

*Original Article****The Survey Effectiveness of Active Method in Communicable Disease Surveillance***Mohammad Moazeni-Bistgani¹ Reza Imani² *Shahla Shahrjerdi³

1- Department Surgery, School of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran

2- Department of Infectious Diseases and Tropical Medicine, School of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran

3- Health Center, Shahrekord University of Medical Sciences, Shahrekord, Iran

*sh.shahrjerdi@gmail.com

(Received: 13 Jan 2015; Revised: 29 Jun 2015; Accepted: 21 Oct 2015)

Abstract

Background and purpose: Surveillance is a system of continuing health checks, is considered as a critical part of public health practice for planning and implantation of effective prevention and control interventions for communicable diseases in the region. The aim of this study was to determine the effects of an active method of data collection on the improvement of these diseases surveillance.

Materials and Methods: This research was an interventional study that carried out from January 2011 to January 2013. We surveyed the number of reporting communicable diseases before and after this modification on collecting data in our region and compared them. We changed the method of data collection from passive to active by experts. The collected data analysis was performed by SPSS software using descriptive statistics and independent samples t-test.

Results: A total of 763 physicians enrolled, of whom 327 were employed in the health centers non-affiliated to the university. In the centers non-affiliated to the university, the mean reporting from these centers were 12.0 ± 8.7 [95% confidence interval (CI): 11.1-13.0] after the intervention, compared with 2.8 ± 3.7 (95% CI: 2.4-3.2) before the intervention. The mean reporting from affiliated centers did not change considerably after the intervention (11.7 ± 16.1 vs. 12.1 ± 16.3). The mean reporting of both groups in 2012 was significantly different from that in 2011 ($P < 0.001$). But no difference was observed between mean reporting of two groups throughout 2012 ($P = 0.998$).

Conclusion: We recommend the active method for collecting data of communicable disease, especially from the physicians in centers non-affiliated to the university.

[Moazeni-Bistgani M, Imani R, *Shahrjerdi Sh. **The Survey Effectiveness of Active Method in Communicable Disease Surveillance.** *Iran J Health Sci* 2015; 3(4): 52-58] <http://jhs.mazums.ac.ir>

Key words: Communicable Diseases, Data Collection, Public Health Surveillance

1. Introduction

Surveillance is considered as a critical part of public health practice in all national health policies. It includes the capability for data collection and analysis, as well as the timely propagation of information about the specific disease to persons who can carry out the effective prevention and control interventions. Health sector managers use this information to determine the priorities, planning, resources allocation, rapid prediction and detection of the outbreak, monitoring and evaluating the practices of diseases prevention and control (1,2).

Every health care provider (e.g., medical doctors), knowing of or in attendance on a case or suspected case of any of the infectious diseases or conditions defined in our country's surveillance system, must report to the local health officer for the jurisdiction where the patient resides. One of the goals of the surveillance system is to collect timeliness reporting infectious diseases, 34 diseases listed and defined in our country's surveillance system according to be communicable and present in local. Collecting data of communicable disease constitutes an important part of surveillance for planning and implantation of effective prevention and control interventions for these diseases. Nevertheless, we observed some of the patients with the reportable communicable disease, who were diagnosed and treated only. The patients neither were reported nor checked out their families. This finding was a threat, which could challenge prevention and control interventions, especially when an outbreak occurs. As, Chaharmahal VA Bakhtiari province (a province in the west of Iran) has special geographic features with many impassable and faraway areas.

Some experts believe, the most common problem of surveillance systems may be complexity and extensiveness it (3). Therefore, we decided to change data collection method from the passive into active

in the health centers to improve these diseases surveillance in our region

2. Materials and Methods

The research was an interventional study that carried out from January 2011 to January 2013. We surveyed the number of reporting infection diseases before and after this modification on collecting data in our region and compared them.

The study population comprised the medical doctors who employed in health centers in Chaharmahal VA Bakhtiari, Iran. According to the available information, of medical doctors 900 employed in this province. We selected them as the sample size under a census method. Of these 137 (15.2%) were excluded due to lack of reporting to a health system. The information obtained from 763 (84.7%) medical doctors. They recorded the data of the patients with reportable communicable diseases in the special form. Based on the World Health Organization (WHO) protocol and because of being communicable and present in local; they were including reporting by the Iranian Ministry of Health and Medical Education.

The method of data collection was passive in 2011. The health care centers achieved the reporting data of physicians working in the health centers non-affiliated to the university (related to other government departments and the private sector) through the patients referred to those centers for receiving health services. Then, they merged the all data and sent to the fighting disease unit province monthly. We changed this method into the active method in 2012.

To collect data in 2012, we designed a suitable and confirmed form for recording patients' information including demographic characteristics and type of disease. At the bottom of the form, we provided a list of 34 communicable diseases and how their reporting to the health system. Nine experts

checked the validity of the form. A test-retest method was conducted on a sample of 20 medical doctors as a pilot. They recorded the data on the form when visiting each infectious disease patient and sent it to the health system by the expert within two consecutive months. A high degree of reliability (correlation coefficient: 0.85) was obtained for the form. This form obtained as the basic information of the reporting physicians. We distributed it among medical doctors in order that they could register the data when visiting the patients. Consequently, we determined and introduced an expert of fighting diseases unit to the physicians for collecting filled-out forms each 15 days in each city. For urgency reporting, we declared the phone number and the email address of fighting diseases unit of each city through this form until they could immediately report the data of some diseases; for example measles.

During implementation, the procedure was monitored and evaluated. The patients were registered and calculated only one time in each group of reporter centers. We checked the details monthly for three purposes: to register, assure, and calculate the reports, classify the reports based on the reporter center, and to find the tools used for sending reports. Repeated reports registered for the both reporter centers. To determine the effectiveness of this method, we compared 2012 data with 2011 data.

The socio-demographic characteristics of physicians in the two groups are expressed by descriptive statistics; frequencies and percentages. The mean reporting of the two groups of reporter centers is presented as a mean ± standard deviation. The comparison of the data between mean reporting of the two groups of reporter centers was conducted by the independent samples t-test. $P < 0.050$ was considered as statistically significant, and analysis was performed using SPSS software (version 16, SPSS Inc., Chicago, IL, USA).

3. Results

About 763 physicians were enrolled into this study, of which 327 were employed in the health centers non-affiliated to the university, and 436 in the health centers affiliated to the university.

3.1. Group A: The physicians employed in the centers affiliated to the university (436)

These physicians comprised 238 men and 198 women. 161 (36.9%) were specialist, and the rest were general physicians. They were employed in the centers affiliated to the university; 238 in healthcare centers, 183 in hospitals and 15 in medical laboratories (Table 1). All physicians reported the data within 2 years under study. All physicians recorded the data in the form in 2012. They sent the filled-out forms by the expert (408, 93.6%) and the phone (28, 6.4%). Table 2 summarizes the mean reporting. There was a significant difference between the mean reporting before and after the intervention ($P < 0.001$).

Table 1. Socio-demographic characteristics of physicians in the two groups

Reporter centers	Variable	N	%
Affiliated to the university (n = 436)	Sex		
	Male	238	54.6
	Female	198	45.4
	Education		
	Specialist	161	36.9
	General practitioner	275	63.1
Non-affiliated to the university (n = 327)	Workplace		
	Health care center, hospitals	421	96.5
	Laboratories	15	3.5
	Sex		
	Male	191	58.4
	Female	126	41.6
	Education		
	Specialist	97	29.6
	General practitioner	230	70.4
	Workplace		
	Clinics	317	96.9
	Laboratories	10	3.1

Table 2. Mean, standard deviation, and 95% confidence interval of reporting by physicians in the two groups

Reporter centers	Study years				P value *
	2011-year Mean ± SD	2011-year 95% CI	2012-year Mean ± SD	2012-year 95% CI	
Affiliated to the university (n = 436)	11.7 ± 16.1	10.2-13.2	12.1 ± 16.3	10.5-13.6	P < 0.001
Non-affiliated to the university (n = 327)	2.8 ± 3.7	2.4-3.2	12.0 ± 8.7	11.1-13.0	P < 0.001
The total reporting (n = 763)	7.9 ± 13.1	6.9-8.8	12.0 ± 13.6	11.1-13.0	P < 0.001

SD: Standard deviation, CI: Confidence interval

3.2. Group B: The physicians employed in the centers non-affiliated to the university (327)

These physicians comprised 191 men and 126 women. 97 (29.6%) were specialists and the rest general physicians. 117 were employed in the clinics and 10 in medical laboratories (Table 1). 49 (15.0%) physicians reported within the 2 years under study and 278 (85.0%) physicians did in 2012 only. All physicians (327) recorded the data in the form in 2012. They sent the filled-out forms by the expert (275, 83.8%), the phone (27, 8.2%), and the electronic mail addresses of fighting diseases units (25, 7.6%). Table 2 summarizes the mean reporting. There was a significant difference between the mean reporting before and after the intervention (P < 0.001).

Figure 1 shows the frequency distribution of reported communicable diseases and the used tools for reporting by two groups' physicians.

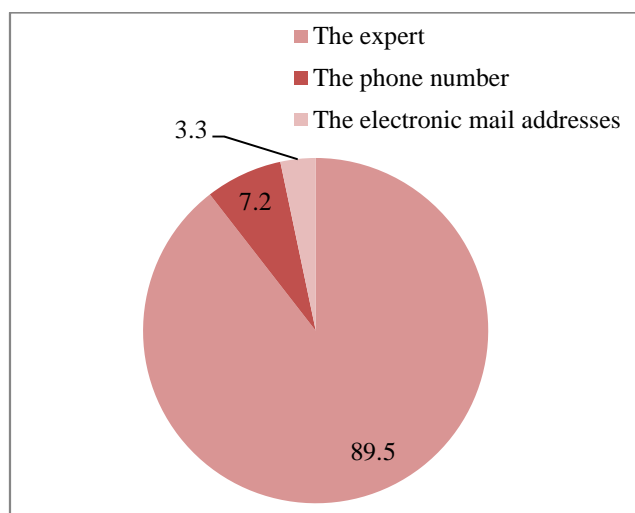


Figure 1. Frequency distribution of the used tools for reporting by physicians in the study

3.3. Comparison of reporting between the physicians in the two groups

There was a significant difference between mean reporting of two groups (affiliated vs. non-affiliated) in 2011 (P < 0.001). But after the intervention, no difference was observed between mean reporting of two groups in 2012 (P = 0.998).

4. Discussion

In the present study, we studied the effectiveness of the active method in the improvement of communicable disease surveillance through changing the passive data collection of these diseases into active in the health centers in Chaharmahal VA Bakhtiari province. The result of this study was consistent with our predictions in 2011. Mean reporting by medical doctors of health centers (affiliated and non-affiliated) increased after the intervention (Table 2) and all medical doctors of these centers recorded the data in the form. Notably, the identified diseases were not limited to a particular group of diseases. No outbreak, change in weather, and water scarcity (4,5) happened in our province during 2012 compared with 2011.

In our study, the reporting increased in the reporter centers, especially the health centers non-affiliated to the university, after the intervention. It meant the medical doctors of the centers non-affiliated to the university (the private sectors) had a low participation and weakness in referral system in 2011 (6). This is similar to a study by Sahal et al. (7). Hence, this success was caused by presentation of the special form and use of the active method for

collecting data. According to Jekel et al. (8), a reporting rate of only 30 to 62% could be achieved by passive method.

At the bottom of the form, we listed reportable communicable diseases and how they should be reported to reduce the possibility of low participation rate by the physicians due to lack of knowledge (9-11). To remove this possibility, health sector managers continuously insisted on implementing educational programs in undergraduate and postgraduate courses for physicians on reporting reportable communicable diseases and its requirement.

Regarding the approved laws (12) stating the medical doctors are accountable for reporting communicable diseases under surveillance of the health system, we advised the health managers to inform physicians about these laws continuously and to perform a strict supervision on implementing of these laws by medical doctors in health centers. Therefore, it is better the reporting is considered as a positive point in the quality evaluation of the health centers, especially in the private sector.

In the present study, we designed and applied a simple form for recording the data of patients. When physicians visited each infectious disease patient, they recorded characteristic of patients in this form. All medical doctors of the health centers (affiliated and non-affiliated to the university) recorded their data in this form. This is similar to some studies (13-16), in which a tool was developed for collecting data based on regional conditions. Therefore, experts collected and sent most of these recorded forms (89.5%) in 2012. By this way, we could partially improve physicians' participation in reporting, and achieve an effective intersectoral collaboration (17). Thus, we could gain ample accurate information in our region. It could be a step toward achieving goals, strategies, and indicators of the health system vision of Iran in 2025 (17-19). We

suggest this method to be used, especially in the regions that have many active private health centers.

Concerning the kind of reporting of these diseases (urgent or non-urgent), in this study, some of the medical doctors selected other ways for sending the data, for example calling fight diseases units (7.2%). They applied this tool for immediately reporting some diseases, such as measles and poliomyelitis (1). We reminded the physicians of this point at the bottom of the form. Another suggested method is the electronic mail address of fighting diseases units. Few physicians selected this way (only 25 physicians, 3.3%). Because of the available electronic facilities, collecting data could be convenient by modern technologies such as mobile and web GIS, especially when an outbreak occurs (15,16,20,21). With regard to geographic conditions of the province under study, appropriate tools are needed for collecting information. Therefore, health managers should supply necessary facilities and physicians should be trained on how to use modern technologies (4,22).

Our study has several strengths. Specifically, we used the census-sampling method, and a large number of medical doctors participated in our study. Therefore, our findings could be generalized to the other regions, especially those with many active private centers. In addition, the medical doctors received face-to-face training when the experts were collecting data.

However, there are also several limitations in this study. According to the conditions and features of this province, the experts collected the data each 15 days and, therefore, we might have no efficient prevention and control interventions at critical times, for example, an outbreak. Sending feedback by higher authorities are essential (23) and useful (24) for reporting. Unfortunately, we did not this action in our study.

Besides, the health system in our province

is facing a load transition from communicable to non-communicable diseases, similar to the other provinces (20). We suggest future studies to investigate the tools of collecting data on non-communicable diseases.

We recommend an active method for collecting data of communicable disease, especially for the data obtained by the physicians in the centers non-affiliated to the university. Through good management of data collection, we could have a good cooperation of physicians with the health system and finally improve intersectoral collaboration. This collaboration could be continuous if we encourage the reporting physicians especially those who use high technologies to send the data and consider the reporting as a positive point in the quality evaluation of all health centers, especially private ones.

Conflict of Interests

The Authors have no conflict of interest.

Acknowledgement

The authors would like to thank Deputy of Health, Shahrekord University of Medical Sciences, Iran, for cooperating in the data collection, as well as the Deputy of Research and Technology for funding this project (Grant Number; 995). Furthermore, we gratefully thank the physicians who participated in this study and experts of fighting diseases units who assisted us in data collection.

References

1. Gooya M. Emerging re-emerging infectious diseases and employee health: New system for the care of contagious diseases in the world. Tehran, Iran: Ministry of Health and Medical Education; 2009. p. 322-9. [Online]. [cited 2009]; Available from: URL: http://www.elib.hbi.ir/persian/EMERGING_EBOOK/11_SURVEILLANCE.htm. [In Persian]
2. World Health Organization. WHO recommended surveillance standards. 2nd ed. Geneva, Switzerland: WHO; 1999. p. 8-14.
3. Salaril Sh, Entezar Mahdi R. Text book of education guideline of communicable diseases surveillance. 1st ed. Urmia, Iran: Urmia University of Medical Sciences; 2003.p. 9-23. [In Persian]
4. Keramarou M, Evans MR. Completeness of infectious disease notification in the United Kingdom: A systematic review. *J Infect* 2012; 64(6): 555-64.
5. 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(9): 866-74.
6. Larijani B, Delavari A, Damari B, Vosoogh Moghadam A, Majdzadeh R. Health policy making system in Islamic Republic of Iran: Review an experience. *Iran J Public Health* 2009; 38(Suppl 1): 1-3.
7. Sahal N, Reintjes R, Aro AR. Review article: communicable diseases surveillance lessons learned from developed and developing countries: literature review. *Scand J Public Health* 2009; 37(2): 187-200.
8. Jekel JF, Katz DL, Wild D, Elmore JG. *Epidemiology, biostatistics and preventive medicine*. 2nd ed. Philadelphia, PA: Saunders; 2001.
9. Nader F, Askarian M. How do Iranian physicians report notifiable diseases? The first report from Iran. *Am J Infect Control* 2009; 37(6): 500-4.
10. Nojoomi M, Vaseghi S. The comparative study of general physician's knowledge in private and governmental sectors about reportable disease. *Razi J Med Sci* 2003; 10(34): 317-23. [In Persian]
11. Kolahi A, Sohrabi M, Abdi P. Knowledge and practice of general practitioners about Surveillance System. *Iran J Infect Dis* 2010; 15(49): 23-9. [In Persian]
12. Zahraei M. Persian textbook of public health. 3rd. Tehran, Iran: Ministry of Health and Medical Education; 2012. p. 908-13. [Online]. [cited 2012]; Available from: URL:http://www.elib.hbi.ir/persian/PUBLIC_HEALTH_EBOOK/08_06.htm. [In Persian]
13. Li YP, Fang LQ, Gao SQ, Wang Z, Gao HW,

- Liu P, et al. Decision support system for the response to infectious disease emergencies based on WebGIS and mobile services in China. *PLoS One* 2013; 8(1): e54842.
14. Rweyemamu MM, Mmbuji P, Karimuribo E, Paweska J, Kamarage D, Neves L, et al. The Southern African Centre for infectious disease surveillance: a one health consortium. *Emerg Health Threats J* 2013; 6.
 15. Chretien JP, Burkom HS, Sedyaningsih ER, Larasati RP, Lescano AG, Mundaca CC, et al. Syndromic surveillance: adapting innovations to developing settings. *PLoS Med* 2008; 5(3): e72.
 16. Wei L, Zhang M. The adoption and use of mobile phone in rural China: A case study of Hubei, China. *Telematics and Informatics* 2008; 25(3): 169-86.
 17. Beheshtian M, Olyaei Manesh A, Bonakdar SH, Malek Afzali H, Larijani B, Hosseini L, et al. Intersectoral collaboration to develop health equity indicators in Iran. *Iran J Public Health* 2013; 42(Suppl 1): 31-5.
 18. Rostamigooran N, Esmailzadeh H, Rajabi F, Majdzadeh R, Larijani B, Dastgerdi MV. Health system vision of Iran in 2025. *Iran J Public Health* 2013; 42(Suppl 1): 18-22.
 19. Rajabi F, Esmailzadeh H, Rostamigooran N, Majdzadeh R. What must be the pillars of Iran's health system in 2025? Values and principles of health system reform plan. *Iran J Public Health* 2013; 42(2): 197-205.
 20. Abellera JP, Srinivasan A, Danos CS, McNabb S, Rhodes B. Unified messaging solution for biosurveillance and disease surveillance. *AMIA Annu Symp Proc* 2007; 11: 857.
 21. Yang C, Yang J, Luo X, Gong P. Use of mobile phones in an emergency reporting system for infectious disease surveillance after the Sichuan earthquake in China. *Bull World Health Organ* 2009; 87(8): 619-23.
 22. Chunara R, Freifeld CC, Brownstein JS. New technologies for reporting real-time emergent infections. *Parasitology* 2012; 139(14): 1843-51.
 23. Azemikhah A, Amirkhani MA, Jalilvand P, Emami Afshar N, Radpooyan L, Changizi N. National maternal mortality surveillance system in Iran. *Iran J Public Health* 2009; 38(Suppl 1): 90-2.
 24. Nicolay N, Garvey P, Delappe N, Cormican M, McKeown P. Completeness and timeliness of Salmonella notifications in Ireland in 2008: a cross sectional study. *BMC Public Health* 2010; 10: 568.