

Gaps in Tuberculosis Knowledge among Primary Health Care Physicians in Croatia: Epidemiological Study

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ABSTRACT

High level of tuberculosis (TB) knowledge among physicians is important in order to achieve high case-finding and efficient case-management. Few attempts on how to measure physicians' TB knowledge and understanding of national TB guidelines in middle-TB incidence countries such as Croatia have been reported. Related surveys were carried out mostly in high or low incidence countries. The aim of this study was to investigate TB knowledge among general practitioners (GPs) and paediatricians in Split and Dalmatian County, Croatia and need for TB education through cross-sectional survey based on anonymous questionnaire sent to all of them and completed by 160 (60.8%) subjects. Although the median percentage of correct responses was not low (70.3%), several areas of concern were revealed. Particularly low knowledge about normal breathing as usual physical chest examination finding in pulmonary TB (43.1%), proper drugs combination in initial phase of treatment (35%), and duration of treatment (61.9%) were found. Need for education in TB control was reported in 87.9% of physicians. TB knowledge score was obtained by the number of correct answers to 14 selected questions and it was 8.18 ± 1.84 . Scores according to years of experience, number of treated TB patients and need for education, were not different from each other. Higher score was correlated with paediatricians ($p=0.025$) and familiarity with existence of National guidelines ($p=0.002$). This study showed gaps in knowledge among physicians being the cornerstone of TB control in Croatia. Given that the most successful intervention in TB control is early detection and early and appropriate treatment, efforts should be done to increase TB knowledge. Majority of participants were willing to take a part in education. This could be a good starting point for organisation of education activities as one of the approaches to reduce tuberculosis burden in middle incidence countries.

Key words: tuberculosis, knowledge, physicians, Croatia

Introduction

Croatia reported the tuberculosis (TB) incidence rate of 26/100 000 in 2006, which showed a slow decrease¹ with estimated case detection rate of 56%².

TB control in Croatia has been changed since 1993 when antituberculosis dispensaries were shut down and National TB Programme (NTP) was created. It has been based on primary health care physicians (PHCPs): mainly on general practitioners (GPs) and paediatricians. In order to facilitate the implementation of NTP, new national guidelines on TB control were published in 1998³ but without following education and refresher training of PHCPs.

It was estimated that, on average, each GP in Croatia would have one TB patient every two years¹. Under these

circumstances, it was not hard to neglect many important issues in tuberculosis management and control, resulting from a lack of experience and expertise. High level of tuberculosis knowledge among physicians is important to achieve high case-finding and efficient case-management.

Only one systematic educational TB project for health care workers (HCWs) was carried out in 2003–2005 in three Croatian Northern Counties, sponsored by one foreign institution. Physicians in the rest of the country usually had no such or similar opportunity. Unfortunately, or actually fortunately, tuberculosis was not among public health priorities in Croatia because the total TB incidence rates in Croatia were continuously decreasing

during the last decade. However, national target in TB control declared in 1998, incidence rate of less than 10/100,000³, would not be reached without additional efforts.

The survey about TB knowledge of Croatian's PHCPs has never been carried out. Related surveys were carried out mostly in high⁴⁻⁸ or low⁹⁻¹⁴ incidence countries. Few attempts on how to measure physicians' knowledge and understanding of national or international guidelines in middle-TB incidence countries such as Croatia were reported. It was hypothesized that with declining incidence of TB in Croatia and lack of TB training, PHCPs would have TB knowledge deficit. It was also hoped that information obtained from this survey could serve as a basis for future TB education activities of PHCPs.

Subjects and Methods

Design and setting

The study design was cross-sectional. It was conducted from February to May 2007 among GPs and paediatricians in Split and Dalmatian County, the second most inhabited County in Croatia¹⁵. An anonymous original questionnaire, along with cover letter explaining the purpose of the study and stamped return-addressed envelope were administered by mail along with the routinely monthly report of infectious diseases published by Public Health Institute of Split and Dalmatian County. It was announced that the answers would be sent with one of the following monthly reports as well as the TB textbook (they were sent after four months). One and a half month after initial mailing, 45% of the questionnaires were returned. Since the questionnaires did not include personal identifiers (a means of enhancing the validity of responses), follow-up of individual responders was not possible. Therefore, the reminder phone call was made to all included physicians, requesting one more time for participation. If the first questionnaire had been lost, the second was mailed along with new prepaid envelope. During personal communication of the author due to various reasons with PHCPs, they were also reminded of the study.

The study was approved by Ethic Committee of Public Health Institute of Split and Dalmatian County.

Inclusion and exclusion criteria

Primary health care (PHC) in Croatia has been based mainly on GPs, paediatricians and gynaecologists and it has been organised and funded through National health insurance system which covers more than 97.7% of Croatian's population. It finances a package of health care services, including TB diagnosis and treatment. PHCPs are the basis of health care system in Croatia and the health care workers are the first contact for patients¹.

List of GPs and paediatricians mentioned above was obtained from PHCPs registry of Public Health Institute of Split and Dalmatian County. The questionnaire was administered to all of them to avoid selection bias.

GPs and paediatricians working for profit only are not usually included in TB diagnosis and treatment and were not a part of this study. Gynaecologists were excluded from the study since no case of genital TB in the county had been registered in the last decade and those cases are extremely rare in whole Croatia in general.

Interviewing tool

The study instrument had 29 questions. It was focused on professional data on each respondent, and questions about TB burden in Croatia, transmission, diagnosis, treatment, management of contacts, TB in children, and NTP.

The interview consisted of multiple choice questions with one correct answer to be selected, based on current data and guidelines. TB knowledge was determined by score of 14 (range 0–14) based on answers given to 14 selected questions chosen before the start of the study according to the estimation of the author of their importance in TB epidemiology, with one point awarded for each correct answer.

Data analysis

Data were stratified by medical qualification (GP, Paediatrician), work experience (up to 10 years of experience as medical doctor, 11–20 years, 21–30 years and more than 30 years), number of TB patients treated during last two years (None, One and more), awareness of existence on National guidelines on TB control (Yes, No) and self reported need for education (Yes, No).

Differences between stratification groups for quantitative variables were compared by Student's t-test when data were normally distributed. Kruskal Wallis analysis of variance and Mann-Whitney test were used when data were not normally distributed. For categorical variables, χ^2 test was used. Spearman's rank correlation coefficient was used as a measure of correlation between TB knowledge score and years of medical experience.

P value less than 0.05 was accepted as indicating statistical significance. Statistical analyses were performed using Statistica 7 programme.

Results

Of 263 questionnaires mailed to 224 GPs and 39 paediatricians, 160 (60.8%) were completed and returned. Of all invited GPs, 135 (60%) participated in the study as well as 25 (64%) of all invited paediatricians. Participants' average year of medical practice was 22.3 ± 8.3 (median 21, range 2–38). The stratified characteristics of physicians were shown in Table 1.

No statistically significant differences were observed between GPs and paediatricians according to participation in the study ($p=0.651$) and number of treated TB patients in the last two years ($p=0.495$). However, that difference existed in more years of experience in paediatricians ($p=0.000$). Significantly more GPs were not aware

TABLE 1
TUBERCULOSIS KNOWLEDGE SCORE ACCORDING TO PHYSICIANS' CHARACTERISTICS (N=160)

Physicians' characteristics	Number of respondents (%)	TB knowledge score: X ± SD	p value
Medical background:			
General practitioner	135 (84.4)	8.06 ± 1.9	
Paediatrician	25 (15.6)	8.8 ± 1.29	0.025*
Experience in medical practice (years):			
≥ 10 years	14 (8.8)	8.5 ± 1.69	0.535**
11–20	63 (39.4)	8.25 ± 1.66	
21–30	51 (31.8)	8.18 ± 1.26	
> 30	32 (20.0)	7.8 ± 2.1	
Number of treated TB patients in the last two years:			
None	86 (53.7)	8.4 ± 1.89	0.264*
One or more	74 (46.3)	7.9 ± 1.76	
Familiarity with existence of National guidelines on TB control:			
Yes	12 (7.5)	9.75 ± 1.42	0.002*
No	148 (92.5)	8.05 ± 1.82	
Self reported need for education:			
Yes	140 (87.5)	8.17 ± 1.85	0.401*
No	20 (12.5)	8.9 ± 1.7	

TB – tuberculosis, X – mean, SD – standard deviation

*Mann-Whitney test, ** Kruskal Wallis analysis of variance

of existence of National guidelines ($p=0.003$) and willing to take TB education ($p=0.002$).

TB knowledge score

There were overall 70.3% correct responses.

Mean TB knowledge score to 14 selected questions in the study sample was 8.18 ± 1.84 (median 8, range 4–13). Scores according to years of medical experience, number of treated TB patients and reported need for education, were not significantly different from each other. Paediatricians had lower score than GPs ($p=0.025$, Table 1).

Whereas GPs had significantly lower years of medical practice than paediatricians, analysis of variance of score according to years of medical practice was performed in GPs and paediatricians separately. There was no statistically significant difference of score among GPs ($p=0.278$) nor paediatricians ($p=0.079$). After analysis of variance of score according to combination of medical background and years of medical practice, results showed that scoring difference between GPs and paediatricians occurred due to the medical background ($p=0.04$). Spearman's rank correlation coefficient between score and years of medical practice was not significant ($p=0.052$, $p=0.154$). Higher score showed a significant correlation with respondents who were familiar with existence of National guidelines ($p=0.002$, Table 1).

Total number of the correct answers to 14 selected questions was shown in Table 2.

TB burden

Although 73.1% of the subjects claimed that number of TB cases had been increasing, 74.4% knew that Croatia was the middle incidence country compared to Europe. More than 60% participants were aware that TB was the most frequent among the older age groups.

Transmission

All respondents indicated droplet nuclei as the mode of transmission and majority (94.4%) knew that the pulmonary TB (PTB) was the most infectious site. One third of subjects (31.3%) were aware of the fact that untreated infectious TB case could infect 10–15 persons in one year. Prolonged contact necessary for infection was correctly identified in 90% of the participants.

Diagnosis

Significance of positive tuberculin test-effect of Bacillus Calmette-Guérin (BCG) vaccination+infection with Mycobacteria, was known by 85.6% of the participants. Almost all respondents (97.5%) were able to identify culture confirmation of Mycobacterium tuberculosis as definite diagnosis of TB. However, 83.1% of the physicians identified correct number of sputum examination when TB was suspected. Normal breathing as usual physical chest examination findings in PTB was recognised in 43.1% of the respondents.

TABLE 2
SELECTED QUESTIONS MAKING TUBERCULOSIS KNOWLEDGE SCORE

Correct answers on selected questions	N	%
Number of TB cases has been in decrease*	43	26.9
The older ages groups are the most affected*	97	60.6
PTB is the most infectious site	151	94.4
Untreated infectious TB case can infect 10–15 persons in one year	50	31.3
Definite diagnosis is culture confirmation of <i>Mycobacterium tuberculosis</i>	156	97.5
Physical chest examination result in PTB will be usually normal breathing	69	43.1
The treatment usually requires 6 months	99	61.9
Initial phase of TB treatment usually starts with HRZE	56	35.0
Tuberculin testing and chest X rays are required in contacts of TB case*	124	77.5
Latent tuberculosis infection is treated with isoniazid	99	61.9
BCG-vaccinated child can get tuberculosis	124	77.5
Children are usually infected in their families	141	88.1
Familiarity with existence of National guidelines on TB control*	12	7.5
Primary health care physicians are the first level of TB control*	87	54.4

TB – tuberculosis, PTB – pulmonary tuberculosis, HRZE – isoniazid, rifampin, pyrazinamide, ethambutol, BCG – *Bacillus Calmette-Guérin*
* referred on Croatia

Treatment

The duration of treatment was correctly identified by 61.9% of the participants. Usual combination of four anti-tuberculous (isoniazid, rifampin, pyrazinamide, ethambutol) during initial phase of treatment was recognised in 35% of the physicians. Side-effects of TB drugs were correctly pointed out in 91.9% of the respondents.

Management of contacts

The priority in contact tracing was given to all family members in the same household in 90.6% of the physicians. Medical history, tuberculin test and chest X rays, as a recommended evaluation of TB contacts, were correctly identified by 77.5% of the respondents. Less than two-third (61.9%) participants claimed that latent tuberculosis infection was treated with isoniazid.

TB in children

Facts that children were usually infected in their families and that BCG-vaccinated child could get tuberculosis were recognised by 88% and 77.5% of the physicians. BCG-vaccinated child would be evaluated if in contact with TB patient by 98.1% of the respondents.

National tuberculosis programme

Small part of respondents (7.5%) was familiar with existence of National guidelines. A few of PHCPs (5%) had the guidelines in their offices. One half (54.4%) of physicians were aware that they were actually the first level of TB control. All respondents claimed that TB was subject of mandatory reporting. Need for education in TB control was reported in 87.9% of the physicians.

Discussion

This is the first survey assessing TB knowledge of PHCPs in Croatia. According to the knowledge of this author, this was one of rare studies performed in middle-TB incidence countries in recent years in English literature, especially in Europe.

Initial assumption of the author was that there were gaps in the TB knowledge among PHCPs according to the lack of continuous TB education and decline of TB incidence.

Although the median percentage of correct responses was not low (70.3%), several areas of concern were revealed. Some of the significant findings indicated definitely low knowledge about normal breathing as usual physical chest examination findings in PTB (43.1%), exact drugs combination in initial phase of treatment (35%), and duration of treatment (61.9%). Almost one-fifth of the physicians identified incorrect number of sputum examination when TB was suspected. Contagiousness of untreated infectious TB patient, the most important reservoir of infection in community, was known to only one-third of the respondents. Those findings are particularly serious because delayed diagnosis and treatment of tuberculosis contribute in more severe disease and higher mortality at the individual level. It is also responsible for an increased period of infectivity in the community generating new TB cases. It was not possible to assess knowledge about treatment outcome monitoring, since it has not been introduced so far.

It was indicated that the number of treated TB patients was not in correlation with higher knowledge in opposite to other studies^{13,14} which may be explained with small number of TB patients per one PHCP during two years on average in Croatia.

Very low familiarity with existence of National guidelines of TB control was underlined, much lower than described elsewhere⁴. Only one-half of GPs and paediatricians were aware that they were actually the first level of TB control in Croatia. It may be explained by neglected information for PHCPs during implementation of guidelines and lack of continuous education afterwards. As a result, only 5% of the respondents had guidelines in their offices to consult it when needed or to check different uncertainties.

This study emphasized lower TB knowledge correlated with GPs being the cornerstone of primary health care and TB control as well. In Croatia is custom that health care of patients over 7 years is provided by GPs, while below that age is provided by paediatricians. TB in children younger than 7 years is very rare, less than 2% of all TB cases in the last decade¹. Therefore, majority of TB patients was managed by GPs. It was reasonable to assume that paediatricians would have lower TB knowledge than GPs. In spite of this fact paediatricians had better knowledge. This surprising result may be explained by additional four years of education during specialisation in paediatrics as well as better familiarity with existence of National guidelines.

Nevertheless, majority of participants (87.9%) among whom significantly more GPs, were willing to be more educated about TB. This could be good starting point for planning and organisation of education activities.

It is well known that the most successful intervention in TB control is early detection and early and appropriate treatment of TB patient. High TB knowledge and awareness are necessary to reach those targets and are integral part of the new World Health Organization Stop TB Strategy¹⁶. To support implementation of this strategy, Stop TB Partnership recommended activities aimed to improve TB knowledge and raise TB awareness at different levels¹⁷. It can help also to limit the development of acquired drug resistance which is burning issue in TB control in many countries^{18,19}.

This study identified many gaps in TB knowledge, especially related to TB burden, infectiousness, treatment, management of contacts and NTP among PHCPs. From a public health point of view, it is imperative that physicians are able to recognize and promptly treat TB patients. All identified mistakes may result in delays in diagnosis and institution and duration of appropriate treatment. It is, therefore, important to develop continuous health education to improve TB knowledge and awareness at different levels and to ensure funding for those activities^{19–21}. Thus, it will be necessary to design activities to place TB again high on the political agenda¹⁷, foster political will and increase financial and other resources for improving TB control^{21,22} through better educated health care workers familiar with current national guidelines, as well. In Croatia, where TB laboratory services are available and TB drugs are free of charge with uninterrupted supply, one way to reach the targets of Stop TB Strategy is to increase case-detection rate and to shift passive case-finding to more aggressive and in-

creased active case-finding among high risk groups which is currently 4.4%³.

Familiarity with existence of National guidelines on TB control was associated with higher TB knowledge score as a result of this study. The guidelines were published in a hard copy and on Internet and may be easily consulted when needed. The PHCPs should be informed about existence of National guidelines and how to reach them. Mandatory specialisation for majority of GPs in family medicine was planned and should put more emphasis on TB education because they present the cornerstone of TB control in Croatia. The task of updating TB knowledge could be carried out by professional societies (respiratory, general practice, epidemiology), universities, public health institutes and nongovernmental organisations by organising on-going medical education programmes, conferences and other educational activities within the aims of NTP.

Several possible limitations of this study should be noted. First, in any survey using a questionnaire, the problem of non-response must be considered. Non-responders may have had different level of TB knowledge and practices. Given that the study was based on anonymous responses without reward for extra-work of PHCPs, it can be assumed that the response rate of 60.8% was good and higher than in other studies^{6,12–14}. Second, it was not possible to supervise PHCPs while filling in the questionnaire. That is why it was kindly requested in cover letter not to consult any source of TB information. Nevertheless, it can be assumed that the answers reflected their true knowledge without any consultations, especially when participation was anonymous and seeking assistance to complete the survey would require an additional time.

Third, it was requested to give the number of TB patients treated during the last two years. Total number of TB patients during medical practice would be probably better correlated with TB knowledge. However, searching of the whole written database of medical records would be time-consuming and would probably result in much lower response rate.

Fourth, the study was conducted in Split and Dalmatian County with the long-standing favourable epidemiological situation in TB control compared to other Croatian Counties¹. Therefore, it is possible that these results may underestimate knowledge in Counties with higher TB rates.

Conclusions and Policy Implications

This study underlined many gaps in TB knowledge among PHCPs. Given that the most successful intervention in TB control is early detection and early and appropriate treatment of TB patient, efforts should be done to increase TB knowledge among PHCPs. It can be concluded that informing and education of PHCPs about existence and content of National guidelines would significantly increase their TB knowledge and consequently may improve case-finding and case-management. The

findings resulted from this study may serve as a basis for improving the education of PHCPs as one of the approaches to reducing TB burden in middle incidence country. Repeated surveys of health professionals' know-

ledge would be recommended for measurement of the impact of TB education and promotion of current guidelines.

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NEDOSTACI U ZNANJU O TUBERKULOZI MEĐU LIJEČNICIMA PRIMARNE ZDRAVSTVENE ZAŠTITE U HRVATSKOJ: EPIDEMIOLOŠKA STUDIJA

SAŽETAK

Visoka razina znanja liječnika o tuberkulozi je važna za učinkovito otkrivanje oboljelih kao i za njihovo odgovarajuće liječenje i praćenje. Istraživanja znanja liječnika o tuberkulozi kao i poznavanje nacionalnih smjernica za nadzor nad tuberkulozom su uglavnom rađena u zemljama niske ili visoke incidencije, dok su takva istraživanja manjkava u zemljama srednje incidencije poput Hrvatske. Stoga je cilj ove studije bio istražiti znanje o tuberkulozi među liječnicima primarne zdravstvene zaštite, prvenstveno liječnicima opće/obiteljske medicine i pedijatrima, u Splitsko-dalmatinskoj županiji uz procjenu potrebe za dodatnom izobrazbom o nadzoru nad ovom zaraznom bolesti. Ova prosječna studija napravljena je putem anonimnog upitnika koji je ispunilo 160 (60.8%) liječnika. Premda prosječan postotak točnih odgovora nije malen (70.3%), uočen je zabrinjavajuće mali postotak točnih odgovora na pitanja o vrsti fizikalnog nalaza prilikom auskultacije pluća (43.1%), uobičajenoj kombinaciji antituberkulotika tijekom početne faze liječenja (35%) te najčešćoj dužini liječenja (61.9%). Većina liječnika (87.9%) je izrazila potrebu da se dodatno izobrazbi o tuberkulozi. Razina znanja se procjenila na osnovu točnih odgovora na 14 prethodno izabranih pitanja koja je prosječno iznosila 8.18 ± 1.84 bodova. Razine znanja ovisno o godinama radnog staža, broju liječenih tuberkuloznih bolesnika i izraženoj potrebi za izobrazbom, nisu se međusobno značajno razlikovale. Više znanja su pokazali pedijatri ($p=0.025$) i oni liječnici koji su bili upoznati s postojanjem Napatka za suzbijanje i sprečavanje tuberkuloze ($p=0.002$). Ovo istraživanje je pokazalo ozbiljne nedostatke u znanju o tuberkulozi među liječnicima koji su osnova nadzora nad tuberkulozom u Hrvatskoj. S obzirom da je najuspješnija metoda kontrole tuberkuloze rano otkrivanje te rano i pravilno liječenje oboljelih, potrebno je intenzivirati napore u izobrazbi liječnika o tuberkulozi. Većina liječnika je izrazila potrebu i volju za sudjelovanjem u takvoj vrsti izobrazbe. Stoga je to dobro polazište za organizaciju i odziv na različite edukativne aktivnosti usmjerene tuberkulozi kao jednim od pristupa za smanjivanje pojavnosti tuberkuloze u zemljama srednje incidencije.