Research Article

Participation of infectious disease surveillance in primary health care

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Abstract

The aim of the study was to analyse participation of primary care physicians in infectious disease surveillance and to find factors which influence the primary health physician's participation in surveillance. Infectious disease reporting by 854 primary care physicians from 15 primary care institutions in South Bačka district, AP Vojvodina, Serbia was monitored during a 6 month period. The number and structure of infectious disease reporting through the mandatory surveillance system was compared with the number and structure of infectious diseases reported through routine statistics and the number and structure of infectious diseases reported in the whole area, including reports from secondary and tertiary health care settings and laboratories. The youngest and oldest physicians reported the lowest average number of infectious diseases. Paediatricians and dermatologists had the highest and emergency specialists, occupational medicine specialists and other consultants the lowest average number of reported infectious diseases, with the ratio between paediatricians and emergency medicine specialists being 347:1. Lowest reporting rate was observed for infections routinely diagnosed in clinics such as hepatitis, or with ethical considerations such as sexually transmitted infections. The average weekly number of reported infectious diseases was from 0.0 per emergency medicine specialists to 1.4 per paediatrician. Completeness of infectious disease surveillance in primary health care is unsatisfactory. Changing currently insufficient undergraduate and postgraduate training in surveillance might be an important tool for establishing a more effective and sensitive surveillance system. Guidelines for laboratory confirmation and reporting could also increase quality of surveillance.

Introduction

Infectious diseases were the leading cause of mortality at the beginning of the 20th century. The wide use of antibiotics in the first half of the 20th century and immunization in the second half led to a significant decrease in incidence and mortality of many

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infectious diseases with the result that they were outnumbered by numerous non-communicable diseases and injuries by the end of the century.

Socioeconomic, environmental and behavioural factors, as well as international travel and migration foster and increase the spread of communicable disease[1] leading to a contrasting situation at the end of the 20th and beginning of the 21st century. Against a constant background of established infections, epidemics of new and old infectious diseases periodically emerge, greatly magnifying the global burden of infections.[2] The recent experiences with the use of *Bacillus anthracis* in acts of terrorism[3] as well as issues related to small pox vaccine production and preparedness[4] are just a few of many examples of this burden.

Contrary to popular expectation, some infectious diseases became important health problems at the end of the 20th century. Hepatitis B and C remain major problems in many countries despite the application of preventative measures. Sexually transmitted diseases remain widespread in both developed and developing countries. Food borne infections have found new reservoirs and routes of transmission.

Health surveillance is defined as an on-going systematic collection, analysis, and interpretation of health data essential for planning, implementing, and evaluating public health activities, linked with the timely dissemination of data.[5] Surveillance systems functioning in this way provide health data necessary for designing, implementing, and evaluating public health prevention programs.[6] An infectious diseases surveillance system is a part of public health surveillance, which is in turn supports a broad health information system. The goals and benefits of collected data are defined by data itself as well as the type of data inside the system. Early detection of outbreaks is necessary for effective and rapid control, and information about endemic diseases is necessary for monitoring trends and evaluating existing public health measures. A functional surveillance system is essential in controlling infectious diseases.[7] Surveillance is not a purpose unto itself. It is a tool for defining rational priorities in health care.[8]

An ideal surveillance system would be one in which every case of infectious disease is reported. This is difficult for different reasons. Many infectious diseases have minor symptoms or result in asymptomatic infections. Some infections are self-treated by patients while for others, health care services are hard to obtain because of the cost and physical distance. The insufficient training of health professionals could result in an inability to diagnose an infection. Infectious disease case definitions or categories could be different or absent in a health care system. Microbiology and other diagnostic testing could be unavailable in addition to the lack of motivation among health professionals in reporting infection diseases. Finally the disease(s) could have a high incidence, but low public health importance such as the common cold, dermatitis, conjunctivitis and many other similar illnesses.

Primary care physicians have the most important role in infectious disease surveillance in many countries.

The aim of our study was to analyse participation of primary care physicians in infectious disease surveillance and to determine factors that influence a primary health physician's participation in surveillance.

Methods

The study was carried out in a sample of 15 primary care institutions in the South Bačka district in Serbia. Before beginning the actual study, a field visit to all primary care institutions was done to determine accurately the number of physicians at each institution. This was required as the actual number differs from the officially reported number as some physicians employed at the sample health institutions were absent for periods of time due to specialization, illness, or pregnancy. Some of them work in secondary or tertiary health care settings, but also only as part-time consultants in primary care. A total of 854 physicians were registered during the field visits. Their demographic data (age, gender, specialization) was recorded.

The reporting of infectious diseases is mandatory for all physicians in the Republic of Serbia, and a standard report forms is available for that purpose. All report forms from the South Bačka district are collected and sent to the Institute of Public Health of Vojvodina.

Infectious diseases have been reported in three various forms:

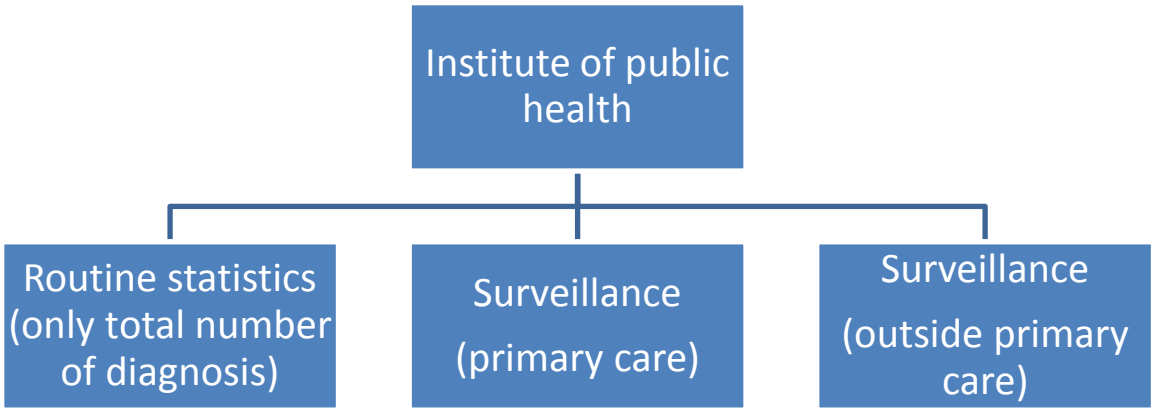
a. through routine reporting for statistical purposes – only number of diagnoses have been reported. This data was collected from primary care institutions on a regular basis. In addition to other diseases, those reports contained cumulative data about specific infectious diseases or groups of infectious diseases.

b. through surveillance system of infectious diseases by individual report form from primary health care – this is a mandatory requirement for every health care practitioner,

c. through surveillance system of infectious diseases by individual report form outside of primary health care – reports from hospitals, laboratories, other health care institutions.
Primary care in Republic of Serbia is organized mainly in the public sector at municipality levels and includes general, paediatric, gynaecology, and occupational medicine, but most of the primary care institutions also have different specialists.

All report forms were collected and compared from the South Bačka district during the 6 months of the research study, including those reported from primary care institutions and those reported from other institutions (outpatient settings, hospitals, laboratories, private health offices).

Figure 1. Infectious disease reporting in Republic of Serbia (simplified)



Collected data was compared with the data from routine statistics reports to ensure the difference of identification between the two sets of data. T tests and analysis of variance were used to compare results.

In all 15 primary care institutions selected health professionals were interviewed to determine the main constraints in disease reporting. In each institution three health professionals were interviewed (general practitioners, paediatricians, other specialists).

Results

The average number of reported infectious diseases was almost twice as high for female physicians (Table 1) and the same difference was also seen in comparing the age groups of physicians.

Table 1. Infectious disease reporting by primary care physicians according to gender

	n	Number of diseases reported	Average number of diseases per physician
Female	609	5392	8.9
Male	245	1206	4.9
Total	854	6598	7.7

Table 2. Infectious disease reporting by primary care physicians of specific diseases or group of diseases

	Statistical health reports	Infectious disease report forms	Total number of infectious diseases reported to IPH	Ratio I	Ratio II
	a	b	c	b/a	c/a
Chicken pox and shingles	3777	3201	3346	0.8	0.9
Food poisoning and other intestinal infectious diseases	1959	828	1159	0.4	0.6
Sexually transmitted infections	505	104	461	0.2	0.9
Tuberculosis	104	97	115	0.9	1.1
Hepatitis	88	16	260	0.2	3.0
Measles, mumps and rubella	43	26	23	0.6	0.5

As shown in Table 2, the reporting rate from primary care was highest with tuberculosis (90%). The remaining 10% were diagnosed at different levels of health care (specialists) and thus not reported by primary care. Similar results were observed for chickenpox and shingles. About half of food poisoning and other intestinal infectious diseases were reported as was measles, mumps, and rubella. Some of the measles, mumps and rubella reports were rejected after microbiology diagnostics provided negative result, and 50% of those were reported from sources other than primary care (hospitals). The lowest rates were observed for sexually transmitted infections (STI) and hepatitis. Only one out of every five cases was reported from diagnoses made in primary care. In comparison, most of the diagnosed hepatitis cases were reported by hospitals and consultants (Table 2). The youngest and the oldest physicians reported fewer infectious diseases (Table 3).

Table 3. Age related infectious disease reporting by primary care physicians

Age group	n	Number of diseases reported	Average number of diseases per physician
61-65	48	284	5.9
56-60	81	577	7.1
51-55	128	926	7.2
46-50	163	2194	13.5
41-45	144	939	6.5
36-40	113	816	7.2
31-35	95	598	6.3
26-30	57	232	4.0
unknown	25	32	1.3
Total	854	6598	7.7

Important differences were observed in the average number of infectious diseases reported by different specialties. Paediatricians and dermatovenerologists had the highest

average of reported cases, and emergency specialists, occupational medicine specialists, and other consultants had the lowest average number of reported cases, with the ratio between paediatricians and emergency medicine specialists being 347:1. Similar results were observed in physicians' participation in surveillance. About 10% of paediatricians and dermatovenerologists did not participate. More than two-thirds of gynaecologists and occupational medicine specialists did not participate, as well as about half of general practitioners. Emergency specialists and other consultants did not participate at all. Better results were observed for pneumologists and specialists of primary care (Table 4).

Table 4. Infectious disease reporting by primary care physicians according to clinical specialty

	n	Number of diseases reported	number of physicians who do report	% of physicians who do report	Average number of diseases per physician
Dermatovenerologists	11	353	10	90.9	32.1
Paediatricians	87	3020	78	89.7	34.7
Specialists of primary care	117	856	88	75.2	7.3
Pneumologists	16	79	11	68.7	4.9
General practitioners	355	1917	182	51.1	5.6
Occupational medicine specialists	60	101	17	28.3	1.9
Gynaecologists	37	182	6	16.2	4.9
Emergency specialists	16	1	1	6.2	0.1
Other consultants	155	89	4	2.6	0.6
Total	854	6598	397	46.5	7.7

The highest average of reported infectious diseases on a weekly basis was from paediatricians (1.3 cases / paediatrician / week). Every general practitioner reported one infectious disease in five weeks. In interviews, health professionals focussed on the constraints of infectious disease reporting. The main reasons for not reporting mandatory diseases are shown in Table 5.

Table 5. Main reasons for not reporting mandatory infectious diseases in primary care

Reason	% of positive answers
Insufficient time	83.3
Lack of knowledge about mandatory reporting	73.3
Disease is not "important"	46.7
Lack of report forms	23.3
Don't want to be involved in possible outbreak investigation	6.7

Discussion

Comparison of two different sources of information about registered infectious diseases in primary care showed important differences. Routine statistics reports showed sometimes five times more cases than surveillance (STI's and hepatitis). One of the reasons is the simplicity of reporting for statistical reports – only number of diagnosis being reported, while surveillance reports required the filling of a specific report form. Underreporting could be explained by the increased time required for the latter as lack of the time was the major constraint noted by 83.3% of the participants. Studies from different countries show that underreporting of infectious diseases is a global problem.[9-17] Factors that influence disease reporting are similar and include: physicians' attitudes and motivation;[18,19] basic and continuous medical training;[20,21] and knowledge about the importance and purpose of surveillance.[22,23] The simplicity of reporting methodology is also an important factor[24] as well as feedback information to physicians.[25]

The results of our study suggest that the organization of health systems could also play an important role in notification and reporting of diseases. Tuberculosis reporting is the highest because almost all primary care institutions have anti-tuberculosis units with TB and pulmonary disease consultants working in them. The success of reporting diagnoses of other infections such as hepatitis by clinicians is very low. Physicians' consideration of the ethical aspects of infectious diseases is also a very important factor.[10,26] Thus most of the sexually transmitted infectious are not reported.

In the absence of clear guidelines and case definitions, reporting of notifiable diseases as a syndrome without laboratory confirmation is problematic for surveillance. The reporting rate is high for diseases such as chickenpox and shingles, in which clinical appearance is clearly linked with the infectious agent. It was apparent that some physicians report food poisoning and other intestinal infectious diseases on clinical criteria while other physicians reported such infections only on laboratory confirmation.

The possible presence of an outbreak during the study period could influence to reporting rate, since under such conditions primary care physicians are motivated to report disease. Again, insufficient training and absence of clear case definitions and clinical guidelines could be some of the causes for this observation.

However, the reason for observed difference in underreporting between male and female physicians (Table 1) is not clear and there is a possible confounding factor playing an important role. Paediatricians, with highest reporting rate in primary care are more usually females, while emergency specialists, with low reporting rate, are more usually males. We do know from other studies that age influences reporting practice.[18,24] This could be the result of motivation of older physicians and insufficient training .of younger physicians.

Other studies did not find the huge differences observed in our study on the influence of specialization on underreporting[18]. Paediatricians have the highest average number of reported infectious diseases in addition to dermatologists (almost all of them working in the largest primary care institution in Novi Sad). One possible reason may be the high incidence of diseases most commonly reported by paediatricians in this Institution.

The spectrum of treated diseases plays an important role on reporting of infectious diseases. Pneumologists (specialists for tuberculosis and pulmonary diseases) have low average number of reported diseases. Differences between general practitioners, specialists of primary care, and occupational medicine specialists are more important, because most of them have a similar spectrum of diagnosed and treated infectious diseases. Primary care specialists have the highest average number of reported diseases, suggesting importance of post graduate training, which is not included in occupational medicine specialization.

Lack of time for reporting is mentioned in some research studies,[27] and was stated as one of the key reasons for underreporting by physicians in the current study. Our research showed that the weekly average number of completed report forms was extremely low – paediatricians and dermatovenerologists have about one report form completed per week. General practitioners complete one report form per month. Most of the participants who were interviewed mentioned insufficient capability for disease reporting which included insufficient knowledge about surveillance and reporting and the public importance of some infectious diseases.

Building and strengthening regional and national capacities for infectious disease surveillance can be achieved through four elements:[9] – training in epidemiology; better equipped and administered laboratories; improved communication infrastructure; and special attention to the health sector, public and private that constitutes the surveillance front line.

The decrease of infectious disease in recent decades has diverted attention from this public health problem, which has been given a low priority in most undergraduate curricula. Most specialization curricula pay little or no attention to epidemiology and surveillance. Improvements in those areas, combined with continuous medical education, would be important tools in establishing a more effective and higher prioritized surveillance system. Using the advantages of electronic medical data, the Internet and web-based reporting[28-30] could also simplify notification and reporting, thus increasing motivation for busy physicians. Providing physicians with clear case definitions and surveillance guidelines, including criteria for laboratory confirmation and reporting, would also increase the quality of surveillance.

Conflict of interest statement

There was no conflict of interest, nor external financing of this study.

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