

**SHORT THESIS FOR THE DEGREE OF DOCTOR OF  
PHILOSOPHY (PHD)**

**The role of family physicians in the epidemiological  
surveillance and the prevention of cardiovascular events**

**by Dr. Katalin Tóth-Vraukó**

**Supervisor: Professor Dr Imre Rurik**



**UNIVERSITY OF DEBRECEN DOCTORAL SCHOOL OF  
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# **The role of family physicians in the epidemiological surveillance and the prevention of cardiovascular events**

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The Examination is held online and starts at 11.00 on 1<sup>th</sup> June, 2021.

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## Background

Epidemiological surveillance entails the continuous and systematic collection, analysis, understanding and dissemination of health care data. Special attention is given to the incidence of infections with respect to the time and the geographic area. Furthermore, risk factors are analysed in order to take adequate preventive and restrictive measures. Reporting the occurrence or the suspicion of infectious diseases to health authorities is an obligation not only in Hungary but in any EU member states, stipulated by law and regulation. The initial patient-doctor consultation takes place most frequently in primary care, thus this is the most important site for epidemiological surveillance. The results of international studies show that, despite the obligations family physicians do not always forward the epidemiological information to the health authorities. In Hungary, all practising physicians are obliged to report and keep a record of infected and potentially infected patients based on case definitions. These cases should be notified to the local health authority as well. Healthcare professionals are also obliged to inform the authorities about the outcomes of the disease if the patient, suffering from the reported condition, had complications, developed a long-term organic malformation or died. The aim of this study was to explore the knowledge, the habits and the daily practice of Hungarian family physicians with respect to the reporting of infectious diseases to the primary care surveillance system.

Cardiovascular disease of atherosclerotic origin is among the major causes of death and hospital admissions in middle-aged and older people in Europe. Thus, primary and secondary prevention of these morbidities is a top priority of national public health policies in European countries. During the last two decades various national and international societies developed guidelines for physicians in order to support their preventive and curative practice. The first European guideline of the *Joint European Task Force of the European Society of Cardiology and Other Societies on Cardiovascular Disease Prevention* (JETF) was published in 1994 but the real breakthrough came in 2003 with the third guideline, introducing the Systematic Coronary Risk Evaluation (SCORE) method. The SCORE is based on European epidemiological data, focused on global cardiovascular risk, estimating the chance of fatal cardiovascular events in the upcoming ten years. This guideline defined target values for the management of major risk factors and gave recommendations on lifestyle change and preventive medication. Currently the sixth recommendation of the JETF is applicable, published in 2016.

Assessment of the success of the implementation of the guidelines and the effectiveness of the continuous care of patients with high cardiovascular risk was the subject of several European studies in the past two decades. The *European Action on Secondary and Primary Prevention by Intervention to Reduce Events* (EUROASPIRE-I) survey started in the middle of the 90s, followed by others, involving 12 and 14 European countries. The last EUROASPIRE studies were conducted in 2006-2007 (III.) and in 2014-2015 (IV) respectively, and both of them had primary care arms. In these cross-sectional surveys the study populations were high risk patients without established cardiovascular disease. Lifestyle (eating habits, physical activity and smoking), BMI, blood pressure and metabolic parameters (plasma lipids, glucose) were recorded and compared to the target values of the relevant JETF guidelines. There were limited national publications about what were happened in primary care settings and Hungary had not been invited to participate in these studies, although some national surveys were conducted on primary and secondary prevention during this period. Regarding the target values of lipid parameters, the Hungarian REALITY and Multi-GAP studies concluded that the effectiveness of outpatient clinics of lipid specialists or cardiologists was significantly higher than that in primary care, but these differences have gradually diminished over the years.

The national "*Hungarian Cardiovascular Consensus Conferences*" (HCCC) are organized biannually, where opinion leaders of cardiovascular and metabolic diseases discuss and share their experiences. They are followed by the publication of updated guidelines, which are almost identical to the European guidelines of Task Forces.

We conducted two nationwide cross-sectional surveys to assess the effectiveness of cardiovascular risk management in respect of the achievement of target values of some anthropometric, clinical and laboratory parameters in different subgroups of high risk patients in Hungarian primary care. The first survey was performed in 2010-2011, the next one in 2015-2016. In this report our aim was to make two comparisons. First, between our two surveys referred to above – to follow the changes in efficacy in Hungarian risk management - , and second, between the results of our surveys and the data of the subpopulation of the relevant European surveys – to compare our results to , i.e. the outcomes of primary prevention arms of EUROASPIRE III. and IV. studies, performed almost at the same time as our surveys.

Hungarian primary health care system is mainly based on solo practices, where one GP and one practice nurse, sometimes one more assistant are working. It's an old and fragmented structure with limited options and resources for patient education and lifestyle management, without organized cooperation between the practices and other stakeholders in primary and secondary prevention (e.g. health improvement offices, local governments etc.) This situation

results a huge gap between possibilities and needs regarding preventive activities in primary care.

Nowadays there are governmental initiatives in Hungary to create partnerships between practices involving more healthcare professionals and offer more resources to support risk assessment of patients and risk management activities.

## **METHODS**

To answer our research questions a survey was run involving family physicians attending continuous medical education (CME) programs organised by the four medical faculties in Hungary. The participants were recruited during their CME program and were asked to fill in a questionnaire. This cross-sectional study was carried out in the last quarter of 2015, covering the whole country. The questionnaire was developed based on a former longitudinal study including demographic questions and 10 statements about the reporting habits of family physicians related to infectious cases. The validated questionnaire was previously tested by an expert group comprised of representatives of the four Hungarian Departments of Family Medicine .

Participation was voluntary, a participation rate of about 80% was achieved, and answers were processed anonymously.

Our research questions were:

- How could the current epidemiological surveillance system be improved with the insights of family physicians?
- What information do family physicians have on the reporting system of infections?
- Is there any correlation between the gender, age, previous experience, geographical location of practices and their reporting habits?

The data assessing demographic characteristics were: gender, age, location and years spent in practice. Physicians were asked to rate their answer options between 0=fully disagree, 10=fully agree.

For the statistical analysis, the *Stata 11* software was used. The descriptive statistics were produced by the 'summarize' command and the regression analysis was performed using the 'glm' command. The association between dependent variable (agreement score on statement) and independent variables (gender, age, practice time, practice location) was analyzed using a general linear model (with maximum likelihood optimization). In this model the regression coefficient presented for categorical variables (gender, practice location) means one unit

increment or decrement of score (respectively to positive or negative sign) compared to the reference category. The reference category for the gender was ‘male’ and for the practice location ‘the capital’.

In the second part of our research, our study group - based on the Hungarian primary care research network - performed a representative nationwide *cross-sectional survey* in 2010-2011. It was repeated in 2015-2016 using almost the same method while taking into account the updates of the national and international guidelines.

Followed by an advertisement for targeted – mostly tutorial – practices, the applicant practices were selected by location and by the population they served.

Twenty primary care practices participated in the first survey and 40 in the second one. There were minimal overlaps between the practices, which covered the whole country geographically. Half of the practices were in urban settings, the other half in rural areas.

Patients between 40 and 80 years of age were included to whom one or more of the following medications had been prescribed at least for 12 months before enrollment into the survey: (1) antihypertensive and/or (2) lipid lowering and/or (3) antidiabetic medication. The first 10 persons who visited the primary care office were consecutively selected from each diagnostic (prescription) group. Exclusion criteria were: (1) the available electronic health records were incomplete, (2) participation in our former survey.

All measurements were retrieved from the electronic medical records for each patient, which were: (1) mean values of the last three blood pressure (BP) measurements, (2) laboratory data of fasting values of plasma glucose, HbA<sub>1c</sub>, triglycerides, total, HDL and LDL-cholesterols, based on calculation and (3) anthropometric parameters.

Risk assessments were done centrally by the research group according to the IV. and VI. Guidelines of the *Hungarian Cardiovascular Consensus Conferences*. The principal assessment criteria of these guidelines were essentially identical to those of the IV. and V. JETF guidelines.

*Statistical analysis* was performed on the relevant data of the two Hungarian surveys by using Student’s unpaired t-test. The level of significance was set to  $P < 0.05$ . All analyses were performed using the STATA 10.1. software (Statacorp LP. College Station, TX, USA).

Data were stored under the provisions of the Hungarian national health data protection law. According to recent Hungarian regulations, no permission of an ethical committee was required because all data were drawn from patients’ files and were anonymously sent to the data processing center.

All health care providers contributed on a voluntary basis, without any financial incentives.

## **RESULTS**

The survey was completed by 347 (186 female and 161 male) family physicians; their age was  $54.6 \pm 11.1$  (mean $\pm$ SD). The years spent in practice varied between 1 to 55 ( $21.9 \pm 11.9$ , mean $\pm$ SD).

From the family physician's point of view, the epidemiological surveillance system works well. However, it should be considered that most of the responders exclusively report only lab proven infections. Family physicians usually consider reporting infected patients as a professional task, though many of them do not have enough time to do it. The majority of them do not know exactly how the transferred and reported data will be used by the healthcare authorities. Some physicians believe that a single report cannot contribute to the surveillance systems. It was also reported that the electronic reporting system frequently failed to function. The majority of physicians agree that only severe infections are reported in special care. According to the analyses, three of the four examined demographic characteristics (age, place of practice, years spent in practice) showed significant association with the reporting habits. Older physicians frequently believed that one single report cannot contribute to the operation of the epidemiology surveillance system. Physicians, who had spent a longer time in practice, were more likely to consider the epidemiological reporting system as effective.

Female physicians were agreed that more severe infectious diseases can be diagnosed at primary care level and also confirmed less influence on their everyday practice. They have a higher awareness of epidemiology.

The reporting habits were often influenced by the geographic location of the practices. Rural family physicians considered more frequently the reports as a professional task instead of obligation only. Those who worked in small villages agreed less reporting only lab proven cases. Urban based physicians were hindered less by failures of the computer- system.

Patients with high risk but free from cardiovascular disease (subgroups A and D), reached the target blood pressure in 75.8% and 60%, respectively, which is a significant difference. In the first survey only 37.1% and 30.1% of the patients were below the target threshold (subgroups B and C). This rate was 42.7% in the identical subgroup (E) during the second survey, while the target value had changed from 130/80 mmHg to 140/90 mmHg. Only 33.3% of the patients

reached the LDL-cholesterol target value ( $< 2.5$  mmol/l) in the first survey, while five years later it increased to 39.3%. Just over 10% of patients reached the LDL-cholesterol target value ( $<1.8$  mmol/l) in the first and 15.8% in the second survey, the difference is significant. Reaching the 1.7 mmol/l plasma triglyceride target value was more successful in subgroups B and C. Achievement of the HDL-cholesterol target value improved slightly by the second survey, it was between 64-71% in all subgroups.

In both surveys the glycated hemoglobin (HbA<sub>1c</sub>) target values were analyzed only among type 2 diabetic patients. During the five-year period, there were no improvements in Hungary. The proportion of patients with HbA<sub>1c</sub>  $<7\%$  was 42% in the first and 40% in our second survey, respectively.

The measurement of total cholesterol was later replaced by plasma LDL-cholesterol, therefore these values were compared. It was found that the treatment of hypertensive patients was always more effective in Hungary. Total cholesterol levels were almost identical, while LDL-cholesterol level was treated more effectively in Hungarian primary care. Considering only the HbA<sub>1c</sub> values, the advantage of the Hungarian patients disappeared, five years later the EUROASPIRE data were better. Statistical differences between the Hungarian and European results could not be calculated because the lack of detailed European datasets.

## **DISCUSSION**

This is the first Hungarian study providing evidence that certain demographic characteristics of family physicians are related to their reporting habits of infectious diseases. Furthermore, it reflects the different points of view of primary care providers working in different geographical locations. Previous studies indicated that family physicians did not like reporting cases not yet proven by a laboratory tests because it could be professionally awkward. This is also the case in Hungary, particularly in rural areas, that are far from available laboratory services. Authors of studies from New Zealand, USA and Spain mentioned the lack of time as hindrance of reporting, similarly to their Hungarian colleagues. Three different studies also identified lack of time as the main barrier to reporting. Other studies stated that missed reports were explained by patients who refused transferring their personal data, by too much paperwork expected from the doctors or simply forgetting it. Hungarian primary care practitioners do not receive any financial incentives for the notification of infectious diseases. Most policy changes in the area of payment systems are inadequately informed by research. Besides this, several studies

identified epidemiological knowledge of the practitioner as the most important determinant of notification. No doubt, there is room for improvement in Hungary as well. The lack of clear instructions, inadequate dissemination of guidelines and no assistance with reporting procedures, supervision or feedback are the most important reasons for under reporting. In Hungary, there is no legally binding professional guideline for the management of infections in primary care; hence the regulations could be easily disregarded.

Without appropriate epidemiological knowledge, some physicians could believe that a single report is insufficient for surveillance-operations. Frequent failures of the electronic reporting system were noted. These were only partially explained by simple technical reasons; inexperienced staff members (doctors and nurses) could also been responsible, because the use of computer-systems does not have a long tradition in Hungarian primary care. A study also described the epidemiological awareness of female doctors was higher than that of male physicians. Hungarian female physicians had also better awareness of epidemiology, they confirmed readiness for diagnosing even severe infections in primary care and were less influenced by reporting obligations.

Older physicians believed that a single report does not contribute to the operation of the epidemiology surveillance system. This concept is unacceptable, since every submitted report counts. If health care authorities are unaware of an infected person, they cannot take the necessary preventive actions. Consequently, the infection may be transferred to other individuals, thus increasing the burden on health care providers, as well as governmental administrators.

Moreover, it emphasises the importance of further educational programmes in epidemiology, because it represents only a small part in undergraduate education and vocational training as well.

The reporting habit of physicians was often influenced by the geographic location of practices. Rural practitioners were mostly considering the report as not only an obligation by law but also a professional task; consequently they were the most committed. They were less likely to report only lab proven and confirmed cases, certainly due to the restricted availability of microbiology laboratories compared to the capital or larger cities although they were more hindered by IT issues.

We could to reach the appropriate representativeness in the study, covering 8% of all physicians providing primary health care for adults. All of the medical faculties were involved in the research, covering the whole country geographically. The mean age of study population and the national age-data was almost the same.

This research has limitations. The participants involved voluntarily, which may not reflect the entire study population. Furthermore, the survey took place in a specific period of time, and other results could have been obtained in another occasion.

Our results call for a more systematic control by health care authorities. In addition, general practitioners' knowledge on epidemiology should be improved, with more updated educational programmes organised by university departments and/or governmental bodies. Inadequate knowledge is leading to unsatisfactory attitude that influences the practices. The epidemiological surveillance and electronic reporting systems should also be technically improved.

### ***Main findings of second research***

There was a significant improvement in Hungary in the management of blood-pressure and LDL-cholesterol level among high risk patients. The effectiveness of diabetes care deteriorated. In international relation, management of blood pressure and LDL-cholesterol values were better in Hungary, while previous advantage in diabetes care disappeared. Higher ratio of diabetic patients was above the target laboratory values in Hungary than the means of the EUROPEAN surveys, where respective national data from the participating countries were not available. Other comparisons were made according to the main risk factors and registered laboratory parameters regarding target levels.

Primary care has a unique role in cardiovascular prevention in each European country. The effectiveness of cardiovascular risk management in Hungary did not improve essentially during the period between 2010 and 2016. Family physicians should be helped by updated educations how to provide a more effective patient's education and lifestyle intervention. Structural changes in primary care settings to facilitate cooperative management in general practice should also be encouraged. They need more support with the involvement other health care professionals, wider community orientation and expanded competencies. Medical advice against smoking, inappropriate nutritional habits, sedentary lifestyle and obesity should be promoted both in the general population and at governmental levels.

## Summary

In the first part of the **Theses** the reasons of non-reporting of infectious diseases for the health authorities were evaluated, beside the knowledge, attitude, and daily practice and reporting activities of Hungarian family physicians.

Self-administered questionnaires were used in both surveys; where 116 and 347 answers were collected from the nationally representative group of family physicians.

The most important reason for underreporting was the lack of knowledge about the reporting system, while majority of them consider it as sufficient. Rural doctors mostly believe that appropriate reporting is both a legal and professional task. Urban based doctors report mostly laboratory confirmed cases and they experience more frequently IT problems. Older physicians think that the reporting system is more reliable, while female doctors have wider knowledge about how the surveillance system is working.

The main conclusions were: the epidemiological knowledge and the IT system should be developed in the Hungarian primary care, beside more concise regulations and higher number of supervisions performed on more professional way.

In the second part of the **Theses**, the effectiveness of care of Hungarian patients with cardiovascular risk was compared to that of two European surveys, performed in the same time frame.

The risk stratification was based on international guidelines. From 20 primary care practices 679 patients were recruited, while later on 629 from 40 practices. Blood pressure, serum LDL,- and HDL-cholesterol, triglycerides and HbA<sub>1c</sub> levels were measured, beside BMI and waist circumference values and smoking habit.

Comparing the findings of the two Hungarian and European surveys, it could be concluded, that treatment of high blood pressure and pathological LDL-cholesterol values were more effective in Hungary in both periods, while the previously experienced advantage in the diabetes care was disappeared. There was no change in the triglyceride values achievement. Ratios of smokers were always higher in Hungary.



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### List of publications related to the dissertation

1. Jancsó, Z., Rurik, I., Kolozsvári, L. R., Mester, L., Nánási, A., Oláh, C., Ungvári, T., **Tóth-Vraukó, K.**, Kalabay, L., Torzsa, P.: Care management of patients with high cardiovascular risk in Hungary an international and Hungarian longitudinal comparison of target level achievement. *BMC Fam. Pract.* 21 (1), 1-8, 2020.  
DOI: <http://dx.doi.org/10.1186/s12875-020-01150-9>  
IF: 2.022 (2019)
2. **Tóth-Vraukó, K.**, Jancsó, Z., Kalabay, L., Lukács, A., Maráczsi, G., Mester, L., Nánási, A., Rinfel, J., Sárosi, T., Tamás, F., Varga, A., Vitrai, J., Rurik, I.: An appraisal: how notifiable infectious diseases are reported by Hungarian family physicians. *BMC Infect. Dis.* 18 (1), 45-61, 2018.  
DOI: <http://dx.doi.org/10.1186/s12879-018-2948-5>  
IF: 2.565





### List of other publications

3. Rurik, I., Jancsó, Z., Kalabay, L., Láncki, L., Mester, L., Móczár, C., Nánási, A., Semánová, C., Schmidt, P., Szidor, J., Tamás, H., Torzsa, P., Ungvári, T., Végh, M., **Tóth-Vraukó, K.**, Kolozsvári, L. R.: Evaluation of primary care services in Hungary.  
*Research Square* 2020, 1-23, 2020.  
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4. Virtanen, E., Kivelä, J., Wikström, K., Lambrinou, C. P., De Miguel-Etayo, P., Huys, N., **Tóth-Vraukó, K.**, Moreno, L. A., Usheva, N., Chakarova, N., Radó, S. I., Iotova, V., Makrilakis, K., Cardon, G., Liatis, S., Manios, Y., Lindström, J., Feel4Diabetes-Study Group: Feel4Diabetes healthy diet score: development and evaluation of clinical validity.  
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DOI: <http://dx.doi.org/10.1186/s12902-020-0521-x>  
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5. **Tóth-Vraukó, K.**, Vitrai, J., Mucsi, G., Rurik, I.: A családorvosok fertőzőbeteg-bejelentéseinek vizsgálata.  
*Orv. Hetil.* 155 (31), 1228-1235, 2014.  
DOI: <http://dx.doi.org/10.1556/OH.2014.29903>

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