Rusnak, Duric, Jakubcova, Rusnakova, Obradovic-Balihodzic. Introduction of the European Union case definitions to primary care physicians has improved the quality of communicable diseases notification in Tuzla, Bosnia and Herzegovina (Original research). SEEJPH 2017, posted: 22 May 2017. DOI: 10.4119/UNIBI/SEEJPH - 2017-143

ORIGINAL RESEARCH

Introduction of the European Union case definitions to primary care physicians has improved the quality of communicable diseases notification in Tuzla, Bosnia and Herzegovina

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Abstract

Aim: The Public Health Reform II project was implemented in Bosnia and Herzegovina from December 2011 to December 2013 and was funded by the European Union Aid schema. The principal aim of the project was to strengthen public health services in the country through improved control of public health threats. Workshops for primary care physicians were provided to improve the situation and increase communicable diseases notification rates in eight selected primary care centres. They were followed with visits from the project's implementing team to verify the effects of trainings.
Methods: The quality of notifications from physicians in Tuzla region was compared before and after the workshop. The timeliness was used as an indicator of quality. Medians of timeliness before and after the training were compared by use of Wilcoxon test, whereas the averages of timeliness were compared by use of the t-test.
Results: There were 980 reported cases, 80% before the training and 20% after the training. A lower median of timeliness for all the reported cases after the training was statistically significant compared to the median value before the training. A similar picture was revealed for specific diseases i.e. tuberculosis and enteritis, not so for scarlet fever and scabies.
Conclusion: The significant reduction in time response between the first symptoms and disease diagnosis indicates the positive impact of the training program in Tuzla. Hence, primary care physicians provided better quality of reported data after the training course.

Keywords: Bosnia and Herzegovina, communicable diseases notification, surveillance, timeliness, Tuzla.

Conflicts of interest: None.

Acknowledgements: The authors are grateful to all primary care physicians and epidemiologists for their interest in training topics and to the management teams of health care centres for their close cooperation.

Funding: The data used for this study were collected within the Public Health Reform II project in Bosnia and Herzegovina. The project was funded by the European Union (EU) as a part of the Instrument for Pre-Accession Assistance (IPA). The project was implemented by the consortium comprising the CEU Consulting GmBh, Wien, Austria and DIADIKASIA, Athens, Greece.

Introduction

Surveillance on communicable diseases is defined as an ongoing, systematic collection, analysis, interpretation and dissemination of infectious disease data for public health action (1,2). Effective surveillance provides information on infections that are the most important causes of illness, disability and death, populations at risk, outbreaks, demands on health care services and effectiveness of control programs so priorities for prevention activities can be determined (3,4).

The primary aim of infectious diseases surveillance is to eliminate and eradicate disease incidence with two core functions: early warning system for outbreaks and early response to disease occurrence, known also as epidemiological intelligence. An early warning and response system for the prevention and control of communicable diseases is essential for ensuring public health at the regional, national and global levels. Recent cases of severe acute respiratory syndrome, avian influenza, haemorrhagic fevers and especially the threats arising from the possibility of misuse of biological and chemical agents demonstrate the need for an effective system of surveillance and early warning at national level providing a higher data structure (5-7).

The structure of surveillance system is based on the existing legislation, goals and priorities, implementation strategies, identification of stakeholders and their mutual connections, networks and partnerships and also capacity for disease diagnosis. Primary care physicians or general practitioners who provide the first contact with a patient play a crucial role in the system. The surveillance system relies on the detection of communicable disease in the patients and disease notification (8-10).

The project Public Health Reform II (Europe Aid/128400/C/SER/BA)was implemented in Bosnia and Herzegovina from December 2011 till December 2013 and was funded by the European Union Aid schema. Its principal aim was to strengthen public health services in the country through improved control of public health threats. One of the three components of the project dealt with enhancing and improving assessment of global public health and the system of communicable diseases notification.

Based on an interest from regional public health authorities, eight of them were selected to participate in some workshops. Interviews with general practitioners in each region were taken during the initial phase of the activities. Professionals who were interviewed indicated the following challenges for the surveillance system they contribute to: the list of mandatory notified diseases too long, clear case definitions and rationale for surveillance missing, mixture of case-based (11) and syndromic surveillance (12), lack of capacity for cases confirmation and a low level of communication among all surveillance stakeholders.

The interview findings led to organization of workshops for primary care physicians in eight primary health care centres during March 2013. The aim was to improve the situation and increase notification rates. It was expected that acquiring deeper insights into the role of disease notification would lead to an increased effectiveness of the surveillance system. Outcomes from the effort to improve the quality of notifications in the region of Tuzla are reported in this paper. Physicians from the county were invited in cooperation with the local public health office and notifications were stored in electronic format. This set-up of the endeavour was uniformly repeated across all the eight regions of Bosnia and Herzegovina.

Methods

Study design

The study was designed with the aim of revealing potential effects of updating primary care physicians with details of surveillance. Thus, a cohort of primary care physicians was used to follow the effects. Selection of participants was on the basis of interest. No attempts to randomize were undertaken. The project collected baseline data on notification from the database maintained by the Tuzla epidemiologists for year 2012 up to February 2013. The workshop was carried in March 2013. The project attempted to keep contact with participants by email and by personal visits. Data from the same source were collected until October 2013. There were 20 participants at the first workshop. Estimating the proportion from the total of those who serve the region was not possible because of the lack of data. However, the total number of general practitioners listed in 2014 was 378 physicians (13) as our participants were mostly from offices within the city of Tuzla. Our estimate is based on the average number of citizens per general practitioners (GPs) in the region which is 1263 inhabitants per GP. Tuzla has 120441 inhabitants according to the census from 2013, which results in about 95 general practitioners in the city. Hence, participation in the workshop represents approximately 21% of all primary care physicians in Tuzla.

Workshop

The workshop started with an introduction of aims and expected outcomes. Assessment of knowledge on surveillance, disease reporting and attitudes to disease notification followed. Principles of communicable disease surveillance and use of case definitions with emphasis on importance of surveillance, techniques, categories and use of the EU case definitions were presented by the project. Following discussion dealt with everyday problems and opinions on the system of surveillance as well as the use of the EU case definitions. At the end of the workshop each participant received a copy of the EU case definitions, translated into the local language. Local management of primary health care centres and people from epidemiology department were also invited to participate as observers.

All data were anonymised and no ethical considerations were identified.

Data processing

The timeliness for notifications obtained from primary care physicians in the town of Tuzla was compared before and after the workshop. The timeliness was used as an indicator of quality, as it reflects the speed between steps in a public health surveillance system (14).

We chose the following definition of timeliness out of several options: *"Average time interval between date of onset and date of notification by general practitioners/hospital (by disease, region and surveillance unit). It means time interval between the first symptoms of diseases and reporting"*, as defined by the ECDC (15). Timeliness was computed from dates stated in individual notifications separately for those noted before and after the workshop.

The file was sorted based on the ICD-10 diagnosis stated by the physician notifying the case and laboratory confirmation. Timeliness was computed for all the diagnoses as well as selected ICDs for tuberculosis (A15), scarlet fever (A38), enteritis (A09) and scabies (B86).

Differences in medians before and after the workshop were compared by use of the two-sample Wilcoxon Rank Sum Test and Signed Rank Tests and the average values were compared by the two-sample independent t-test from the R project (16), with a level of statistical significance set at $P \leq 0.05$.

Results

As Table 1 illustrates, the sample comprised 980 reported cases, 784 (80%) were before the training and 196 (20%) were reported after the workshop.

In total, 147 primary care physicians reported syndromic diagnosis of a communicable disease case (140 before the workshop and 69 after the workshop).

Table 1. Timeliness for notified cases before and after the workshop

Total sample				
Sample	**Total**	**Before**	**After**	**P-value**
Total Cases	980	784	196	
Median	1	6	1	0.030*
Average	12	20.2	9.2	0.039†
Maximum	152	152	133	
Minimum	0	0	0	
Tuberculosis				
Sample	**Total**	**Before**	**After**	**P-value**
Total Cases	159	99	60	
Median	58	60	13	0.014*
Average	57.1	57.6	27	0.019†
Maximum	152	152	133	
Minimum	0	0	0	
Enteritis (A09)				
Sample	**Total**	**Before**	**After**	**P-value**
Total Cases	132	86	46	
Median	2	3	2	0.035*
Average	3.7	3.2	2.7	0.065†
Maximum	41	41	23	
Minimum	0	0	0	
Scarlet fever (A38)				
Sample	**Total**	**Before**	**After**	**P-value**
Total Cases	33	17	16	
Median	0	1	0	0.487*
Average	1.8	1.6	1.5	0.611†
Maximum	13	13	13	
Minimum	0	0	0	
Scabies (B86)				
Sample	**Total**	**Before**	**After**	**P-value**
Total Cases	98	71	27	
Median	0	1	0	0.512*
Average	1.7	3.9	2.7	0.481†
Maximum	37	37	13	
Minimum	0	0	0	

*P-values from Wilcoxon test.

†P-values from t-test.

The difference in medians of timeliness for the total sample (Table 1) indicates a reduction from 6 days to 1 day following the workshop; the average of the indicator was reduced to one half. The difference was statistically significant for both the median value (p=0.03) and the mean value (p=0.04). The reduction for notified cases of tuberculosis was more pronounced. It

went down from a median of 60 days to 13 days (p=0.01), whereas the mean from 57.6 days to 27.0 days and this difference was statistically significant too (p=0.02).
The median of timeliness notification for enteritis cases was significantly lowered after the workshop from 3 days to 2 days and this difference was statistically significant (p=0.03). Furthermore, this difference was also evident in the comparison of mean values.
There were no significant differences in both median and mean values in the timeliness for scarlet fever and scabies before and after the workshop (Table 1).

Discussion

The surveillance system in Bosnia and Herzegovina suffered after the war. It is not stabilized yet, experiencing lack of funds, and it is both organizationally as well as politically divided. It is run on a regional basis, where all primary care physicians are legally required to notify cases based on syndromic diagnosis. Such a system is characterized by underreporting due to lack of responsibility and weak supervision from authorities. Nevertheless, some authors have demonstrated positive effects of an information campaign on improved notifications in a province of Vojvodina, Serbia (17) where public health services operate in a similar environment to Bosnia and Herzegovina.
This project in Bosnia and Herzegovina aimed to increase syndromic notification rates through focused workshops as an example for regional epidemiologists how to continue with improving quality of the surveillance. However, we are aware that the quality consists of a multidimensional character and the timeliness is only one of them. Thus, using it for a proxy of quality has its limitations. Timeliness of a surveillance system depends on a number of factors and its assessment should include a consideration of how the data will be used and is specific for individual diseases under surveillance (3,18). Other indicators of timeliness are also available, such as the average time interval between the date of outbreak notification and the date of the first investigation or proportion of outbreaks notified within 48 hours of detection and the like. Obtaining a comprehensive assessment of surveillance quality requires considering more attributes, such as sensitivity, representativeness, usefulness, simplicity, acceptability and flexibility (15,19). Therefore, even so, this report demonstrates a significant reduction in notification time between syndromic diagnosis and notifications, and the quality improvement was achieved incompletely. Another opened question is whether or not achievements are to be sustained. Nevertheless, the changes in notifications were observed after the workshops, based on a follow-up evaluation.
Our findings are congruent with similar studies where timeliness of disease notification was also followed and reported, before and after some type of intervention with a main aim to reduce time response between two steps in the process of reporting. Implementation of electronic laboratory reporting resulted in reducing the median of timeliness to 20 days versus 25 days for non-electronic laboratory reporting (20). Another study has demonstrated reduced median of timeliness for notifications by 17 days from the year 2000 to 2006 with a higher rate of notification completeness (21).
The importance of increased interaction between primary care physicians and surveillance professionals in notifying communicable diseases was demonstrated in our study, as well. Providing case definitions from the EU and along with the local ones was appreciated and probably contributed to improved notification rates. The fact that standard case definition is a premise for data quality and validity (22) was reconfirmed with similar studies reported (23,24), where increased dedication to reporting with data quality- timeliness and completeness was observed. There are factors which are beyond the influence of physicians, such as patient's awareness of symptoms, patient's search for medical care, capacity for case confirmation,

reporting of laboratory test results back to the physician and to other surveillance stakeholders and public health agencies, which limit the validity of interpretation of the findings, too. Another limitation stems from the limited time of the study, where 80% of cases were reported before the workshop and 20% of cases were notified after the workshop. Another serious limitation of this study stems from the design used. Given the specific audience we worked with, namely general practitioners from various parts of the administrative area, the selection of the study participants was "on the basis of interest". As an EUROPEAID project we had no other choice. Therefore, the results based on such constrained participation should not be utilized with valid statistical inference on the level of population. The sample representativeness may seriously affect the generalizability (external validity) of the findings. Nevertheless, the study was intended to be more of a pilot nature, demonstrating the feasibility of monitoring the quality of the surveillance system.

Communicable disease surveillance is the first step towards prevention and it is one of the most important tools used in public health. The surveillance system should be regularly evaluated in terms of usefulness and quality by defined standards and recommendations. In this report, we shared results of the surveillance system evaluation in Tuzla, Bosnia and Herzegovina by using one of quality standards- timeliness of disease notification before the training and after the training. This study underlined the importance and effectiveness of increased communication and feedback procedures between primary care physicians and surveillance professionals, use of standard case definition and surveillance evaluation. The identified outcomes of evaluation should be the basis for setting priorities and activities to improve the quality and effectiveness of the surveillance system.

References

1. World Health Organization. Communicable disease surveillance and response systems. Geneva, Switzerland; 2006. http://www.who.int/csr/resources/publications/surveillance/WHO_CDS_EPR_LYO_2006_2.pdf (accessed: 29 March, 2017).
2. World Health Organization. Recommended Surveillance Standards (second edn.). Geneva, Switzerland; 1999. http://www.who.int/csr/resources/publications/surveillance/whocdscsrisr992.pdf (accessed: 29 March, 2017).
3. Centres for Disease Control and Prevention. Progress in improving state and local disease surveillance – United States, 2000–2005. Atlanta, USA; 2005. http://www.cdc.gov/MMWR/preview/mmwrhtml/rr5013a1.htm (accessed: 21 July, 2015).
4. Lemon SM, Hamburg MA, Sparling FP, Choffnes ER, Mack A. Global Infectious Disease Surveillance and Detection: Assessing the Challenges- Finding Solutions. Washington, DC: The National Academies Press; 2007.
5. European Centre for Disease Control and Prevention. Surveillance objectives. Stockholm, Sweden. http://ecdc.europa.eu/en/activities/surveillance/Pages/surveillance_objectives.aspx (accessed: 29 March, 2017).
6. Weinberg J. Surveillance and control of infectious diseases at local, national and international levels. Clin Microbiol Infect 2005;11:11-4.
7. Rolfhamre P, Grabowska K, Ekdahl K. Implementing a public web based GIS service for feedback of surveillance data on communicable diseases in Sweden. BMC Infect Dis 2004;4:17.

8. Jamison DT, Breman JG, Measham AR, Alleyne G, Claeson M, Evans DB, et al. Disease Control Priorities in Developing Countries, 2nd edition. Washington DC: World Bank; 2006.
9. Baker MG, Fidler DP. Global Public Health Surveillance under New International Health Regulations. Emerg Infect Dis2011;7:1058-63.
10. Souty C. Improving disease incidence estimates in primary care surveillance systems. Popul Health Metr 2014;19:12.
11. WHO. WHO Technical consultation on event-based surveillance- Meeting report. Lyon: France; 2013. http://www.episouthnetwork.org/sites/default/files/meeting_report_ebs_march_2013_final.pdf (accessed: 29 March, 2017).
12. Henning, KJ. What is syndromic surveillance. MMWR Morb Mortal Wkly Rep 2004;53:7-11.
13. Institute for Public Health FB& H. Health statistics annual Federation of Bosnia and Herzegovina. Sarajevo; 2013. http://www.zzjzfbih.ba/wp-content/uploads/2009/02/Zdravstveno-statisticki-godisnjak-FBiH-20121.pdf (accessed: 29 March, 2017).
14. Thackers SB, Stroup DF. Future directions for comprehensive public health surveillance and health information systems in the United States. Am J Epidemiol 1994;140:383-97.
15. European Centre for Disease Control and Prevention. Data quality monitoring and surveillance system evaluation – A handbook of methods and applications. Stockholm, Sweden; 2014. http://ecdc.europa.eu/en/publications/publications/data-quality-monitoring-surveillance-system-evaluation-sept-2014.pdf (accessed: 29 March, 2017).
16. The R Project for Statistical Computing. Vienna, Austria.http://www.R-project.org/ (accessed: 29 March, 2017).
17. Duric P, Ilic S. Quality of infectious diseases surveillance in primary health care. Sri Lank J Infect Dis 2012;2:37-46.
18. Yoo HS, Park O, Park HK, LeeEG, Jeong EK, Lee JK, et al. Timeliness of national notifiable diseases surveillance system in Korea: a cross-sectional study. BMC Public Health 2009;9:93.
19. Buehler JW, Hopkins SR, Overhage JM, Sosin DMT. Framework for evaluating public health surveillance systems for early detection of outbreaks: recommendations from the CDC Working Group. MMWR Recomm Rep 2004;53:1-11.
20. Samoff E, Fangman MT, Fleischauer AT, Waller AE, Macdonald PD. Improvements in timeliness resulting from implementation of electronic laboratory reporting and an electronic disease surveillance system. Public Health Rep 2013;128:393-8.
21. Jansonn A. Timeliness of case reporting in the Swedish statutory surveillance of communicable diseases 1998-2002. Scand J Infect Dis 2004;36:865-72.
22. Jajosky RA, Groseclose S. Evaluation of reporting timeliness of public health surveillance systems for infectious diseases. BMC Public Health 2004;4:29.
23. Turnberg W, Daniell W, Duchin J. Notifiable infectious disease reporting awareness among physicians and registered nurses in primary care and emergency department settings. Am J Infect Control 2010;38:410-13.
24. Keramarou M, Evans MR. Completeness of infectious disease notification in the United Kingdom: A systematic review. J Infect 2012;64:555-64.

Rusnak, Duric, Jakubcova, Rusnakova, Obradovic-Balihodzic. Introduction of the European Union case definitions to primary care physicians has improved the quality of communicable diseases notification in Tuzla, Bosnia and Herzegovina (Original research). SEEJPH 2017, posted: 22 May 2017. DOI: 10.4119/UNIBI/SEEJPH - 2017-143