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Influence of on-job training on quality of infectious disease surveillance

Wpływ dokształcania zawodowego na jakość nadzoru nad chorobami zakaźnymi

Abstract:

Infectious disease surveillance systems are a very important part of national and local efforts to prevent and control infectious diseases. In many countries, especially those with limited health systems, the role of primary care physicians in surveillance is essential, but their lack of knowledge about surveillance can often be a barrier for an effective surveillance system. A one day training seminar was provided to physicians in a primary care centre in AP Vojvodina, Serbia and notifications of infectious diseases by trained physicians were then followed. After the training, the incidences of registered infectious diseases rose 3.9 times (7.5 times with chicken pox excluded). This was mostly for infectious diseases which do not require laboratory confirmation (streptococcal infections, intestinal infectious diseases). The average number of reports per physician increased nearly 8 times with almost all the physicians who participated in the surveillance study.

Streszczenie:

Systemy nadzoru nad występowaniem chorób zakaźnych są bardzo ważnym elementem krajowych i lokalnych działań, mających na celu zapobieganie i kontrolę nad rozprzestrzenianiem się chorób zakaźnych. W wielu krajach, w szczególności tych z ograniczonymi zasobami systemów ochrony zdrowia, podstawową rolę w nadzorze pełnią lekarze. Niedostateczna ich wiedza w tej materii często bywa barierą dla efektywnego systemu nadzoru. Przeszkolono lekarzy w systemie jednodniowego seminarium w Instytucie Zdrowia Publicznego w Vojvodinie w Serbii. Szkolenia przeprowadzili wcześniej odpowiednio przygotowani w tym kierunku lekarze. Po takim szkoleniu 3,9 razy wzrosła częstość zarejestrowania przypadków chorób zakaźnych (nie licząc ospy wietrznej, gdzie częstość ta zmalała 7.5 razy). Dotyczyło to głównie chorób zakaźnych, które nie wymagają potwierdzenia laboratorium (infekcje paciorkowcowe, jelitowe choroby zakaźne). Średnia liczba sprawozdań w przeliczeniu na jednego lekarza powiększyła się prawie 8 razy i dotyczyło to prawie wszystkich lekarzy sprawujących nadzór na chorobami zakaźnymi i uczestniczących w niniejszym badaniu.

Keywords: *epidemiology, communicable diseases, primary health care, surveillance, health education*

Słowa kluczowe: *epidemiologia, choroby zakaźne, podstawowa opieka zdrowotna, nadzór, edukacja zdrowia*

Introduction

Epidemiological surveillance is defined as the routine systematic collection, analysis, and data interpretation concerning human diseases, and their distribution to all government and health care workers who need this data to be able to carry out certain measures [1,2].

Surveillance of infectious diseases represents a part of a public health management program within a wider health information system. Early epidemic detection is necessary for efficient and rapid control while information on endemic infectious diseases is essential in the monitoring of these diseases [3]. Systematic registration of infectious diseases by medical workers and laboratories creates an effective database for public health assessment [4].

It is critical for all countries to have the capacity to detect, assess, and respond to public health events, and to be able to contain the spread of diseases within their borders, thus minimizing the international spread of diseases [5].

Primary health care physicians are frequently the first physicians and very often the only physicians to see patients with infectious diseases. A survey of national systems in Europe in 1991-92 demonstrated that the time unit for reporting ranged from daily to once a year and for mandatory notification systems of STD completeness of

reporting varied from over 90% to less than 10% and most countries did not use case definitions [6].

Notification of infectious diseases is mandatory and has a long tradition in the Republic of Serbia. Recent studies revealed that the quality of infectious diseases, including sensitivity, completeness and participation of primary care physicians is not satisfactory [7,8].

Unsatisfactory training in surveillance methodology combined with low awareness on surveillance goals, as well as a lack of case definitions and diagnostic and communication equipment were among the principal reasons identified.

All notification reports are collected by institutes of public health on district level and then sent to The Institute of Public Health of Vojvodina collecting them from the entire autonomous province. Based on their experience with the quality of notifications, epidemiologists from the Institute of Public Health of Vojvodina, Centre for Disease Control and Prevention in the Republic of Serbia have recognized the need for on-job training aimed at attaining improvement in this area among primary care physicians. As a pilot site for this endeavour the Primary Care Centre in Temerin was selected. The team reported the results of the evaluating effects of the on-job training supported by provision of case-definitions and alleviating the approach to diagnostic and communication tools. The effort revealed a number of valuable observations, it tested educational approaches and learning materials, and generally improved the quality of reporting. The lessons learned will be used to foster similar activities with physicians from other primary care centres in the country.

Materials and Methods

Design

The project was designed in two phases. The introductory one lasted two months and comprised of the training activities and preparation of managerial changes. During the second phase, the collection of notifications continued under the new management structure, using case definitions by already trained staff. An evaluation of the process and the results was done at the end of the fifth month of the project.

The Primary Care Centre in Temerin was selected for the intervention, based on its history of good cooperation with health centre authorities; relative geographical closeness (important for every day communication and supervision); the small number of settlements and practitioners; and the relatively low incidence of infectious diseases (small number of reported infectious diseases).

The Primary Care Centre in Temerin is the only one primary care institution within the Municipality of Temerin that is divided into three settlements. The centre is divided into five health stations; four of them provide services of general medicine and one is comprised of general practitioners, paediatricians, a gynaecologist and other out patient specializations.

Altogether the centre employs thirty physicians, out of whom twenty-four were included in the project. Twelve were from general medicine, six from emergency medicine, four from paediatrics and two were gynaecology specialists.

Training

The on-job training for medical doctors who are to provide notification of communicable diseases was composed of one day on-job training in surveillance approaches, in the collection of biological samples, and the coordination algorithm was described and interviews with participants were carried out. The sessions tackled issues concerning the definition and significance of infection diseases surveillance, a review of the local epidemiological situation and the quality of infectious diseases reporting. Subsequently, the methodology of reporting infectious diseases with examples was exercised. A set of forms for reporting along and a booklet with case definitions were distributed to all participants. The staff of the Primary Care Centre in Temerin were trained in the sampling of biological material from health stations as well as how to keep and transport material. A training manual was distributed to the staff.

Changes in management

A coordinator for surveillance at the health centre level was selected, as were coordinators at all service levels and in the health stations. Trained couriers delivered infectious diseases forms to the Institute of Public Health of Vojvodina. The role of the reporting coordinator was to supervise and receive reporting methodology and feedback information. Everyday contact was established. Permanent methodological assistance was given to the physicians in the health centre. Feedback information on the number and structure of registered infectious diseases per physician was sent to the physicians in the Temerin Health Centre every seven days. Information was sent every 30 days on the number and structure of registered infectious diseases per physician from the previous month. Two field supervisions were conducted, one with physicians and the other with the management of the centre. Both focused on reporting problems and approaches to solving them.

Evaluation

The intervention was conducted for three months using daily notification reports based on syndrome diagnosis. This was compared with data from the same three months in the previous year reported by the Centre and also reports covering AP Vojvodina. The population of Vojvodina is

2,021,992 and the Centre covers an area with 28,275 inhabitants. The total number of notifications as well as the notification rates per 100 000 for all reported diseases were used to evaluate the differences between the status prior the education and afterwards, as well as the differences between reporting after the doctor training in the centre and the overall reporting level. Notification rates per 100 000 inhabitants were used as a proxy for incidence rates [9]. Fisher's Exact Test for Count Data was used to evaluate an alternative hypothesis that the true odds ratio is not equal to 1 at the level of 95%. The statistics were computed using R Statistical Project [10].

Results

Infectious disease incidences registered during the three month study period were compared to incidences registered in the Municipality of Temerin in the same trimester of the preceding year (Table 1). Substantial differences were observed between numbers of notifications in the study period after educational training in Temerin's primary care centre. The difference was statistically significant in all diagnosis but salmonellosis. However notifications also significantly increased for intestinal infectious diseases ($p<0.0001$) reported through syndrome surveillance (gastroenteritis and diarrhoea, food poisoning). Streptococcus infections ($p<0.0001$), including angina and scarlet fever and sexually transmitted infections ($p<0.05$) differed in a positive manner. On the other hand, a small number of registered cases of chicken pox revealed a negative statistically significant difference ($p<0.0001$). All other notified cases ($p<0.0001$) as well as total numbers of notifications ($p<0.0001$) significantly differed in totals for pre- and post-educational intervention.

When comparing attitudes to reporting during the three month post training period between the physicians from the Centre and the reporting performance in the entire AP Vojvodina, only salmonellosis was not significantly changed by the project. Differences in the reporting of all other diseases and groups of diseases were observed as being positive ($p<0.0001$) (Table 2).

Discussion

The evaluation of the changes after the project period in the selected centre confirmed the positive effects of the training, the changes in management and the facilitation of access to case definitions by participating physicians and medical workers in infectious disease surveillance. Several studies attempted to elucidate on the causes of under-reporting [11,12]. Feedback and remunerations were often considered as being primary factors. This study underlined the role of interactions between epidemiologists and clinical practitioners in improving the rates of notifications of communicable diseases. The intensification observed is primarily the result of better reporting of diseases that can be diagnosed according to clinical manifestation. Better registration of diseases with etiologic diagnosis (STI's, salmonellosis) is the result of more patient referrals.

Before the educational training one-third of evaluated physicians in Temerin's primary health centre did not report infectious diseases, while after the educational training there was just one physician who did not report any. It was also noted that of all physicians working in the emergency squad had begun reporting. This resulted in early detection of several epidemics and, by the registration of one physician, a suspicious case of possible anthrax, which was rejected in further analysis.

Case definitions on their own significantly influence improved data validity, but also stimulated participation in surveillance also in other studies [13]. Discussions revealed that one of frequent reasons infectious diseases are not notified is the physician's lack of confidence in whether to report a syndrome case or only one which has been confirmed by a laboratory. Another ambiguity stems from the lack of role definitions among the physicians and medical workers in reporting cases. Determination of indirect participants in surveillance such as local coordinators at every reporting station could improve data distribution [14]. Also daily delivery of disease registrations by a courier directly from the reporting station to the epidemiological department is beneficial for reporting, but involves financial constraints, and policy priorities in medical institutions limit this approach. Thus mail delivery by post among primary reasons for delays in the submission of reports [15].

A significant component of accurate surveillance based on syndrome notification is laboratory confirmation [16]. Elucidation on the value of laboratory validation for epidemiology reasons and indirect effects on outpatient practices leads to increased diagnostic accuracy. The example from the Netherlands demonstrates that 1000 faeces samples per 100 000 inhabitants are examined annually [17]. In USA, 315 million tests concerning bacteriological diagnostics are completed annually [18]. In the Institute of Public Health of Vojvodina, 60 000 faeces samples per 600 000 inhabitants annually are examined for the South Bačka region as are 200 000 other samples of human material.

There are also various factors influencing a patient's attitude to general practice as well as to the attending physician's decision to request microbiology diagnostics [19]. The cost of transportation to the laboratory, the high price of other services, and the impossibility to complete the whole diagnostics in the institution of primary health care discourages the patient, particularly when the disease

in question has insignificant symptoms or when it is an older patient living in a distance from a laboratory.

Diagnostic facilities are mostly available in larger towns and cities. In New Zealand for example, etiologic diagnostics of intestinal infectious diseases are present in the range from 75% (hepatitis A) to 100% (verocitoxigen E. coli infection) [20].

Life long continual training of is of utmost importance for an effective infectious diseases surveillance system [21,22]. We have observed that written feedback information that includes examination of actual epidemiologic circumstances has motivated the participants in the study. We also observed that permanent and continual contact with the participants has also stimulated them to solve problems in the surveillance system. Creating microbiological diagnostics at smaller health centres, and ensuring the rapid results and dissemination of biological material would not only improve the etiologic diagnostics of infectious diseases but also motivate the key players, patients and physicians, in identifying and reporting those diseases.

The study's limited time span and the catchment area limited to a single centre resulted in the inability of examining other variables to check the quality of the surveillance system, as suggested by the guidelines [23]. Further studies of this kind will certainly address this limitation.

Conclusions

The support of authorities in health institutions is critical to the success of strengthening the surveillance of infectious diseases.

The following factors should contribute to the improved quality of notifiable disease surveillance in public health: the introduction of new methods and techniques regarding data collection levels (the control of completeness and validity of reporting at the primary level, the use of internet and e-mail); and the level of data processing and analysis (high quality software); and the feedback information as regards to the interpretation of laboratory results with recommendations for further treatment or referrals.

Continuous monitoring and evaluation of surveillance systems as a routine activity in health care units and institutions are inevitable preconditions in strengthening epidemiological and public health service.

Cohesiveness of legal regulations to contemporary epidemiological surveillance is essential for real observations of epidemiological situations. The control of legal provisions and their application by competent institutions is also necessary in realizing these surveillance goals. The study with all the experiences and materials developed represents a pilot model for its continuation using a larger sample with longitudinal follow up.

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Acknowledgements

Authors would like to thank to Mary Relindes Ellis, MFA, Graduate Research Assistant, and The University of Iowa for the great help in editing the manuscript.

Tab. 1. Comparing notifications and rates per 100 000 inhabitants for infectious diseases notified in Primary Care Centre Temerin a year prior the project and during the three months after training

Diagnosis	*Before project*		*After project*		Difference before and after
	Notifications Total	Rate /100,000	Notifications Total	Rate /100,000	
Salmonellosis	1	3.5	7	24.8	n.s.
Diarrheal syndrome	12	42.4	145	512.8	<0.0001
Sexually transmitted infections	4	14.1	15	53.1	<0.05
Chicken pox	71	251.1	10	35.4	<0.0001
Streptococcal infections	6	21.2	368	1301.5	<0.0001
Other diseases	19	67.2	85	300.6	<0.0001
All diseases	109	385.5	629	2224.6	<0.0001

Tab. 2. Infectious diseases notified in Primary care centre Temerin and in AP Vojvodina during the same three-month period after education provided to physicians in the Primary Care Centre in Temerin

Diagnosis	Primary Care Centre Temerin	AP Vojvodina	Difference
	Notification rate/100 000	Notification rate/100 000	
Salmonellosis	24.8	14.9	n.s.
Diarrheal syndrome	512.8	55.9	<0.0001
Sexually transmitted infections	53.1	11.7	<0.0001
Chicken pox	35.4	274.8	<0.0001
Hepatitis	3.5	6.5	<0.0001
Streptococcal infections	1301.5	114.7	<0.0001
All diseases	2224.6	566.1	<0.0001