Integrated Disease Surveillance and Response Reporting: Effect of Training on Primary Healthcare Workers in Plateau State, Nigeria

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Original Article

ABSTRACT

Background: Complete and timely reports, eradication and elimination of epidemic diseases are challenges to many developing countries.This study assessed the effect of training on Integrated Disease Surveillance and Response reporting among primary healthcare workers in Plateau State.

Methods: In this quasi-experimental study (with pre- and post-intervention phases), a multi-stage sampling technique was used to select a sample of 216 primary healthcare workers in Mangu and Jos South Local Government Areas. We assessed the two groups at baseline using an interviewer-administered questionnaire (that assessed knowledge, practices and factors affecting IDSR reporting). The intervention group received the training throughout the study and the control at the end. Post-intervention assessment on the groups was done.We analysed the data using Epi-Info, set confidence level at 95% and a ρ value ≤ 0.05 was considered statistically significant.

Results: Ninety six (88.9%) of the respondents in the intervention group had good knowledge of IDSR reporting. The difference between pre- and post- intervention IDSR reporting was statistically significant ($\chi^2 = 41.55$; $df = 1$; $\rho < 0001$) for the intervention group, and statistically insignificant ($\chi^2 = 0.12$; $df = 1$; $\rho = 0.7260$) for the control. Post-intervention, IDSR inappropriate practices decreased from 74.1% to 48.1% but, appropriate practices increased to 51.9% in the intervention group. IDSR timeliness and completeness of reporting were statistically significant ($\chi^2 = 16.31$; $df = 1$; $p < 0.0000$) in the intervention group.

Conclusion: The study revealed that training has a positive effect on the knowledge and practices of IDSR reporting by healthcare workers and we recommend that it should be strengthened at all levels of healthcare delivery in the State.

Key Words: Training, Integrated Disease Surveillance Response Reporting

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La surveillance intégrée des maladies et la réponse de Reporting: Effet de la formation sur les soins de santé primaires les travailleurs dans l'État du Plateau, le Nigéria

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L'article d'origine

Résumé

Arrière-plan: Complet et rapports en temps opportun, l'éradication et l'élimination des maladies épidémiques sont des défis pour de nombreux pays en développement.Cette étude a évalué l'effet de la formation sur la surveillance intégrée des maladies et rapports Réponse primaire entre travailleurs de la santé dans l'État du Plateau.

Méthodes: Dans cette étude quasi-expérimentale (avec pré- et post-intervention phases), une technique d'échantillonnage en plusieurs étapes a été utilisé pour sélectionner un échantillon de primaire 216 travailleurs de la santé dans le Mangu et Jos Sud Zones de gouvernement local. Nous avons évalué les deux groupes à l'aide de base par un intervieweur, questionnaire (qui a évalué connaissances, les pratiques et les facteurs affectant RICE reporting). Le groupe d'intervention a reçu la formation tout au long de l'étude et le contrôle à la fin. Post-évaluation des interventions sur les groupes était fait.Nous avons analysé les données en utilisant Epi-Info , set niveau de confiance à 95% et une valeur $\rho \leq 0,05$ a été considérée comme statistiquement significative.

Résultats: Quatre-vingt-six (88,9 %) des répondants du groupe d'intervention avaient une bonne connaissance des rapports RICE. La différence entre le pré- et post- intervention rapports RICE était statistiquement significative ($\chi 2 = 41,55$; df = 1; $\rho < 0001$) pour le groupe d'intervention, et statistiquement non significative ($\chi 2 = 0,12$; $df = 1$; $\rho = 0,7260$) pour le contrôle. Post-intervention, RICE pratiques inappropriées a diminué, passant de 74,1 % à 48,1 % mais, pratiques appropriées ont augmenté de 51,9 % dans le groupe d'intervention. RICE la rapidité et l'exhaustivité des rapports étaient statistiquement significatives ($\chi 2 = 16,31$; df = 1 ;$p < 0,0000$) dans le groupe d'intervention.

Conclusion: L'étude a révélé que la formation a un effet positif sur les connaissances et les pratiques de reporting RICE les travailleurs de la santé et nous recommandons qu'il soit renforcé à tous les niveaux de prestation des soins de santé dans l'État.

Mots clés: Formation, Surveillance intégrée des maladies Réponse Reporting

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INTRODUCTION

Integrated Disease Surveillance and Response (IDSR) is a strategy that involves the collection, analysis, interpretation and feedback of data on priority disease. (1,2) It has a holistic and integrated approach and uses similar structures, personnel and processes.(3) World Health Organization Regional Office for Africa (WHO/ AFRO) in 1998 adopted and adapted it, and its aim is to assist health workers to detect and respond to these diseases.(4,5)

A country with a functional IDSR system uses standard case definitions to collect and analyse data on priority diseases.(6) When higher levels are alerted and confirmed laboratory diagnosis is made, appropriate and timely feedback is given at all levels.(6)

The current structure of IDSR in Nigeria is based on the three levels of government; Federal, State and Local levels. (7) Designated focal persons at the Local Government Area (LGA) level collect data on IDSR from designated focal sites or facilities. They collate the results and forward them to the State Ministry of Health and give feedback to the health facilities.(8) The Disease Surveillance and Notification Officer (DSNO) of the State at the Epidemiological Unit, after appropriate analyses and feedback to the health facilities, compiles the information and forwards it to the Epidemiology Unit of the Federal Ministry of Health. The unit also plans appropriate strategies for disease control. (8) Nigeria's IDSR strategy reported thirty-five diseases and events, twelve epidemic-prone diseases- six diseases targeted for elimination or eradication, six non-communicable diseases, and eleven are of public health importance. (1)

In Africa, communicable diseases are the leading causes of illness, disability and death and reliable public health systems are needed to preventing and controlling them.(9,10) Despite increases in knowledge about Disease Surveillance and Notification (DSN) during the 1990s, there remains a gap between what public health policy-makers currently need to know about it to improve health and reach international development goals. (11, 12)

Most developing countries, like Nigeria lack complete, updated data, rendering trend assessment particularly difficult. This is due to under investment in the system for their collection, analysis, dissemination and use.(11) This is in keeping with a study conducted in Sabon Gari, Kaduna State, Nigeria where there was missing, incomplete and untimely reporting of IDSR data.(13)The existing data bases are limited in determining priorities and early detection to enable the prevention and control of epidemics.(14)

Healthcare facilities are absent or inadequate in resource-limited countries in Africa, Asia and other parts of the world. Consequently, these countries do not have adequate domestic disease detection or response capabilities. (12)This results in a porous patchwork of surveillance systems. (14)These findings are similar to those of a Tanzanian study, where there are weak reporting systems in terms of timely receipt of all reports from all facilities studied and in managing those reports at the district level. (15)

Many Physicians, Nurses and Laboratory Scientists are not aware of IDSR and among those that are aware, the details of disease reporting and channels of reporting are lacking. This is further confirmed by the study conducted in Kaduna State, Nigeria where case definitions for diseases were reported to be available, but not sighted. (13)

Nigeria has embraced the new IDSR strategy that has been introduced it in all the States of the Federation.(11) Presently; the existing surveillance system is incapable of detecting early warning signs of outbreaks, which has resulted in high morbidity, disability and mortality.(13)

IDSR is a relatively inexpensive strategy and it provides critical information for monitoring a community's health. It relies on quality and timely data generated by trained personnel. Primary Health Care (PHC) workers are the first point of contact in the health system and their skills in IDSR reporting are vital in improving the current situation.

MATERIALS AND METHODS

Plateau State is located in the North Central region of Nigeria with the State capital Jos, located in the Northern part of the State. It is comprised of seventeen LGAs. (14,15) Mangu LGA is a fast growing area and the bulk of the non- literate population are small scale subsistence farmers and petty traders. It has 94 health facilities;6 are secondary health facilities and the rest (88) are PHC facilities; both private and publically owned.(16)The control area was Jos South LGA, an expanding settlement. It has 68 PHC facilities; both public and privately owned.(17)

The structure of IDSR in these LGAs is similar to that in the country. Both have focal sites where trained focal persons are responsible for completing and filling the IDSR forms on the priority diseases. They forward the collected and compiled data to the LGA Department of Health, where the LGA DSNO collates the data and forwards it to the State DSNO. The State DSNO compiles the data and writes the comprehensive report. In each of these LGAs there are 2 LGA DSNOs, where the second is an assistant DSNO. The information is usually forwarded from the LGA to the State using mobile phones via text messages. From the State, the data is forwarded to the FMOH, usually by electronic mail.

This was a facility-based, quasi-experimental study involving two hundred and sixteen health personnel of the PHCs who were selected using simple random sampling technique by computer generated random numbers. The number of health workers within the public and private health facilities varied disproportionately with the ratio of the staff strengths of the public to private PHC centers in both LGAs being 4:1 Based on this ratio, 84 respondents were selected from the public health facility in Mangu LGA and 24 in the private facilities. Eighty eight respondents were selected in the public health facility and 20 in the private facilities in Jos South LGA. This made a total of 108 respondents per LGA.A sampling frame of 278 in the intervention and 289 in the control group was gotten from the registered list of medical personnel in the LGAs. Using computer generated list of random numbers from Winpepi software; version 11.25 and based on the public, private workforce ratio, the required sample size of respondents was selected for the intervention.

Health personnel of PHC centers in Mangu LGA were the intervention population and those in PHC centers in Jos South LGA were the control group. At baseline, assessment of the knowledge, practices and factors affecting IDSR reporting in both study groups was conducted using pre-tested, structured, interviewer-administered questionnaires.A week after this, a two day training was organised for the intervention group, which focused on theintroduction-rationale for IDSR/history, priority diseases and forms for reporting**,** outbreak investigation/role of the district level in IDSR reporting, channel of reporting and reporting forms (practical session).

The training was fragmented, accommodating the study population who were on strike for about 10 months, but consented to voluntarily participate. It took place in various locations, such as offices in secondary centers where the strike was not ongoing. A total of 10 trainings, each lasting 2 days for the 108 health personnel recruited for the study were conducted. It comprised of an organised lecture, a practical session on IDSR forms reporting and an interactive group discussion which was given in English by the Principal Investigator and assisted by the State Epidemiologist. The health education model used was the social intervention model, where group behaviour is expected to influence the general and final behaviours or practices of individuals within the group and ultimately system activities. (18). This was combined with the motivation model, where the respondents became aware of the right channel of IDSR reporting and were expected to be motivated through interest, evaluation and decision-making and ultimately act by accepting and adopting the correct channel of IDSR reporting. The control group was given the same two day training a week after post data collection for

ethical reasons. The research team paid monthly visits to the PHCs to reinforce the knowledge gained.

There were 6 questions regarding knowledge and one mark was awarded for a correct answer, while zero was awarded for a wrong answer. The total marks for each respondent was used to grade levels of knowledge into: A score of 0-3 out of 6 was assessed as poor knowledge and that of 4-6 as good knowledge. There were 9 questions regarding practice and one mark was awarded for a correct answer, while zero was awarded for a wrong answer. The total marks for each respondent was used to grade levels of practice into: A score of 0-4 out of 9 as inappropriate practice and 5-9 as appropriate practice.

Those facilities submitting weekly reports of epidemic prone diseases each week for the three months duration of the study had timely reporting. Those that submitted data on all the categories of IDSR diseases from their facilities monthly for the duration of the study had complete reports. Ethical clearance was obtained fromJos University Teaching Hospital Ethical Clearance Committee. Permission was obtained from Chairmen and PHC Directors of both LGAs and informed consent was gotten from all respondents.

Quantitative data generated pre- and post-intervention were collated and analysed with EPI info version 3.5.3 statistical software. Qualitative data such as sex, religion, marital status, highest level of education, occupation and factors responsible for IDSR reporting were presented as percentages, while quantitative data like age was presented using mean and standard deviation.

RESULTS

The mean age of respondents in the intervention group was 40.0 ± 6.8 years and in the control group it was 37.8 ± 5.5 years. The age group 28-37 years, female sex, married respondents with tertiary level of education and predominantly Community Health Extension Workers (CHEWs) were the most frequent findings in the study groups. The intervention and control groups were comparable in most of the sociodemographic parameters except age, religion, ethnicity and years of working experience. (Table1)

Ninety six (88.9%) of the respondents in the intervention group had good knowledge on IDSR reporting at post-intervention, which was statistically significant; p< 0001. However, in the control group, the difference at pre and post-intervention were not statistically significant. (Table 2)

Post-intervention, inappropriate practices regarding IDSR reporting decreased from 74.1% to 48.1% in the intervention group, which was statistically significant and appropriate practices increased to 51.9%from 25.9%. In the control group, there was no statistically significant difference in the practices. (Table 3)

Reporting status in the intervention group was complete in less than half; 44.4% of the respondents after the training, though there was an increase from the pre-intervention value of 3(2.8%), which was however statistically significant; p<0.0001. In the control population, no reporting was predominant among more than 70.0 % of them at all phases of the study. (Table 4)

Seventy four (68.5%) of those in the intervention group in the study had untimely reporting, though at post -intervention, this improved statistically; p<00001 from 10.2% to 31.5%, with 98 of them being involved in the IDSR network. In the control group, timely reporting remained steady at 7.4% through all stages of the study. (Table 5)

DISCUSSION

About 43% and 63% of respondents in the intervention and control groups respectively, were between the ages of 28-37 years. This was different from the findings of a study on DSN among Physicians in Germany, where the majority were aged 40-49 years and that on measles surveillance among Physicians in Qatar where 73.5% of them were aged 30–49 years. (19, 20) This may be as a result of the various cadres of staff; Nurses, Midwives, Environmental Health Officers, Community Health Officers, CHEWs, LS and Laboratory Technicians that made up the target

population of this study. In the German and Qatari studies, a homogenous group, whose ages are most likely to fall within a certain range made up the study population. In addition, Physicians take longer to qualify than those in this study, so are more likely to be older.

About 42% and 33.3% of respondents in the intervention and control groups respectively, were CHEW. This finding was contrary to the study in Ibadan, Nigeria where only 9.5% were CHEWs, with 90.5% being Medical Officers. (21)CHEWSare predominantly found in the PHC centers at the district level, though they may also be found at other tiers of healthcare delivery. This may explain why they were majority in this study. About 51% and 52.8% of respondents in the intervention and control groups respectively, were females. This sex finding was contrary to that of the German study, where 29.4%, a lower proportion, were female and the Qatari study among Physicians, where 61% of them were males. (19, 20)Nurses in this study may have accounted for the higher female proportion and the lower one in the Qatari study. This may be as a result of Medicine being thought of as a "man's" profession for a long while and women are more likely to be in the other professions.

Most respondents in the intervention group had more than 10 years working experience and 5-10 years in the control group. This may be due to the older population in the intervention group who might have worked for longer periods and the younger control group. These findings were both different from the Qatari study, where 50% had 5 years or less experience at their current facility. The current health situation of Qatar where most healthcare workers are foreign and in training may have accounted for this finding. (20)

There was good knowledge among the intervention group, which was statistically significant and in agreement with the study conducted among DSNOs in Ibadan, Nigeria where knowledge on IDSR reporting was 97.6%, but poor among the control group; 17.6% at post intervention.(21) The finding in the control group was in keeping with that of a study conducted among Doctors in Benin City, Edo, Nigeria. Only 11.9% of them had good knowledge on disease notification, which may be explained by the fact that it was conducted among Doctors only who worked in government hospitals.(22) However this study was conducted among various cadres of healthcare workers, whose collective knowledge might have resulted in an additive effect.

Complete and timely reporting in the intervention and control groups at pre and post intervention were low, respectively. These inconsistencies could mean the need for better attitudinal changes with the higher levels of knowledge and skills in IDSR reporting acquired. There is also a need for more training and re training of these healthcare workers, especially those directly involved in IDSR reporting, such as the focal persons. This was similar to the findings of low completeness and timely reporting in 109 Tanzanian Districts. (23) This was below a secondary evaluation of the completeness and timeliness of IDSR reporting in eight WHO AFRO countries, where collectively, there was92% completeness and 70% timeliness of reporting in the facilities. (24)This high rate might have been due to its collective nature and the reported intensified training of healthcare personnel in the region. However, it was higher than that reported over two months, 26.5% and 22.5% timeliness and slightly less than monthly completeness of 32.7% reported in the study in Sabon Gari, Kaduna, Nigeria. (13) It was also higher than the pre-intervention findings of 2.3% completeness in that among health workers in Yobe State. (25)

Training in this study had a positive effect on knowledge and practices of the respondents in the intervention group. These findings are in line with that of health workers in Yobe State where it was concluded that training had a positive effect on health personnel knowledge, reporting requirement and the timeliness and completeness of the DSN system. (25) The study on the WHO AFRO region also concluded that training improved these outcome variables. However in that

conducted in Qatar, it was recommended that training was lacking and needed to be institutionalised to improve knowledge and practice on DSN.

This study therefore revealed that training has a positive effect on the knowledge and practices of IDSR and its reporting. Therefore it can be used as an effective tool for improving timeliness and completeness of IDSR reporting among all health care personnel in all levels of healthcare delivery.

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REFERENCES

1. The Nigerian Academy of Science. Integrated Disease Surveillance and Response. Stakeholders' Awareness Creation Workshop. Abuja 2010. p1.
2. World Health Organization and Center for Disease Control and Prevention. Technical Guidelines for Integrated Disease Surveillance and Response in the African Region. October 2010. p5.
3. Abubakar AA, Sambo MN, Idris SH, Sabitu K, Nguku P. Assessment of Integrated Disease Surveillance and Response Strategy Implementation in Selected Local Government Areas of Kaduna State. Ann Nigerian Med 2013; 7(1):14-9.
4. Ferguson NM, Cummings DA, Fraser C, Cajka JC, Cooley PC, Burke DS. Strategies for Achieving Indicators. Nature 2006 Jul 27;442(7101):448–52.
5. Centre for Disease Control.Global Health - Integrated Disease Surveillance and Response.Available At http://www.cdc.gov/globalhealth/dphswd/idsr/.Last Accessed 11/06//2014.
6. Epidemiology Division, Federal Ministry of Health, Nigeria. National Technical Guidelines for IDSR. Federal Ministry of Health 2002. p1-15.
7. Federal Ministry of Health, Abuja, Nigeria. National Health Policy on Integrated Disease Surveillance and Response 2005. p 7-8.
8. Abubakar AA, Sambo MN, Idris SH, Sabitu K, Nguku P. Assessment of Integrated Disease Surveillance and Response Strategy Implementation in Selected Local Government Areas of Kaduna State. Ann Nigerian Med 2013; 7(1):14-9.
9. World Health Organization. Disease and Injury Regional Estimates for 2004. Available At http://www.who.int/healthinfo/global_burden. Last Accessed 10/06/2014.
10. World Health Organization, Regional Office for Africa. Integrated Disease Surveillance in the African Region: A regional strategy for Communicable Diseases 1999-2003. Geneva; 2001. Available At http://whqlibdoc.who.int/afro/2001/AFR_RC_48_8.pdfDocument AFR/RC/48/8. Last Accessed 11/06/2014.
11. Wagner MM, Tsui FC, Espino JU. The Emerging Science of Very Early Detection of Disease Outbreaks. J Pub Health Mgmt Pract 2001 Nov;7(6):51–59.
12. Guidelines Working Group. Updated Guidelines for Evaluating Public Health Surveillance Systems. MMWR Morb Mortal Wkly Rep 2001 Jul 27;50(RR13):1–35.Available At http://news.bbc.co.uk.Last Accessed 09/06/2014.
13. Abubakar AA, Idris SH, Sabitu K, Shehu AU, Sambo MN. Emergency Preparedness and the Capability to Identify Outbreaks: A Case Study of

Sabon Gari Local Government Area, Kaduna State. Ann Nigerian Med Jan-Jun 2010; 4(1):21-27.
14. Federal Republic of Nigeria. Official Gazette on IDSR. May 2007.p 12-15.
15. Plateau State Government of Nigeria. Nigeria: People, Population and Settlement. Available At www.onlinenigeria.com Last Accessed 03/07/2014.
16. Encyclopedia Britannica. Mangu. Available At http://en.britanica.org. Last Accessed 03/07/2014.
17. Plateau State Government of Nigeria. State Health Management Information System .Health Facilities Data Base by Local Government Area .p1.
18. Park K. Communication for Health Education. In: Parks Text Book of Preventiveand Social Medicine.18th edition: IndiaM/S Banarsidas Bhanot, 2005; p 658-659.
19. Krause G, Ropers G, Stark K. Notifiable Disease Surveillance and Practicing Physicians.Emerg Infect Dis. 2005 March; 11(3): 442–445.
20. Nazzal ZA, Said H, Horeesh NA, Al-Attal S. Measles Surveillance in Qatar, 2008: Physicians' Knowledge andPractices and Support Received. EMHJ, 2011, 17(11): 818-824.
21. Dairo MD,Bamidele JO, Adebimpe WO. Disease Surveillance and Reporting in Two South Western States in Nigeria: Logistic Challenges and Prospects. JournalofPublicHealthandEpidemiology ; September20102(6):125-129.
22. Ofili AN, Ugwu EN, Ziregbe A, Richards R, Salami S. Knowledge of Disease Notification among Doctors in Government Hospitals in Benin City, Edo State, Nigeria. Public Health. 2003 May; 117(3):214-7.
23. Rumisha SF, Mboera LE, Senkoro KP, Gueye D, Mmbuji PK. Monitoring and Evaluation of Integrated Disease Surveillance and Response in Selected Districts in Tanzania. Tanzan Health Res Bull. 2007 Jan; 9(1):1-11.
24. Sow I, Alemu W, Nanyunji M, Duale S, Perry HN, Gaturuku P. Trained District Health Personnel and the Performance of Integrated Disease Surveillance in the WHO African Region. East African Journal of Public Health March 2010; 7(1):16-19.
25. 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 Mar; 12(1):1-5.

Table 1: Pre-Intervention Socio-demographic Data of the Respondents

Characteristics	Intervention group (n = 108) Freq	(%)	Control group (n = 108) Freq	(%)	χ^2	p-value
Age group(years)						
28-37	46	(42.6)	68	(63.0)	10.34	0.0006
38-47	43	(40.0)	32	(29.6)		
48-57	19	(18.0)	8	(7.4)		
Sex						
Female	55	(50.9)	57	(52.8)	0.08	0.7850
Male	53	(49.1)	51	(47.2)		
Religion						
Christianity	97	(89.8)	105	(95.4)	------	**0.0250
Islam	11	(102)	3	(4.6)		
Marital status						
Married	93	(86.1)	85	(78.7)	------	**0.6236
Single	8	(7.4)	14	(13.0)		
Widow	5	(4.6)	4	(3.7)		
Widower	1	(0.9)	2	(1.9)		
Divorced	1	(0.9)	2	(1.9)		
Seperated	0	(0.0)	1	(0.9)		
Highest educational level						
Tertiary	58	(53.7)	69	(63.9)	2.31	0.1280
Secondary	50	(46.3)	39	(36.1)		
Occupation						
CHEW	45	(41.7)	36	(33.3)	----------	** 0.6220
Nurse	16	(14.8)		(13.9)		
Lab Scientist	11	(10.2)	11	(10.2)		
CHO	10	(9.3)	8	(7.4)		
Lab Technician	8	(7.4)	16	(14.8)		
EHO	8	(7.4)	13	(12.0)		
Midwife	7	(6.5)	7	(6.5)		
Dr	3		2	(1.9)		
Ethnicity						
Berom	1	(0.90)	59	(54.6)	----------	**<0.0001
Mwaghavul	55	(50.8)	6	(5.6)		
Mupun	16	(14.8)	1	(0.9)		
Ron	10	(9.3)	11	(10.2)		
Rukuba	1	(0.9)	11	(10.2)		
Ngas	9	(8. 3)	0	(0.0)		
Yoruba	4	(3.7)	2	(1.9)		
Igbo	3	(2.8)	5	(4.6)		
Pyem	3	(2.8)	0	(0.0)		
Jarawa	0	(0.0)	13	(12.0)		
Others *	6	(5.6)	0	(0.0)		
Working Experience (Years)						
>10	51	(47.2)	14	(13.0)	----------	<0.0001
5-10	42	(38.9)	70	(64.8)		
<5	15	(13.9)	54	(50.0)		

*Others - Bogghom, Chip, Fulani, Goemai, Jere, Taroh

** Fisher's exact

Table 2: Knowledge Grading ofIntegrated Disease Surveillance and Response Reporting

Knowledge grade	Intervention group				Control group			
	Pre-intervention		Post-intervention		Pre-intervention		Post-intervention	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Good	52	(48.1)	96	(88.9)	21	(19.5)	19	(17.6)
Poor	56	(51.9)	12	(11.1)	87	(80.6)	89	(82.4)
Total	108	(100.0)	108	(100.0)	108	(100.0)	108	(100.0)

$\chi^2 = 41.55$; $\rho < 0.0001$ $\chi^2 = 0.12$; $\rho = 0.7260$

Table 3: Practice Grading ofIntegrated Disease Surveillance and Response Reporting

Practice Grade	Intervention group				Control group			
	Pre - Intervention		Post - intervention		Pre-intervention		Post-Intervention	
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)
Inappropriate	80	(74.1)	51	(48.1)	98	(90.7)	102	(94.2)
Appropriate	28	(25.9)	57	(51.9)	10	(9.3)	6	(5.8)
Total	108	100.0	108	100.0	108	100.0	108	100.0

$\chi^2 = 16.31$; $p < 0.0000$ $\chi^2 = 1.08$; $p = 0.2990$

Table 4: Reporting Status of the Respondents

Reporting	Intervention group				Control group			
	Pre-Intervention (n=108)		Post-Intervention (n=108)		Pre-Intervention (n=108)		Post-Intervention (n=108)	
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)
None	68	(63.0)	48	(44.4)	78	(72.2)	77	(71.3)
Incomplete	37	(34.3)	12	(11.1)	22	(20.4)	23	(21.3)
Complete	3	(2.8)	48	(44.4)	8	(7.4)	8	(7.4)

$\chi^{2} = 55.91$; $\rho < 0.0001$ $\chi^{2} = 0.03$; $\rho = 0.9860$

Table 5: Timeliness of Reporting

Timeliness	Intervention group				Control group			
	Pre-Intervention (n=108)		Post-Intervention (n=108)		Pre-Intervention (n=108)		Post-Intervention (n=108)	
	Freq	(%)	Freq	(%)	Freq	(%)	Freq	(%)
Untimely	97	(89.8)	74	(68.5)	100	(92.6)	100	(92.6)
Timely	11	(10.2)	34	(31.5)	8	(7.4)	8	(7.4)

$\chi^{2} = 14.85$; $\rho < 0.0001$ $\chi^{2} = 0.00$; $\rho = 1.0000$