (4.7)		58.8 (4.9)	
Indian	35 (28.2)	28.4 (5.2)		58.8 (4.9)	
Others	14 (11.3)	28.5 (4.7)		58.0 (6.6)	
Nationality					
Malaysian	120 (96.8)	27.4 (4.8)	0.861 ^b	58.5 (5.9)	0.508 ^b
Non-Malaysian	4 (3.2)	27.0 (5.8)		56.6 (5.0)	
Scholarship status					
Scholar	63 (50.8)	26.7 (4.6)	0.096 ^b	58.7 (6.5)	0.651 ^b
Self-funded	61 (49.2)	28.2 (5.1)		58.2 (5.2)	

^aMean (SD), ^bIndependent t-test, ^cOne-way ANOVA. SD: Standard deviation; ANOVA: Analysis of variance

Most of the students had positive attitude toward communicable diseases reporting, rewards, and penalty for notification. Nearly 61% of them agreed that they will report after laboratory

Table 2: Knowledge and attitude of mandatory infectious disease surveillance and reporting in Malaysia (n=124)

Variables	n (%)
Knowledge	
Good	5 (4.2)
Moderate	57 (47.5)
Low	58 (48.3)
Mean (SD)	26.3 (4.9)
Range	13.0-39.0
Attitude	
Good	13 (10.8)
Moderate	100 (83.3)
Low	7 (5.8)
Mean (SD)	58.4 (5.9)
Range	38-70
Mandatory surveillance for infectious diseases in Malaysia	
Yes	114 (92.7)
No	1 (0.8)
Do not know	8 (6.5)
Objective of infectious disease surveillance in Malaysia	
Correct response	101 (81.5)
Correct response of notifiable diseases	
≤6 diseases	30 (24.2)
6-12 diseases	90 (72.6)
All 13 diseases correct	4 (3.2)
Correct response of diseases to be notified within 24 h	
≤4 diseases	61 (49.2)
5-8 diseases	56 (45.2)
All 9 diseases correct	7 (5.6)
Correct response of notifiable diseases	
Dengue	115 (92.7)
Tuberculosis	100 (80.6)
Measles	98 (79.0)
Malaria	96 (77.4)
Cholera	91 (73.4)
Whooping cough	88 (71.0)
Typhoid	86 (69.4)
HIV	84 (67.7)
Rabies	73 (58.9)
Leprosy	65 (52.4)
Yellow fever	58 (46.8)
Food poisoning	40 (32.3)
Tetanus	31 (25.0)
Correct response of notifiable diseases by phone within 24 h	
Ebola	92 (74.2)
Dengue	74 (59.7)
Poliomyelitis	67 (54.0)
Cholera	67 (54.0)
Diphtheria	66 (53.2)
Plague	61 (49.2)
Rabies	49 (39.5)
Yellow fever	37 (29.8)
Food poisoning	35 (28.2)

SD: Standard deviation

confirmation. About one-third of the students agreed that reporting without patient's consent will violate patient's privacy, and 21.3% agreed, and 29.5% were neutral to the statement that reporting will violate doctor-patient confidentiality. Majority of the students (46.3% strongly agreed, and 31.7% agreed) agreed that infectious disease notification has been an important emphasis in medical training [Table 3].

Discussion

We conducted this cross-sectional study to determine knowledge of mandatory notifiable infectious diseases and attitude toward infectious disease notification among final year medical students.

Knowledge of mandatory infectious disease notification

We found that 92.7% of the final year students were aware of mandatory surveillance for infectious diseases in Malaysia, and 81.5% of them correctly respond to the objective of country's surveillance system. Similar to our finding, previous studies done among health professionals in Nigeria, Germany, and England showed that the percentage of awareness of the physician's duty for disease notification was as high as 87%–97%.^[7,15,18] Regards to the overall knowledge of infectious disease reporting, even

among general practitioners and physicians, the good level of knowledge was ranged from 14.3% to 37%.^[8,9] Among the final year students in this study, 47.5% had moderate knowledge, but only 4.2% of them had good level of knowledge which was lower than previous studies.^[8,9] There were also deficiencies regards to the knowledge of notifiable diseases and infectious diseases to be reported within 24 h after diagnosis as very few students correctly identified all of the notifiable diseases listed. Moreover, only 25% and 32.3% of the students knew tetanus and food poisoning were notifiable diseases. Regards to the notifiable diseases within 24 h after diagnosis, more than half of the students were correct for cholera, dengue, diphtheria, poliomyelitis, and Ebola, but only 39.5%, 28.2%, and 29.8% of the students knew rabies, food poisoning, and yellow fever should be reported within 24 h after diagnosis. Previous studies conducted among doctors and healthcare personnel in Taiwan, United States, England and Wales, and Nigeria also revealed that the doctors failed to know the notifiable diseases which included the diseases that required immediate reporting as well as reporting within 7 days after clinical diagnosis.^[6,8,15,18] The study which was done in Nigeria by Aniwada and Obionu showed that <30% of primary health-care workers in private sector had correct knowledge of reportable diseases and reporting procedures while this was 50%–60% in public sector.^[20] It was well documented that lack of awareness

Table 3: Attitudes towards infectious disease reporting among final year medical students (n=124)

Statements	Strongly agree, n (%)	Agree, n (%)	Neutral, n (%)	Disagree, n (%)	Strongly disagree, n (%)
Reporting communicable diseases is one of the public health responsibilities of a doctor	87 (70.7)	22 (17.9)	12 (9.8)	1 (0.8)	1 (0.8)
I am willing to report if I know the disease is notifiable	84 (68.3)	30 (24.4)	6 (4.9)	2 (1.6)	1 (0.8)
I am willing to report if there is an easy and convenient method to report	70 (56.9)	23 (18.7)	22 (17.9)	6 (4.9)	2 (1.6)
I only report after confirming the diagnosis by laboratory tests ^d	37 (30.1)	38 (30.9)	36 (29.3)	7 (5.7)	5 (4.1)
If I am too busy, I am not reporting communicable diseases ^d	7 (5.7)	9 (7.4)	16 (13.1)	23 (18.9)	67 (54.9)
It would only be necessary to report if the disease is severe ^d	14 (11.4)	14 (11.4)	25 (20.3)	38 (30.9)	32 (26.0)
If I am too busy to report, I will ask the nurse in the hospital/clinic to assist in reporting	15 (12.2)	53 (43.1)	35 (28.5)	6 (4.9)	14 (11.4)
It would be helpful to the safety of your practice if communicable disease reporting could be comprehensively completed by every doctor	48 (39.0)	56 (45.5)	15 (12.2)	2 (1.6)	2 (1.6)
Reporting communicable diseases has been an important emphasis in your medical training	57 (46.3)	39 (31.7)	23 (18.7)	3 (2.4)	1 (0.8)
Failing to report suspected cases is against the law	36 (29.0)	35 (28.5)	43 (35.0)	5 (4.1)	4 (3.3)
Reporting communicable diseases without the consent of patients will violate their privacy ^d	12 (9.8)	26 (21.3)	38 (31.1)	25 (20.5)	21 (17.2)
A good reward system will increase my willingness to report	24 (19.5)	37 (30.1)	38 (30.9)	11 (8.9)	13 (10.6)
Most local medical doctors respect the importance of reporting communicable diseases	42 (34.1)	54 (43.9)	23 (18.7)	3 (2.4)	1 (0.8)
Penalty for not reporting will increase my willingness to report ^d	25 (20.3)	39 (31.7)	34 (27.6)	17 (13.8)	8 (6.5)
Reporting communicable diseases is time-consuming and should not be done by hasty doctors ^d	16 (13.0)	21 (17.1)	43 (35.0)	15 (12.2)	28 (22.8)
Reporting communicable diseases will violate doctor-patient confidentiality ^d	12 (9.8)	14 (11.5)	36 (29.5)	35 (28.7)	25 (20.5)

^dNegative statement

of notifiable diseases is associated with underreporting.^[5,6,8,9,15,16] Knowledge of notification requirements and procedures was correlated not only with time and frequency reporting but also with active reporting partnership for the surveillance system.^[8] Although there was the good level of awareness for mandatory notification system among final year medical students in this study, knowledge of notifiable diseases was needed to be improved. Training about surveillance and disease notification have shown not only to improve health-care provider's knowledge and attitude of mandatory infectious diseases notification but also to have an impact on effective reporting for surveillance systems.^[16,21]

Attitude toward infectious disease notification and reporting

Physician's attitude toward infectious disease reporting also played an important role in timely and effective reporting.^[5] The study done by Pacheco *et al.* showed that physician's attitude relating notification significantly increased the odds of reporting the notifiable disease.^[22] In our study, the majority of the students (83.3%) had moderate attitude and 10.8% had the good level of attitude toward infectious diseases notification. Similar to the research conducted among Korean physicians by Kim *et al.*,^[11] most of the students in this study had the positive attitude for communicable diseases reporting, rewards, and penalty for notification. Furthermore, the response rate was high as 82.67% in our study that showed the interest and willingness of final year medical students regards to this topic. About one-third of the students agreed that reporting without patient's consent will violate patient's privacy and violate doctor-patient confidentiality. Moreover, 61% of them agreed that they only report after laboratory confirmation. According to standard reporting procedure in Malaysia, notifiable infectious cases should be reported based on clinical diagnosis regardless of laboratory confirmation. If the results are not conclusive or presence of missing data, the cases may be reported as a probable or suspected.^[3] It had been shown that the belief of notification after laboratory confirmation and violating patient's privacy was associated with underreporting of mandatory notifiable diseases.^[5,6]

Relationship between sociodemographic characteristics and knowledge and attitude toward infectious disease notification

Studies had revealed the knowledge and attitude of infectious diseases reporting with respects to sociodemographic characteristics such as gender,^[8] races,^[8] specialties,^[10,15] years of experiences,^[23] and geographical regions.^[7] Our study revealed that knowledge and attitude of infectious disease reporting were not significantly different between genders, races, nationalities, and scholarship status among final year medical students which were similar to the findings of study done among physicians.^[8]

Majority of the students in our study mentioned that infectious disease notification has been an important emphasis in their medical training. Although training during residency and

continuing medical education provided the knowledge about disease reporting, most of the trained physicians received this knowledge during medical school.^[8] It was also found that the physicians who had received training on reporting were more knowledgeable of diseases for immediate reporting and notification procedures^[8,21] which also had a positive effect on reporting practices.^[21]

Limitations of the study

Although the response rate was high as 82.67%, our study has some limitations. The participants may respond differently to some of the attitude questions due to social desirability. This study was conducted in one private medical college; therefore, the findings cannot be generalizable to other medical institutions. This was a cross-sectional study; hence, we could neither observe the changes in the student's knowledge and attitude over time nor inference of causality. Since the study had been conducted among medical students, we were not able to measure the reporting practice and the barriers to the mandatory infectious disease notification.

Future directions of the study

This study highlighted the needs of training on infectious disease notification procedures among medical students. Case definitions and the list of notifiable diseases that need immediate reporting as well as notification within 7 days after clinical diagnosis should be emphasized. Moreover, future research should explore knowledge and attitudes of mandatory infectious diseases notification, the reporting practice, and the barriers to notification among practitioners in Malaysia.

Conclusions

The majority of the final year medical students had the moderate level of knowledge and positive attitude of mandatory infectious disease notification though there were some deficiencies. Providing awareness training about infectious disease notification and procedures while in final year may modify the medical student's knowledge and attitude toward infectious disease notification. This would not only be beneficial and help to reduce the underreporting and incompleteness in future but also fulfill the future role in country's disease surveillance system.

Acknowledgment

The authors would like to acknowledge to all final year (semester 10) students who participated in this study. We also would like to thank the management of Melaka-Manipal Medical College (MMMC) and Research Ethics Committee (MMMC) to grant the approval for this study.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. VanBeneden CA, Lynfield RU. Public health surveillance for infectious diseases. In: Lee M, Teutsch SM, Thacker SB, St. Louis ME, editors. *Principles and Practice of Public Health Surveillance*. 3rd ed. New York: Oxford University Press; 2010. p. 236-54.
2. Disease Control Division, Ministry of Health Malaysia. *Infectious Disease Outbreak: Rapid Response Manual*. 1st ed. Putrajaya, Malaysia: Ministry of Health; 2003. p. 71.
3. Surveillance for Infectious Disease, Disease Control Division, Ministry of Health Malaysia. *Case Definition for Infectious Diseases in Malaysia*. 2nd ed. Putrajaya, Malaysia: Ministry of Health; 2006. p. 101.
4. Fadaei Dehcheshmeh N, Arab M, Rahimi Fouroshani A, Farzianpour F. Survey of communicable diseases surveillance system in hospitals of Iran: A Qualitative approach. *Glob J Health Sci* 2016;8:53909.
5. Figueiras A, Lado E, Fernández S, Hervada X. Influence of physicians' attitudes on under-notifying infectious diseases: A longitudinal study. *Public Health* 2004;118:521-6.
6. Tan HF, Yeh CY, Chang HW, Chang CK, Tseng HF. Private doctors' practices, knowledge, and attitude to reporting of communicable diseases: A national survey in Taiwan. *BMC Infect Dis* 2009;9:11.
7. Iwu AC, Diwe KC, Merenu IA, Duru CB, Uwakwe KA. Assessment of disease reporting among health care workers in a South Eastern State, Nigeria. *Int J Community Med Publ Health* 2016;3:2766-74.
8. McClean CM, Silk BJ, Buehler JW, Berkelman RL. Disease reporting among Georgia physicians and laboratories. *J Public Health Manag Pract* 2010;16:535-43.
9. Khorrami RA, Karami M, Abedini Z. Knowledge, attitude and practice of general practitioners about disease notification (reporting) in Qom. *Iran J Epidemiol* 2012;7:49-56. Available from: <http://www.irje.tums.ac.ir/article-1-31-en.html>. [Last accessed on 2017 Mar 11].
10. Phalkey RK, Kroll M, Dutta S, Shukla S, Butsch C, Bharucha E, *et al.* Knowledge, attitude, and practices with respect to disease surveillance among urban private practitioners in Pune, India. *Glob Health Action* 2015;8:28413.
11. Kim YS, Park KH, Yoo HS, Kwon JW, Shin E. Reporting of national notifiable infectious diseases (NNIDs) and related characteristics. *Korean J Epidemiol* 2007;29:200-10. Available from: <https://www.e-epih.org/upload/pdf/kje-29-2-200.pdf>. [Last accessed on 2017 Mar 10].
12. Doyle TJ, Glynn MK, Groseclose SL. Completeness of notifiable infectious disease reporting in the United States: An analytical literature review. *Am J Epidemiol* 2002;155:866-74.
13. Krause G, Ropers G, Stark K. Notifiable disease surveillance and practicing physicians. *Emerg Infect Dis* 2005; 11:442-5.
14. Chorba TL, Berkelman RL, Safford SK, Gibbs NP, Hull HF. Mandatory reporting of infectious diseases by clinicians. *JAMA* 1989;262:3018-26.
15. Voss S. How much do doctors know about the notification of infectious diseases? *BMJ* 1992;304:755.
16. Lar LA, Afolaranmi RO, Tagurum YO, Uzochukwu B, Zoakah AI. Challenges of integrated disease surveillance response reporting among healthcare personnel in Mangu, Plateau State, Nigeria. *J Publ Health Epidemiol* 2015;7:108-13. Available from: <http://www.academicjournals.org/journal/JPHE/article-full-text-pdf/0F27B6651264>. [Last accessed on 2017 Mar 11].
17. Nnebue CC, Onwasigwe CN, Adogu PO, Onyeonoro UU. Awareness and knowledge of disease surveillance and notification by health-care workers and availability of facility records in Anambra State, Nigeria. *Niger Med J* 2012;53:220-5.
18. Drysdale SF. Knowledge of infectious disease reporting amongst military and civilian medical officers. *J R Army Med Corps* 1994;140:125-6.
19. Lwanga SK, Lemeshow S. *Sample Size Determination in Health Studies: A Practical Manual*. Geneva: World Health Organization; 1991.
20. Aniwada EC, Obionu CN. Disease surveillance and notification, knowledge and practice among private and public primary health care workers in Engu State, Nigeria: A comparative study. *Br J Med Med Res* 2016;13:1-10.
21. Bawa SB, Olumide EA. The effect of training on the reporting of notifiable diseases among health workers in Yobe State, Nigeria. *Niger Postgrad Med J* 2005;12:1-5.
22. Pacheco M, Katz AR, Hayes D, Maddock JE. Physician survey assessing pelvic inflammatory disease knowledge and attitudes to identify diagnosing and reporting barriers. *Womens Health Issues* 2016;26:27-33.
23. Lafond KE, Dalhatu I, Shinde V, Ekanem EE, Ahmed S, Peebles P, *et al.* Notifiable disease reporting among public sector physicians in Nigeria: A cross-sectional survey to evaluate possible barriers and identify best sources of information. *BMC Health Serv Res* 2014;14:568.