# Proceedings of the 3rd V4 Conference on Public Health 2017

## Prague, 19-20 October 2017

# Proceedings of the 3rd V4 Conference on Public Health 2017

## Prague, 19-20 October 2017

**Edited by Martin Dlouhý**

**Scientific Committee**

Martin Dlouhý, University of Economics, Prague; President of the Czech Society of Social Medicine and Heath Care Management; Chair of the Scientific Committee

Róza Ádány, Faculty of Public Health, University of Debrecen, Hungary

Helena Bouzková, National Medical Library, Prague, Czech Republic

Andrzej M. Fal, National Institute of Public Health in Warsaw & Wroclaw Medical University, President of the Polish Society of Public Health, Poland

Petr Háva, Faculty of Social Sciences, Charles University, Prague, Czech Republic

Helena Hnilicová, First Medical Faculty, Charles University, Prague, Czech Republic

Jan Holčík, health policy consultant, Czech Republic

Zdeněk Kučera, Czech Health Literacy Institute, Prague, Czech Republic

Hana Janečková, Third Medical Faculty, Charles University, Prague, Czech Republic

Antonín Malina, Institute of Postgraduate Medical Education, Prague, Czech Republic

Iveta Nagyová, Faculty of Medicine, P. J. Safarik University in Košice, and SAVEZ, Slovakia

Piotr Romaniuk, School of Public Health, Medical University of Silesia in Katowice, Poland

Alena Šteflová, WHO Country Office in the Czech Republic

**Organizing Committee**

Miroslav Barták, University of Jan Evangelista Purkyně, Ústí nad Labem, Czech Republic, Chair of the Organizing Committee

Krzysztof Kaczmarek, School of Public Health in Bytom, Medical University of Silesia in Katowice, Poland

Zuzana Katreniaková, Faculty of Medicine, P. J. Safarik University in Košice, and SAVEZ, Slovakia

Zsófia Kollányi, Faculty of Social Sciences, Eötvös Loránd University, Hungary

Suggested citation: Dlouhý, M. (Ed.) *Proceedings of the 3rd V4 Conference on Public Health 2017*. Prague, Professional Publishing, 2018.

**Editor:** Martin Dlouhý

The contributions were reviewed by the Scientific and Organizing Committees.

© Society of Social Medicine and Health Care Management of the Czech Medical Association of Jan Evangelista Purkyně (Společnost sociálního lékařství a řízení péče o zdraví České lékařské společnosti Jana Evangelisty Purkyně)

Edition © Professional Publishing, s. r. o., Prague

First Edition, 2018

ISBN 978-80-88260-08-0

# Contents

# Cross-Border Healthcare in the Czech Republic and its Relationship to Other V4 Countries

Miroslav Barták[a], Beáta Gavurová[b]
[a]Faculty of Social and Economic Studies, J. E. Purkyně University, Ústí nad Labem, Czech Republic
[b]Technical University of Košice, Faculty of Economics, Slovakia

**Abstract**

Currently, the cross-border healthcare still represents a marginal part of the Czech healthcare system's performance. Compared to the total healthcare expenditures in the Czech Republic that accounted for CZK 299.9 billion in 2014, the costs of the treatment provided to Czech patients abroad constitute mere 0.27%, and the (subsequently refunded) costs of the treatment provided to foreign patients in the Czech Republic are 0.24%. The aim of the paper is to analyse the available data of the cross-border healthcare reimbursement in the Czech Republic and its relationship to other V4 countries. In 2016, there were total costs of foreign citizens' healthcare from the V4 countries in the Czech Republic about CZK 419 million for patients from Slovakia, about CZK 39 million for patients from Poland and about CZK 5 million for patients coming from Hungary. On the other hand, the costs of patients from the Czech Republic in Slovakia reached CZK 364 million, about CZK 57 million in Poland and just CZK 2.5 million in Hungary. The cross-border healthcare reimbursements play some role between the Czech and Slovak health systems as well as between the Czech and Polish healthcare systems. On the other hand, the relationship between the Czech and Hungarian healthcare systems is not in this term significant.

**Keywords:** cross-border health care, V4 countries, reimbursements, Health Insurance Bureau.

## 1 Introduction

In recent years, the importance of cross-border exchange of health services has grown tremendously. The causes lie not only in the development of international tourism and in migratory movements of the population of some countries, but also in the increasing level of health care and the associated financial costs. The organization of healthcare and services is a matter for individual Member States of the European Union (EU). The EU's role is to complement the health policies of the Member States, even though functional settings of individual health systems differ [1, 2]. In particular, it aims to: facilitate the achievement of common objectives by the governments of the individual EU countries; create economies of scale by sharing resources; to help Member States tackle common challenges - a pandemic, chronic illness or the impact of an increase in life expectancy on healthcare systems. Health policy is implemented by the EU on the basis of a health strategy [3]. This policy focuses on: (i) prevention - in particular, promoting healthy lifestyles; (ii) creating a level playing field for maintaining good health and quality of health care for all; (iii) addressing major health threats affecting more than one EU country; (iv) maintaining good health in older people; (v) promoting dynamic health systems and new technologies. The reality of health-care systems in the EU states remains a different level of funding, both in relative and absolute terms, as well as the different outcomes/outcomes of health interventions and the efficiency of health systems in relation to the objectives set [1,2].

In March 2011, the EU has adopted a new law that gives citizens of the Member States the right to choose a provider of health services across the EU [4]. This has significantly altered the ability of citizens of the Member States to use health services in other European countries. The Directive also explicitly states that Member States cannot deny payment of this care to patients seeking care in another Member State, even if the type of care in their home country is not covered. This adjustment significantly reduces the barriers to healthcare consumption in other Member States and, although it states that services are not actively promoted, de facto stimulates patient mobility within the EU [4, 5]. Member States can require patients to seek prior authorisation for certain treatments, generally inpatient care and care requiring highly specialised or cost-intensive medical equipment or infrastructure. A prior authorisation can be refused e.g. if the patient can be offered the treatment in the Member Sate of affiliation within a time limit which is medically justifiable [4].

The Visegrad Group (also known as the "Visegrad Four" or simply "V4") reflects the efforts of the countries of the Central European region to work together in a number of fields of common interest within the all-European integration. The Czech Republic, Hungary, Poland, and Slovakia have always been part of a single civilization sharing cultural and intellectual values and common roots in diverse religious traditions, which they wish to preserve and further strengthen[1]. Also, in the health sector, all V4 countries have a similar historical experience. Their health systems are transforming systems that moved from the state healthcare model to the public health insurance system in the 1990s. In addition, at that time, Czechoslovakia was divided into the Czech Republic and the Slovak Republic. Thus, the healthcare of these two countries has logically even closer links, which are given by the common history of a unified health care system in former Czechoslovakia.

The findings of Special Eurobarometer 425 [6] are that a small minority of Europeans (5%) received medical treatment in another EU country. Only 15% of respondents encountered problems getting reimbursed for cross border treatments. Around half of the respondents show willingness to travel to another EU country to receive medical treatment. The main reasons to seek treatment abroad were to receive treatment that was not available at home, and to receive better quality treatment. Treatments that respondents would consider seeking abroad were mostly for major pathologies, such as cancer treatment or heart surgery. There is no clear-cut answer regarding the kind of information needed to make a decision on cross-border healthcare.

## 2 Data and Methods

The data was obtained from publicly available statistics published by the HIB (Health Insurance Bureau of the Czech Republic) in yearbook for the year 2016 (data 4/2016 – 4/2017). The HIB is a liaison body of the Czech Republic in the sphere of public health insurance and healthcare in the sense of Art. 1, par. 2b) of EU Regulation 987/09, national contact point on the basis of Art. 14 of Public Health Insurance Act and EU Directive 24/2011 on Patients' Rights in Cross-Border Healthcare, designated institution for determination of applicable legislation as concerns non-active persons and cooperating institution for consideration of applications for exemption from applicable legislation in cases of employees and self-employed according to Art. 16 of EU Regulation 883/2004, access point within the meaning of Art. 1, 2a), resp. 88, par 1 of EU Regulation 987/2009, operating common IT system for purpose of international electronic data exchange[2]. The data [7] was processed into tables and graphs and subsequently described. The article contains only basic descriptive characteristics. The goal of the contribution is to analyse in brief the available data of the cross-border healthcare reimbursement in the Czech Republic and its relationship to other V4 countries.

## 3 Results and Discussion

Table 1 shows the foreign insured persons treatment in the Czech Republic - number of cases and actual costs by groups of persons. The following table shows that most care is provided to citizens of Slovakia. In the field of planned care, Hungary has 7 cases in second place behind Slovakia and last place is Poland.

Figure 1 shows the importance of cross-border care between the Czech Republic and Slovakia is clearly visible. In the monitored period, more than 35,000 patients from Slovakia were treated in the Czech Republic with fewer than ten children from Poland and only 394 from Hungary.

---

[1] http://www.visegradgroup.eu/about (cited 19. 10. 2017)

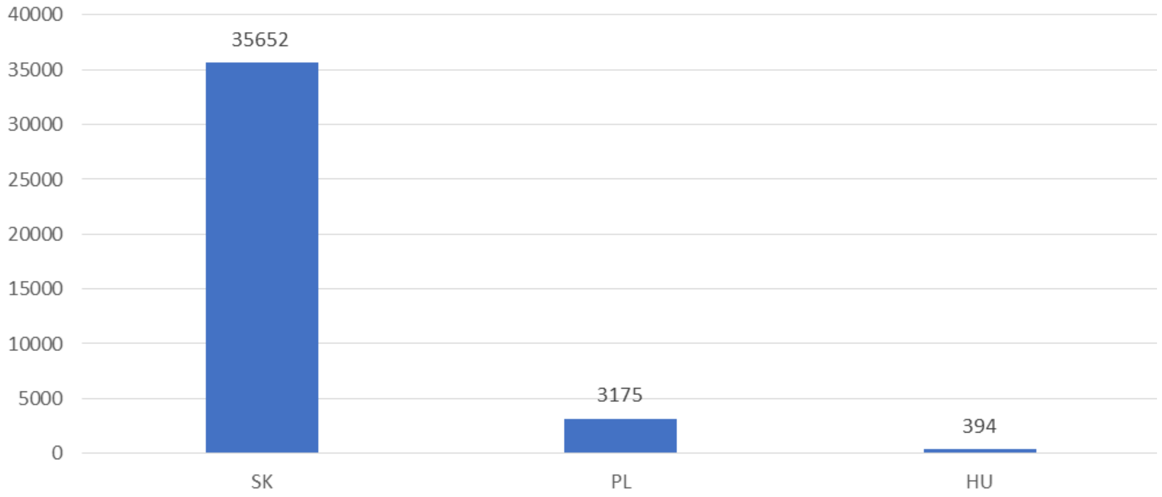
[2] https://www.kancelarzp.cz/en/about-us-en/role-cmu-en (cited 19. 10. 2017)

**Table 1. Foreign insured persons' treatment in the Czech Republic - number of cases and actual costs by groups of persons (2016-2017).**

| Country | Transitional stays | | Insurance out of the state of residence | | Planed care | | Summary CZK |
|---|---|---|---|---|---|---|---|
| | persons | costs CZK | persons | costs CZK | persons | costs CZK | |
| SK | 20 642 | 150 665 776 | 14 292 | 155 525 663 | 750 | 113 058 650 | 419 249 989 |
| PL | 1 387 | 18 646 071 | 1 783 | 15 625 784 | 5 | 4 548 359 | 38 820 215 |
| HU | 239 | 1 688 605 | 148 | 535 799 | 7 | 2 985 775 | 5 210 180 |

Source: https://www.kancelarzp.cz/images/cmu_documents/rocenky/rocenka2016.pdf

**Figure 1. Number of cases treated foreign insured persons (2016-2017)**



Source: https://www.kancelarzp.cz/images/cmu_documents/rocenky/rocenka2016.pdf

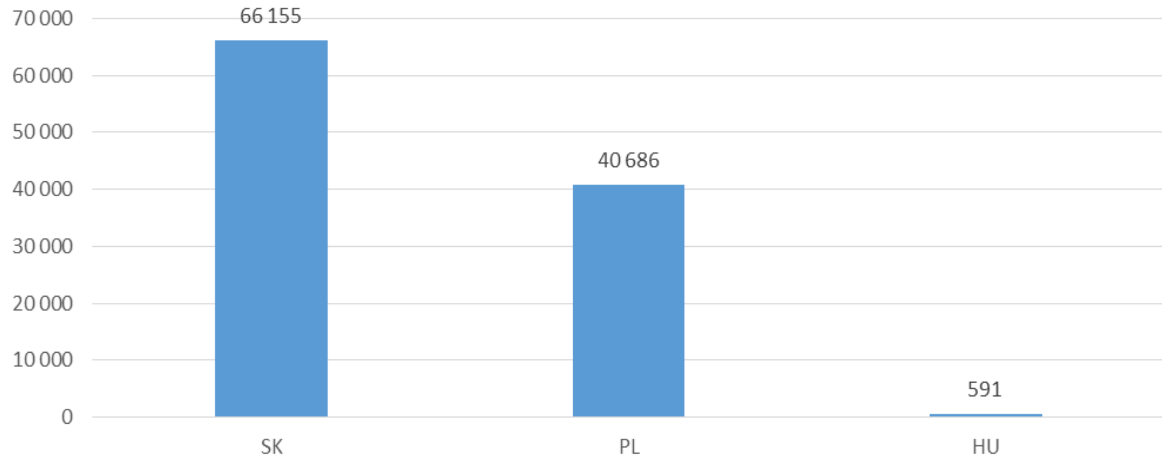
Table 2 shows that most Czech citizens receive health care in Slovakia, followed by Poland and Hungary. The high number of insured persons outside the country of residence in Poland can be explained by greater interconnection of the labour market of the Czech Republic and Poland, especially in the Moravian-Silesian Region. Interestingly, no care for Czech citizens was planned in Poland in the given period. The dominant position of Slovakia is again well visible here, whether it concerns the number of persons or the volume of costs.

**Table 2. Czech insured persons abroad - number of cases and actual costs applied by groups of persons (2016-2017)**

| Country | Transitional stays | | Insurance out of the state of residence | | Planed care | | Summary CZK |
|---|---|---|---|---|---|---|---|
| | persons | costs CZK | persons | costs CZK | persons | costs CZK | |
| SK | 14 285 | 65 021 551 | 51 828 | 297 764 857 | 42 | 1 225 170 | 364 011 597 |
| PL | 3 185 | 10 669 666 | 37 501 | 46 621 822 | 0 | 0 | 57 291 488 |
| HU | 358 | 1 651 360 | 229 | 567 137 | 4 | 264 537 | 2 483 035 |

Source: https://www.kancelarzp.cz/images/cmu_documents/rocenky/rocenka2016.pdf

**Figure 2. Number of cases treated foreign insured persons (2016-2017)**



Based on the previous research of the first author [1], it seems that the cross-border care is still a negligible part of the Czech health services, however in other countries like Poland the situation is different (e.g., deliveries of Polish mothers in the German hospital at the Poland-Germany border). Based on data available in the Czech Republic (see above), the cross-border care within the EU because of residence in another Member State, either because of tourism, study or employment, is not a significant alternative to the care provided by domestic providers.

## 4 Conclusion

The cross-border healthcare reimbursements play some role between the Czech and Slovak health systems as well as between the Czech and Polish health systems. On the other hand, the relationship between the Czech and Hungarian healthcare systems is in this term not significant. Cross-border provision of health care is currently not openly supported by the V4 states. Individual systems serve primarily the needs of their citizens. The total financial volume of care is rather limited from macroeconomics point of view. On the other hand, cross-border provision of healthcare can be in some cases reasonable alternative to domestic healthcare. The issue of cross-border care requires further evaluation and a clear political decision on whether to be a demand-driven or a supply side model, i.e. cross border health care vs. health tourism. The data clearly show the importance of cooperation between the Czech Republic and Slovakia.

## References

[1] BARTÁK, M., ET AL. 2016. Cross-border healthcare in European Union and Czech Republic. *Casopis lekaru ceskych*, 155(5):247-253.

[2] LEGIDO-QUIGLEY, H., ET AL. 2012. Analysing arrangements for cross-border mobility of patients in the European Union: A proposal for a framework', *Health Policy;* 108(1):27-36.

[3] EUROPEAN UNION. https://europa.eu/european-union/topics/health_en [cited 19. 10. 2017].

[4] EU DIRECTIVE 2(2011) 011/24/EU OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 on the application of patients' rights in cross-border healthcare, in European parliament (Ed.), 2011/24/EU; *Official Journal of the European Union L 88/45*.

[5] GLINOS, I. A., ET AL. 2010. A typology of cross-border patient mobility, *Health & Place;* 16(6): 1145-55.

[6] EUROPEAN COMISSION. 2015. *Special Eurobarometer 425: Patients' Rights in Cross-Border Healthcare in the European Union*. Brussels: European Commission.

[7] KANCELÁŘ ZDRAVOTNÍHO POJIŠTĚNÍ. 2017. *Statistická ročenka Kanceláře ZP 2016*. https://www.kancelarzp.cz/images/cmu_documents/rocenky/rocenka2016.pdf.

# Suicides in the Slovak Republic: Trend and Cross-Sectional Analysis

Alexandra Bražinová
Institute of Epidemiology, Faculty of Medicine, Comenius University, Bratislava, Slovak Republic

## Abstract

Background and Aim: Suicide is a significant global public health issue, resulting in loss of lives, and burdening societies. The aim of the study was to assess the situation of suicides in the Slovak Republic, as this has not been published before. We have conducted a study of time trends of suicide rates in the country in the period of its existence 1993–2015 as well as cross-sectional analysis of socio-economic sucide-influencing factors on district level for the period 2011-2015.

Methods: Data for this study were obtained from the Statistical Office of the Slovak Republic, the national mortality database for the period 1993–2015. Socio-economic indicators on district level were extracted from DataCube database of the Statistical Office of the Slovak Republic. We have calculated crude and standardised suicide rates by age, sex, year of death, methods of suicide on both national level (for the whole study period 1993–2015) as well as district level for 2011-2015 period. Suicide rates relative risk and trend were analyzed by using negative binomial and joinpoint regression models respectively. Univariate and multivariate linear regression was used to assess the relationship between the socioeconomic variables and suicide rates at district level.

Results: In the period 1993–2015 were 14,575 suicides reported in the Slovak Republic (85.3% men). The overall time trend for total population is decreasing with time over the study period, from 14.61 in 1993 to 7.76 per 100,000 people in 2015. The overall average age-standardized SR for the study period was 11.45 per 100,000 person years, this is below the Organisation for Economic Co-operation and Development (OECD) average. The rate increases with age, the highest is in men aged 75+ (42.74 per 100,000 people). Risk of suicide is six times higher in men than in women and nine times higher in men than in women in the age group 25–34. Highest suicide rate in the Slovak Republic in 2015 on district level is in Myjava district.

Conclusion: The time trend of SRs is decreasing in the study period 1993–2015, however, at the same time we have observed increasing trend of proportion of deaths classified as caused by 'undetermined intent'. Correct cause of death certification and standardized mortality data collection is higly desirable for accurate monitoring and targeted intervention.

Suicides are an important public health issue in need of focused prevention activities, with special attention on older people.

**Keywords:** suicide rate, mental health, completed suicides, Slovak Republic.

## 1 Introduction

Suicide is a significant global public health issue, resulting in loss of lives, and burdening societies. Suicide is very closely linked to mental health. In about 90% of completed suicides mental disorders are present [10]. People who die by suicide are frequently experiencing undiagnosed, undertreated, or untreated mental disorder, most often depression.

Suicide is the worst possible outcome of mental illness. Mental, neurological, and substance use disorders have an overall huge impact on population health [2, 11]. People with mental disorders have higher mortality risks than the general population, not only by suicide, but also because of comorbid physical illness [3]. Physical comorbidity is often unattended in people with mental disorders [15].

Efficient suicide prevention programmes include mental health promotion activities and mental illness prevention, early diagnosis and treatment interventions [20]. A prerequisite for any policy action is to know the situation.

To assess the current state of affairs in the Slovak Republic, we have conducted a study of time trends of suicide rates in the country in the period of its existence 1993–2015 as well as cross-sectional analysis of socio-economic factors influencing suicide on district level for period 2011-2015. Such a description and analysis might serve further for targeted suicide prevention.

## 2 Data and Methods

In order to calculate the suicide rates, we have acquired the national mortality data from the Statistical Office of the Slovak Republic - database for the period 1993–2015. The mortality data are obtained from death certificates completed by examining physicians and forensic pathologists and provided to the national vital statistics system of the Statistical Office of the Slovak Republic. To extract the needed data, we used the International Classification of Diseases, 10th edition (ICD-10), codes of external causes of death: codes X60-84.

The methods of suicide were organized in the following groups for 1994–2015 (in 1993 ICD-9 was used and therefore this year was excluded from the analysis of suicide method, for consistency): X60-64 medication; X65 alcohol; X66 solvents; X67 gas; X68-69 chemicals, X70 hanging, strangulation, suffocation; X71 drowning and submersion; X72-74 firearm; X75 explosive; X76-77 smoke, fire, steam, hot vapors and objects; X78-79 sharp, blunt object; X80 jumping from a high place, X81 jumping before moving object, X82 crashing of motor vehicle; X83-83 other.

We have calculated crude suicide rates for total population, females and males separately, by individual age groups (<15, 15–24, 25–34, 35–54, 55–74, ≥75).

Suicide rates were standardized by the method of direct standardization to the European standard population [19].

Suicide rates were analyzed by using negative binomial and joinpoint regression models.

Negative binomial (NB) regression models were used to investigate the suicide rates, stratified by sex (reference group: females) and age groups. Year and sex were explanatory variables for NB regressions. The relative risks (RRs) and 95% confidence interval were calculated.

Joinpoint (JP) regression model was used to assess the statistical significance of change in time trends. The model fits a series of joined straight lines to the age-adjusted rates and chooses the best-fitting point or points, where the rate of increase or decrease changes significantly. The number and location of these changes in trends (known as change-points or JPs) is decided by the model, it is unknown before the analysis and varies for individual variables. The resulting line segment between JPs is described by an annual percent change (APC). We calculated also the average annual percent change (AAPC) to characterize trends in SRs over the total study period (1993-2015) [4].

For the analysis, the Joinpoint Regression Program, Version 4.2.0 was used, developed by Statistical Methodology and Applications Branch, Surveillance Research Program, National Cancer Institute [8].

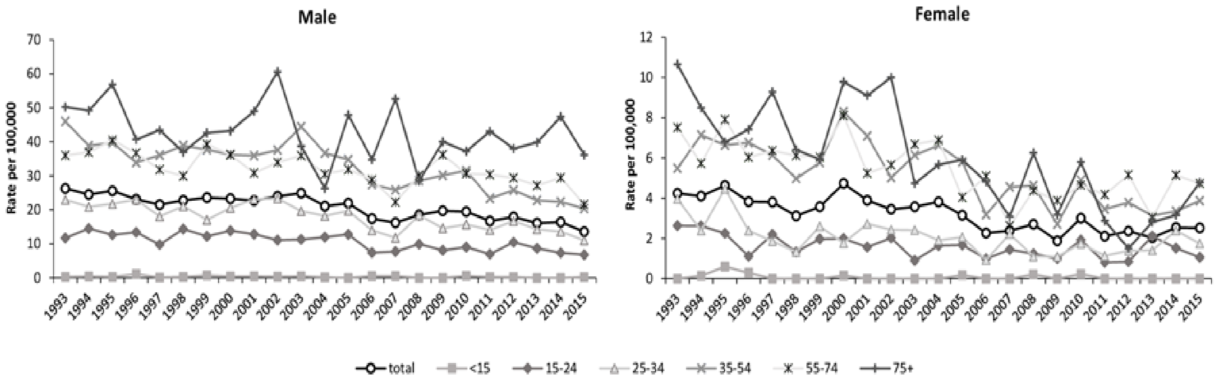
We have also assessed the spatial clustering of suicides by districts of the Slovak Republic. We have calculated average suicide rates for the total population as well as men and women for the period 2011-2015 in all districts of the Slovak Republic (the country has 8 self-governing regions that are further split into 79 districts). Socio-economic indicators on district level were extracted from DataCube database of the Statistical Office of the Slovak Republic. We have evaluated the association between several socioeconomic factors (district density, proportion of the unemployed, divorce rate, proportion of people with university education) and suicide rate per district for the average of the period 2011-2015.

To model the relationship between the socioeconomic variables and the suicide rate, we have used univariate and multivariate linear regression. We have assessed regression coefficients, their statistical significance and the R-squared.

## 3 Results and Discussion

In the period 1993–2015 there were 14,575 suicides reported in the Slovak Republic (85.3% in men). The overall average age-standardized suicide rate (SR) for the study period was 11.45 per 100,000 people, this is at the level of European Union countries average [6]. Out of the overall SR, presented by sex it is 20.74 and 3.21 per 100,000 people for men and women, respectively. The majority (45%) of suicides occurred in the working age population group –35–54 year olds. 25.6% of suicides were in the group of people aged 55–74years. The rate increases with age, the highest is in men aged 75+ (42.74 per 100,000 people) (Figure 1).

**Figure 1. Age-standardized suicide rates in males and females, in six age groups and total population.**

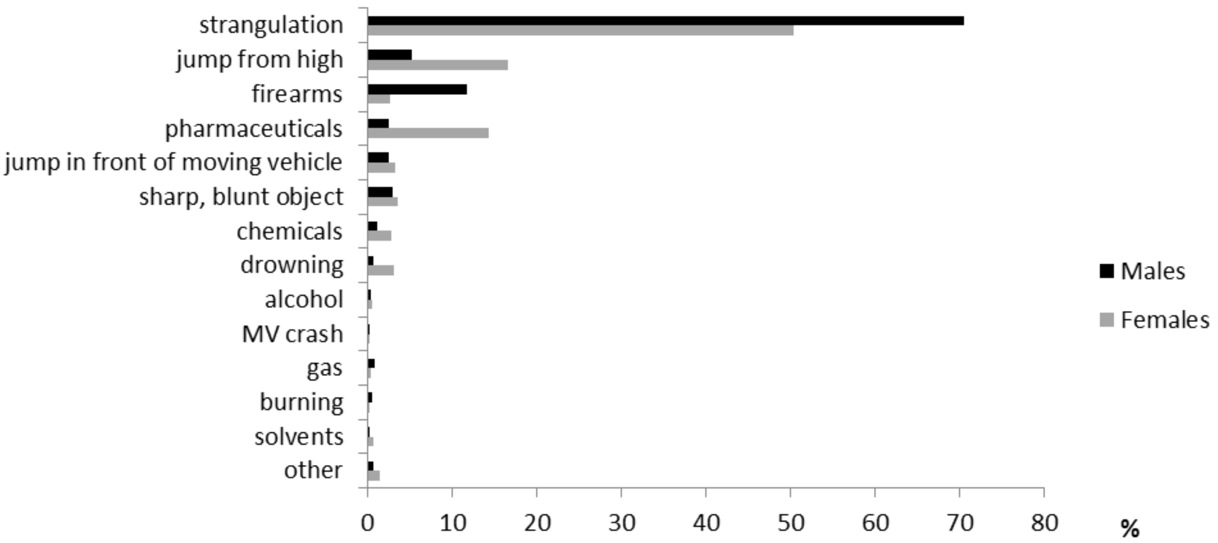


The overall risk of suicide is significantly higher in men across all age groups – overall, the risk is almost sixfold in males (male:female ratio 6:1) and nine times higher in men than in women in the age group 25–34 (male:female ratio 9:1). The average male:female ratio for the world is 1.8:1, highest per region is in Europe (4:1) and within Europe the highest is in post-communist countries (6.4:1 in Poland, 5.9:1 in Lithuania, 5.7:1 in Russian Federation, 5.4:1 in both Moldova and Czech Republic) [17, 18]. There are some possible explanations of the fact male:female ratio of suicide risk is much greater in Slovakia and several other post-communist countries than in the rest of the developed world. One is the structural change that took place in these countries after the fall of communism, followed by unemployment and financial insecurity. Another is prejudice and stigma related to mental illness persisting in the Slovak society and leading to reluctance to seek professional help in case of mental crisis.

Overall time trend for total population as well as for males and females and studied age groups individually is decreasing with time over the study period – all average annual percentage changes (AAPCs) calculated by Joinpoint regression are negative and except for total population the decline is statistically significant. The total population suicide rate dropped from 14.61 in 1993 to 7.76 per 100,000 people in 2015.

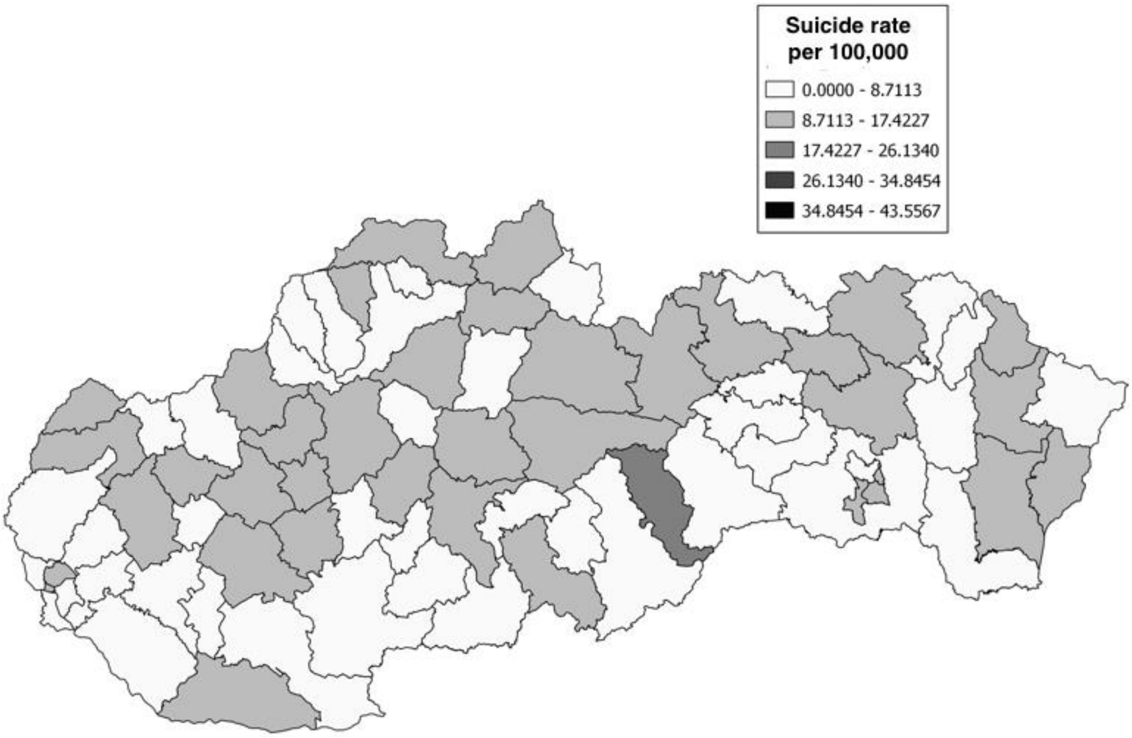
In Figure 2 we present the proportions of frequency of individual suicide mechanisms by sex for the total period 1994–2015. Most common for both men and women is strangulation/suffocation (70.5% of men and 50.3% of women used this method). For women, the second most frequent method is jumping from the height (16.5%) or use of pharmaceutical (14.4%). For men, the second and the third most common method of suicide is firearm (11.8%) and jump from the height (5.2%).

**Figure 2. Proportions of individual mechanisms of injury by sex, for the total period 1994–2015.**



In Figure 3 we present the spatial clustering of suicide rates in 79 districts of the Slovak Republic. Highest suicide rate in the Slovak Republic calculated as the average of 2011-2015 on district level is in Revúca district.

**Figure 3. Average suicide rates for 2011-2015 by districts of the Slovak Republic**



The results of univariate and multivariate linear regression modelling the relationship between selected socioeconomic factors (district density, proportion of the unemployed, divorce rate, proportion of people with university education) and suicide rate in the districts are presented in Table 1.

**Table 1. Relationship between suicide rates and district level density of population, unemployment rate, proportion of people with university education, proportion of the divorced and average net salary per district, for the average of the 5 year period 2011-2015 in the Slovak Republic. Statistically significant regression coefficients are presented.**

| **TOTAL POPULATION** | | | | | |
|---|---|---|---|---|---|
| 2011-2015 average | Density | Unemployment | Divorced | Univ. educ. | $R^2$ |
| | ns | -0,125 (-0,238 to -0,012)* | ns | ns | 0.173 |
| | Density | Average salary | Divorced | Univ. educ. | $R^2$ |
| | ns | ns | ns | ns | 0.120 |
| **MALES** | | | | | |
| 2011-2015 average | Density | Unemployment | Divorced | Univ. educ. | $R^2$ |
| | ns | -0,207 (-0,400 to -0,015)* | ns | ns | 0.202 |
| | Density | Average salary | Divorced | Univ. educ. | $R^2$ |
| | ns | ns | ns | ns | 0.152 |
| **FEMALES** | | | | | |
| 2011-2015 average | Density | Unemployment | Divorced | Univ. educ. | $R^2$ |
| | ns | ns | ns | ns | 0.053 |
| | Density | Average salary | Divorced | Univ. educ. | $R^2$ |
| | ns | ns | ns | ns | 0.036 |

ns = not significant
* = significant
Univ. educ. = proportion of people with university education

Apart from the unemployment rate the other variables did not show statistically significant association with suicide rate. The relationship between the district-level unemployment rate and suicide rate is inversed; decrease in unemployment increases suicide rate.

## 4 Conclusion

In this study we have described the time trends of suicide rate (SR) in the Slovak population in the period 1993–2015. The time trend of SRs is decreasing from 1993 to 2015, however, at the same time we have observed increasing trend of proportion of deaths classified as caused by ‘undetermined intent’ (data not shown). As we know from the international research, these ‘undetermined deaths’ might contain under-reported suicides [14]. Therefore the growing proportion of deaths with an unknown cause in the Slovak Republic is of a concern to the epidemiology of suicide. Correct cause of death certification and standardized mortality data collection is higly desirable for accurate monitoring and targeted intervention [13].

Even though the suicide rate in the Slovak Republic is not above the EU average, it is not a reason for content. Suicides are an important public health issue in need of focused prevention activities. With targeted prevention, many deaths can be avoided [5].

As the highest suicide rate in the Slovak Republic is in the oldest age groups and it is six time higher in men, the population group in the highest risk are older men. The time of entering into the retirement is a potential stressor – with combined loss of self-realisation through work, loss of work income, loss of work-related social network, eventual death of a spouse, lack of social support - life is getting hard. In case of mental crisis unattended by professional help, individuals are in high risk of suicide [12, 16]. Quite alarming is the fact there is no suicide prevention programme in the Slovak Republic. Mental health in general is addressed only sporadically on the national level and it is still quite a tabu in the society.

The regression analysis of the relationship between district-level socio-economic indicators and suicide rates in the districts in our study showed the only significant association to the unemployment rate. The association is inversed – the decrease in unemployment increases suicide rate. This is in contrast to the majority of other studies that confirm positive association between poverty and suicide [1, 9]. Possible explanation is the fact the unemployment rate nor average salary in the district do not reflect the real situation accurately. In case of low unemployment macroeconomic pressure might create stressful atmosphere where the employees fear of being fired in the near future. The average salary was not significantly associated with suicide rate despite the international research that proves such association [9]. The results may have been affected by very small numbers on district level.

Further determination of individual-level risk factors for suicide as well as identification of high-risk areas and investigation of spatial patterns for suicide can provide information necessary for suicide prevention efforts.

## References

[1] BANTJES, J., IEMMI, V., COAST, E., CHANNER, K., LEONE, T., MCDAID, D., PALFREYMAN, A., STEPHENS, B., LUND, C. 2016. Poverty and suicide research in low- and middle-income countries: systematic mapping of literature published in English and a proposed research agenda. *Glob Ment Health*. 13;3:e32.

[2] CHARLSON, F. J., BAXTER, A. J., DUA, T., DEGENHARDT, L., WHITEFORD, H. A., VOS, T. 2016. Excess Mortality from Mental, Neurological, and Substance Use Disorders in the Global Burden of Disease Study 2010 (2016). In: Patel V., Chisholm D., Dua T., Laxminarayan R., Medina-Mora M.E. (eds). *Mental, Neurological, and Substance Use Disorders: Disease Control Priorities*. Third Edition (Volume 4). Washington DC: The International Bank for Reconstruction and Development/The World Bank; Chapter 3.

[3] CHESNEY, E., GOODWIN, G. E., FAZEL, S. 2014. Risks of All-Cause and Suicide Mortality in Mental Disorders: A Meta-Review. *World Psychiatry*; 13(2): 153–60.

[4] CLEGG, L. X., HANKEY, B. F., TIWARI, R., FEUER, E. J., EDWARDS, B. K. 2009. Estimating average annual per cent change in trend analysis. *Statistics in Medicine*; 28, 3670–3682.

[5] CRAMER, R. J., KAPUSTA, N. D. 2017. A Social-Ecological Framework of Theory, Assessment, and Prevention of Suicide. *Front Psychol*; 9(8):1756.

[6] EUROSTAT. 2014. Downloaded 15th December 2017 at http://ec.europa.eu/eurostat/web/products-eurostat-news/-/DDN-20170517-1.

[7] FERRARI, A. J., NORMAN, R. E., FREEDMAN, G., BAXTER, A. J., PIRKIS, J. E., ET AL. 2014. The Burden Attributable to Mental and Substance Use Disorders as Risk Factors for Suicide: Findings from the Global Burden of Disease Study 2010. *PLoS One*; 9(4): e91936.

[8] KIM, H. J., FAY, M. P., FEUER, E. J., MIDTHUNE, D. N. 2000. Permutation tests for joinpoint regression with applications to cancer rates. *Statistics in Medicine*; 19:335–351.

[9] IEMMI, V., BANTJES, J., COAST, E., CHANNER, K., LEONE, T., MCDAID, D., PALFREYMAN, A., STEPHENS, B., LUND, C. 2016. Suicide and poverty in low-income and middle-income countries: a systematic review. *Lancet Psychiatry*; 3(8):774-83.

[10] LONNQVIST, J. K., HENRIKSSON, M. M., ISOMETSA, E. T., MARTTUNEN, M. J., HEIKKINEN, M. E., ARO H. M., KUOPPASALMI K. I. 1995. Mental disorders and suicide prevention. Psychiatry and *Clinical Neurosciences*; 49(suppl. 1):S111–S116.

[11] MURRAY, C. J. L., VOS, T., LOZANO, R., NAGHAVI, M., FLAXMAN, A. D., ET AL. 2012. Disability-Adjusted Life Years (DALYs) for 291 Diseases and Injuries in 21 Regions, 1990–2010: A Systematic Analysis for the Global Burden of Disease Study 2010. *The Lancet*; 380(9859):2197–2223.

[12] OKOLIE, C., DENNIS, M., SIMON THOMAS, E., JOHN, A. 2017. A systematic review of interventions to prevent suicidal behaviors and reduce suicidal ideation in older people. *Int Psychogeriatr*; 29(11):1801-1824.

[13] PRITCHARD, C., AMANULLAH, S. 2007. An analysis of suicide and undetermined deaths in 17 predominantly Islamic countries contrasted with the UK. *Psychol Med*; 37(3):421-430.

[14] PRITCHARD, C., HANSEN, L. 2015. Examining undetermined and accidental deaths as source of 'under-reported-suicide' by age and sex in twenty Western countries. *Community Mental Health Journal*; 51:365–376.

[15] SAXENA, S., MAJ, M. 2017. Physical health of people with severe mental disorders: leave no one behind. *World Psychiatry*; 16(1):1-2.

[16] SEATON, C. L., BOTTORFF, J. L., JONES-BRICKER, M., OLIFFE, J. L., DELEENHEER D., MEDHURST K. 2017. Men's Mental Health Promotion Interventions: A Scoping Review. *Am J Mens Health*; 11(6):1823-1837.

[17] TURECKI, G., BRENT, D. A. 2016. Suicide and suicidal behaviour. *The Lancet*; 387:1227–1239.

[18] VARNIK, P. 2012. Suicide in the world. *International Journal of Environmental Research;* 9*:*760–771.

[19] WATERHOUSE, J., MUIR, C. S., CORREA, P., POWELL, J. (EDS.). 1976. *Cancer incidence in five continents*. Lyon: International Agency for Research on Cancer.

[20] ZALSMAN, G., HAWTON, K., WASSERMAN, D., VAN HEERINGEN, K., ARENSMAN, E., SARCHIAPONE, M., CARL,I V., HÖSCHL, C., BARZILAY, R., BALAZS, J., PUREBL, G., KAHN, J. P., SÁIZ, P, A., LIPSICAS, C. B., BOBES, J., COZMAN, D., HEGERL, U., ZOHAR, J. 2016. Suicide prevention strategies revisited: 10-year systematic review. *Lancet Psychiatry*; 3(7):646-59.

# Inequalities in the Distribution and Utilisation of Health Resources

Martin Dlouhý
Faculty of Informatics and Statistic University of Economics, Prague, Czech Republic
(dlouhy@vse.cz)

## Abstract

The aim of this contribution is to show how the unequal distribution of health resources and their unequal utilization can be measured and evaluated. Two theoretical approaches are described (a) the measures of inequality that cannot explain the variation, but are able to measure the level of variation and their change in time; (b) the analysis of small area variations. There can be found many measures of inequality in the literature. The advantage of the ranges and the Robin Hood Index is that these measures offer more understandable interpretation to wider health policy public than the Gini coefficient and other complex measures (e.g., the Atkinson index, Theil's entropy measure). Researchers should distinguish between the research and the presentation of results to the public, for which the ranges are a suitable way to illustrate the level of inequalities. The analysis of small area variations demonstrates inefficiencies in the health system and does so in a relatively simple way.

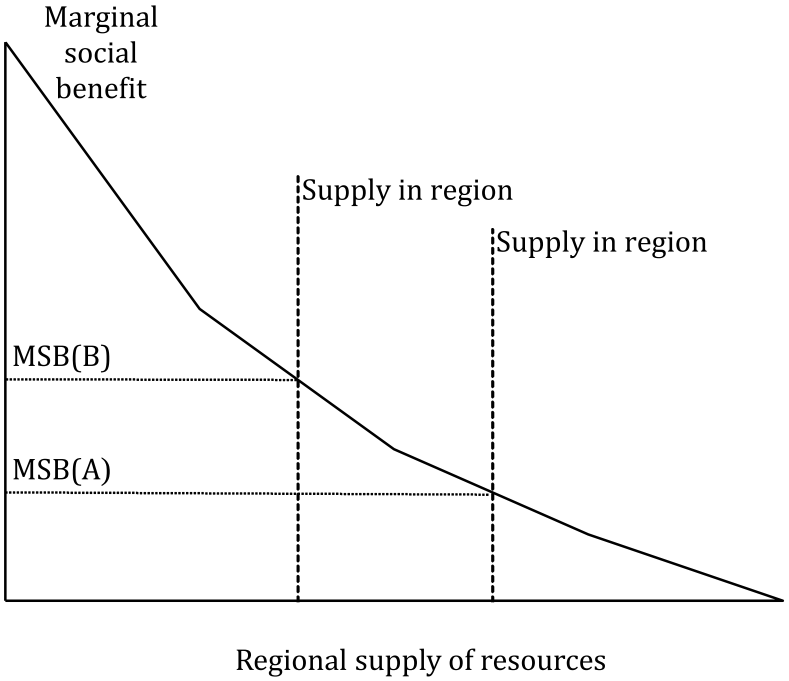
**Keywords:** Measure of Inequality, Small Area Variations, Health Resources, Utilisation.

## 1 Introduction

Studying inequalities in the distribution of health resources and their utilisation is about the variation. A question is whether the observed variation of health resources reflects the variations in the health needs of populations. If it is not the case, variations are a sign of policy failure provided that equal geographical access to health resources (services) was stated as a health policy objective. The regions differ also in the utilization of health services: in some regions, there is a relatively high supply of services and these services are highly used. In other regions there is also a relatively high supply of services, but the utilization of these services is relatively low.

The equal distribution within the public health system is not only about equity but also about efficiency. Let us suppose that two regions, *A* and *B*, have populations with the same health needs, inhabitants of both regions pay taxes and health insurance, but these two regions differ, for example, in the number of physicians per capita. Suppose that all physicians are under contract to the public health system and that there are more physicians in region *A*. However, one cannot see any reason why the public health system should finance the higher number of physicians in region *A*. Being health needs equal in both regions, there is apparently a relative oversupply of health services in region *A* and a relative undersupply of health services in region *B*. Provided that *marginal social benefit* (MSB) from consuming health services are decreasing, an unequal allocation in the numbers of physicians is not efficient because patients from region *A* get lower MSBs than patients in region B could possibly get in case that physicians would be reallocated from region *A* to region *B* (Figure 1). Hence, the total social benefit for the whole society is lower than it could be. In this illustrative example, regulation improves the equity as well as the efficiency.

**Figure 1. Decreasing Marginal Social Benefit**



Empirical evidence from studies does not reveal that more is better. For example, Fisher, Wennberg, Stukel, and Gottlieb [3] found that academic medical centres in the United States differed dramatically in the overall intensity of services they provided to similar patients. The increased intensity did not appear to be associated with higher quality of care or better survival. This means that patients in the high-intensity hospitals spent more days in the hospital and intensive care units; had more specialists involved in their care; and received more imaging services, diagnostic testing, and minor (but not major) procedures. According to their analysis, regions with higher-intensity patterns had much higher per capita supply of hospital beds and physicians. This illustrates the adaptive behaviour of physicians that use all available resources to care for their patients even if such use of resources is inefficient.

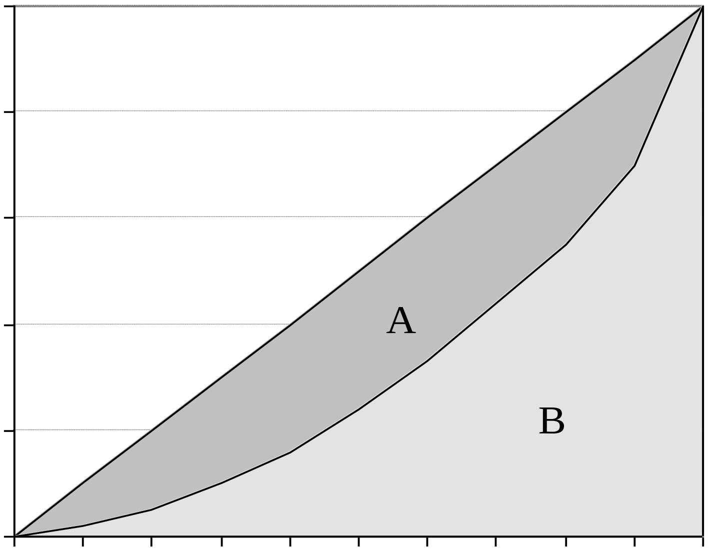
The aim of this contribution is to show how the unequal distribution of health resources and their unequal utilization can be measured and evaluated. I will focus on (a) the measures of inequality, which cannot explain the variation, but are able to measure the level of variation and their change in time; (b) the analysis of small area variations.

To measure the inequality between geographical areas, it is necessary first to define what an appropriate area is. A definition of geographical areas as units of analysis highly depends on the variable (health resource) the inequality of which is to be evaluated. Generally, the geographical areas are relatively small for an analysis of distribution of outpatient services, relatively large for an analysis of distribution of inpatient services, and very large for highly specialized services. Because national statistical offices collect data for administrative units, the geographical areas that researchers analyse in their studies are states, provinces, regions, counties, districts. It is complicated to find reliable information on such geographical units as hospital service areas.

## 2 Measures of Inequality

There can be found many inequality measures in the literature [2, 6]. The most popular measure of inequality is the *Gini coefficient* that is derived from the *Lorenz curve*, a cumulative frequency curve that compares the empirical distribution of the studied health resource with the uniform distribution that represents the perfect equality. The Gini coefficient ranges between 0, which occurs in case of the perfect equality, and 1, which occurs in case of the perfect inequality. To get a graphical representation of the Gini coefficient, you will graph the cumulative percentage of population (from the poorest area to the richest one) on the horizontal axis and the cumulative percentage of variable (health resource) on the vertical axis. This gives you the Lorenz curve (Figure 2). The 45° line represents the perfect equality. The Gini coefficient is defined as a ratio $A/(A+B)$, where $A$ is the area between the 45° line and the Lorenz curve, and $B$ is the area under the Lorenz curve. In case that $A$ = 0, then the Gini coefficient becomes 0, which means the state of perfect equality.

**Figure 2. The Lorenz Curve Framework**



There are alternative ways to calculate the Gini coefficient. One method calculates the Gini coefficient as the half of the average of all pairs of weighted absolute deviations between all areas to the mean. This method uses the formula:

$$GINI = \frac{1}{2x_{pop}}\left(\sum_{i=1}^{n}\sum_{j=1}^{n} p_i p_j \left|x_i - x_j\right|\right),$$

where $p_i$ and $p_j$ are the population proportions, $x_i$ and $x_j$ stand for the number of units of resource per capita, $x_{pop}$ is the average number of units of resource per capita for the entire population, and $n$ is the number of areas. Another method of calculation is given by the formula:

$$GINI = 1 - \sum_{i=0}^{n-1}(Y_{i+1} + Y_i)(P_{i+1} - P_i),$$

where $P_i$ is the cumulative population proportion, $Y_i$ stands for the cumulative resource proportion, and $n$ is the number of areas.

The Robin Hood Index, which is also known as the Pietra ratio or the Hoover Index, measures what proportion of health resources has to be moved from areas with above-average provision to areas with below-average provision to achieve equal distribution. The Robin Hood Index is calculated by the formula:

$$RHI = \frac{1}{2}\sum_{i=1}^{n}\left|p_i - y_i\right|,$$

where $p_i$ is the population proportion, $y_i$ stands for the resource proportion, and $n$ is the number of geographical areas.

The simple measures of inequality are the ranges, which use only data on the extreme values. The *absolute range* is defined as a difference between the maximum and minimum observed values. It is written as $x_{max} - x_{min}$, where $x_{min}$ is the minimum and $x_{max}$ is the maximum number of units of health resource per capita across $n$ geographical areas. The *relative range* is defined as $(x_{max} - x_{min})/x_{pop}$, where $x_{pop}$ is the average number of units per capita for the entire population. Other measures of this type are the *maximin ratio* or *decile ratio*.

By concentrating on the areas with extreme values only, all these indices give only a limited view on the overall distribution and fail to possess many desirable properties of inequality indices required by theory [1]. However, the advantage of the ranges and the Robin Hood Index is that these measures offer more understandable interpretation to wider health policy public than the Gini coefficient and other complex measures (e.g., the Atkinson index, Theil's entropy measure). Researchers should distinguish between the research paper and the presentation of research results to the public, for which the ranges or the Robin Hood Index are a suitable way to illustrate the level of inequalities.

One can, of course, assess the relative distribution of health resources by statistical measures of variance as the *standard deviation* and the *coefficient of variation*, which is defined as the standard deviation divided by mean.

Does the choice of inequality measure matter? There is some evidence that the most common indicators are usually interchangeable. For example, Kawachi and Kennedy [6] calculated the income distribution for the 50 U.S. states and studied the relation of income inequality to mortality. They examined the following measures of income distribution: the Gini coefficient, the decile ratio, the proportions of total income earned by bottom 50%, 60%, and 70% of households, the Robin Hood Index, the Atkinson Index, and Theil's entropy measure. All measures of inequality were highly correlated with each other. Kawachi and Kennedy concluded that a theoretical justification for the choice of indicator is critical in assessing the impact of social and economic policies on income distribution and mortality. On the other hand, there is a little evidence to suggest that the choice of indicator will result in an absolutely different conclusion [6].

## 3 Small Area Variations

The differences in health resources, expenditures, and the utilization of health services have been documented by numerous studies. Wennberg and Gittelsohn [11], in their study examined the extent to which bed and manpower use, expenditures, and utilization vary among hospital service areas in Vermont. They found that there were wide variations in resource input, utilization of services, and expenditures among communities. The results showed inequalities among hospital service areas and indicated a considerable uncertainty about the effectiveness of health services. So observed variations could be explained more by other factors than by differences in illness patterns.

By comparing the utilization of services among geographically defined populations, researchers found unexplained variations in the services provided for patients with similar medical conditions even after controlling by several social, demographic, and health variables. One of the hypothesized sources of the variation is physician practice style. If this is so, the differences in practice style among small areas have two negative consequences: (1) the scarce health resources are wasted; (2) patients get a lower quality of medical care, either by an underuse or by overuse of health services.

In the literature, an analysis of variations in health care is called *small area variations* [4], or *small area analysis* [9]. The method of small area variations (SAV) makes the following assumptions: (a) the epidemiology of disease is constant among all areas; (b) the treatments available are alike in all areas; (c) variations in the supply cause inefficiency. The evaluation of small area variations has three steps:

1. Obtaining data on small areas. In this step, it is essential to distinguish between the data on the services provided in the given area and the data on the services provided for the population of the given area.
2. Description of variations. This is done by descriptive statistics (average, maximum, minimum, standard deviation, coefficient of variation) or by measures of inequality.
3. Analysing sources of variations by correlation analysis and multiple regression analysis.

When addressing variations in hospitalization rates for medical conditions, Wennberg [10] prefers research strategies dealing with aggregate resource allocation (capacity or budget), rather than strategies that micromanage the doctor/patient relationship through practice guidelines or appropriateness criteria applied case by case. Determining on case-by-case basis whether the admission is necessary will not work, because this strategy does not address the fundamental problem that any available bed is used. Wennberg demonstrates the subtle nature of the relationship between supply, practice style, and medical theory on the following example from the United States. The same physicians who serve as the house staff for Boston City Hospital also serve Boston University Hospital. They adopt one practice style when practicing in the Boston City Hospital context, and another practice style in the Boston University setting. Hence, if the differences in admissions are attributable to the per capita supply of beds ("the threshold effect"), then benchmarking by the SAV is an effective cost-containment strategy targeted on reducing hospitalizations.

We have to distinguish the concept of *practice style* from *supplier induced demand*. Folland and Stano [5] defined practice style as an exogenous set of beliefs about the efficacy of various treatments and supplier induced demand as an endogenously chosen level of influence on patient demand. In other words, practice style is about uncertainty in determining the diagnosis and the treatment. This uncertainty implies that for a patient with a given set of symptoms there are more production functions each with a probability representing the true production function. Practice style describes a decision process of a physician related to a selection among these production functions to do the best for a patient. In contrast, the concept of the supplier induced demand serves us to express how physicians influence patients to do the best for themselves.

The problem is that practice style is hard to measure. Folland and Stano [5] argued that utilization equations were not correctly specified by omitting several variables. It is therefore wrong to attribute the unexplained residual variance solely to practice style. Moreover, if areas show a very large variation from one year to the next, then this variation cannot be attributed to practice style. Moore [8] criticized the SAV studies that multiply the difference between high- and low-use rates in small populations by some large population (the state) and come up with money that could be saved by standardizing the national rate at lower level. It is but idle and misleading economic speculation far removed from the reality.

Despite the legitimate criticism of an uncritical application of SAV, the method demonstrates inefficiencies in the health system. In addition, SAV do so in a relatively simple way. Of course, in the complex health system, the interpretation of variation and policy proposal for action has to be cautious.

## Acknowledgments

The research was supported by the grant no. 16-01821S of the Czech Science Foundation.

## References

[1] CHAKRAVARTY, S. R. 1990. *Ethical Social Index Numbers*. Berlin and Heidelberg: Springer-Verlag.

[2] DE MAIO, F. G. 2007. Income inequality measures. *Journal of Epidemiology and Health*; 61:849–852.

[3] FISHER, E. S., WENNBERG, D. E., STUKEL, T. A., GOTTLIEB, D. J. 2004. Variations in the longitudinal efficiency of academic medical centers. *Health Affairs*; Web-Exclusive Collection, VAR-19–VAR-32.

[4] FOLLAND, S., GOODMAN, A. C., STANO, M. 2001. *The Economics of Health and Health Care*. Third Edition. Upper Saddle River: Prentice Hall.

[5] FOLLAND, S., STANO, M. 1989. Sources of small area variations in the use of medical care. *Journal of Health Economics*; 8:85–107.

[6] KAWACHI, I., KENNEDY, B. P. 1997. The relationship of income inequality to mortality: does the choice of indicator matter? *Social Science and Medicine*; 45(7):1121–1127.

[7] LE GRAND, J., PROPPER, C., ROBINSON, R. 1992. *The Economics of Social Problems*. Third Edition. Houndmills: Macmillan.

[8] MOORE, F. D. 1985. Small area variations studies: illuminating or misleading? *Health Affairs*; 4: 96–101.

[9] WAN, T. T. H. 1995. *Analysis and evaluation of health care systems: an integrated approach to managerial decision making*. Baltimore: Health Professions Press.

[10] WENNBERG, J. E. 1996. On the appropriateness of small-area analysis for cost containment. *Health Affairs;* 15(4):164–167.

[11] WENNBERG, J., GITTELSOHN, A. 1973. Small area variations in health care delivery. *Science*; 182(4117):1102–1108.

# Regional Distribution of Doctors, Nurses, and Hospital Beds in the Visegrad Countries

Martin Dlouhý
Faculty of Informatics and Statistic University of Economics, Prague, Czech Republic
(dlouhy@vse.cz)

## Abstract

The existence of regional differences in the distribution of health resources that is described by many studies from different countries is an important problem of public health policy. In this paper, we evaluate the regional inequality in the distribution of doctors, nurses, and hospital beds in four Visegrad countries: the Czech Republic, Hungary, Poland, and Slovakia. The regional inequalities are measured by the Robin Hood Index at the NUTS 2 level. In the case of Hungary we found the highest regional inequality in the distribution of doctors. The Czech Republic has an unequal distribution of nurses. Hospital beds are distributed unequally in Poland.

**Keywords:** Inequality, Regional Distribution, Robin Hood Index, Visegrad countries.

## 1 Introduction

The regional differences in health resources, health expenditures, and the utilization of health services are described by many studies from different countries [1, 3-7]. The regional inequalities in European countries are clearly the results of public planning, so the efficient use of public resources can be questioned. In the public health system, the equal access to services is one of the main objectives of health policy. Hence, any observed variation in the distribution of health resources may be understood as an inequality.

To measure the inequality between geographical areas, it is necessary to define what an appropriate geographical area is. A definition of units of analysis depends on the observed variable (health resource) the inequality of which is to be evaluated. Generally, the geographical areas are smaller for an analysis of geographical distribution of outpatient services, larger for an analysis of distribution of inpatient services, and very large for highly specialized services. Because national statistical offices usually collect data for administrative units, the geographical areas that researchers analyse states, provinces, regions, counties, districts etc.

The aim of this paper is to evaluate the regional inequalities in the distribution of medical doctors, nurses, and hospital beds in four Visegrad countries: Czech Republic, Hungary, Poland, and Slovakia.

## 2 Data

The chosen unit of analysis is the NUTS 2 region. The NUTS classification (Nomenclature of territorial units for statistics) is a hierarchical system for dividing up the economic territory of the European Union. The NUTS classification is defined only for the Member States of the EU. The NUTS 2013 classification was valid from 1 January 2015 till 1 January 2018. The classification listed 98 regions at NUTS 1, 276 regions at NUTS 2, and 1342 regions at NUTS 3 level.

All data come from 2013 (later data were not available for all countries) and were obtained from the Eurostat regional statistics [2]. The sample include four Visegrad countries: the Czech Republic (7 NUTS 2 regions), Hungary (7 regions), Poland (16 regions), and Slovakia (4 regions). In order to avoid outlier observations, we join together data on two regions in cases if the first region is the capital and the second region is its economically and socially dependent neighbourhood. We assume that the population of such neighbouring region frequently use health services in the capital. This assumption was used in two cases: the region of Praha, the capital of the Czech Republic, and the Central Bohemia (Střední Čechy), and the metropolitan region of Bratislava and the West Slovakia Region (Západné Slovensko). You can see that these regions are the outliers from Table 1.

**Table 1. NUTS 2 Regions in the Visegrad Countries, 2013**

| Country | NUTS2 | Doctors per 1000 | Nurses per 1000 | Beds per 1000 |
|---|---|---|---|---|
| CZE | Praha | 6.94 | 13.10 | 8.11 |
| CZE | Střední Čechy | 2.41 | 6.03 | 5.40 |
| CZE | Jihozápad | 3.46 | 7.90 | 6.55 |
| CZE | Severozápad | 2.96 | 7.80 | 6.01 |
| CZE | Severovýchod | 3.25 | 7.83 | 6.33 |
| CZE | Jihovýchod | 3.73 | 8.67 | 6.96 |
| CZE | Střední Morava | 3.43 | 8.00 | 6.10 |
| CZE | Moravskoslezsko | 3.35 | 7.96 | 6.02 |
| HUN | Közép-Magyarország | 4.28 | 6.83 | 7.52 |
| HUN | Közép-Dunántúl | 2.15 | 5.92 | 6.74 |
| HUN | Nyugat-Dunántúl | 2.64 | 6.48 | 7.21 |
| HUN | Dél-Dunántúl | 3.36 | 7.47 | 7.37 |
| HUN | Észak-Magyarország | 2.27 | 6.34 | 7.13 |
| HUN | Észak-Alföld | 2.73 | 6.58 | 6.35 |
| HUN | Dél-Alföld | 3.13 | 6.27 | 6.44 |
| POL | Lódzkie | 2.53 | 5.82 | 5.76 |
| POL | Mazowieckie | 2.62 | 5.98 | 5.62 |
| POL | Malopolskie | 2.35 | 6.08 | 6.54 |
| POL | Slaskie | 2.34 | 6.12 | 6.81 |
| POL | Lubelskie | 2.46 | 6.74 | 6.57 |
| POL | Podkarpackie | 2.06 | 6.57 | 7.08 |
| POL | Swietokrzyskie | 2.22 | 6.48 | 7.79 |
| POL | Podlaskie | 2.53 | 6.34 | 6.10 |
| POL | Wielkopolskie | 1.47 | 4.75 | 4.73 |
| POL | Zachodniopomorskie | 2.42 | 5.21 | 11.94 |
| POL | Lubuskie | 2.02 | 5.41 | 5.24 |
| POL | Dolnoslaskie | 2.17 | 6.01 | 7.96 |
| POL | Opolskie | 1.95 | 6.07 | 5.93 |
| POL | Kujawsko-Pomorskie | 2.17 | 5.79 | 8.37 |
| POL | Warminsko-Mazurskie | 2.08 | 5.80 | 5.53 |
| POL | Pomorskie | 2.00 | 5.07 | 5.32 |
| SVK | Bratislavský kraj | 6.90 | 10.54 | 7.85 |
| SVK | Západné Slovensko | 2.59 | 4.96 | 4.73 |
| SVK | Stredné Slovensko | 3.01 | 5.67 | 5.82 |
| SVK | Východné Slovensko | 3.29 | 6.00 | 6.25 |

## 3 Methods

The function of measures of inequality is expressing the complexity of variation in observed variable by a single number. The most popular measure of inequality is the Gini coefficient. The Gini coefficient is derived from the Lorenz curve, a cumulative frequency curve that compares the empirical distribution of the observed variable with the uniform distribution that represents the perfect equality. The Gini coefficient ranges between 0, which occurs in case of the perfect equality, and 1, which occurs in case of the perfect inequality. The Gini coefficient can be calculated by the formula:

$$GC = \frac{1}{2r}\left(\sum_{i=1}^{n}\sum_{j=1}^{n}\pi_i\pi_j|r_i - r_j|\right)$$

where $\pi_i$ and $\pi_j$ are the population proportions, $r_i$ and $r_j$ are the numbers of resource per capita in regions $i$ and $j$, $r$ is the average number of the resource per capita, and $n$ is the number of regions.

The Robin Hood Index measures what proportion of resources has to be moved from regions with the above-average numbers or resources to regions with the below-average regions to achieve equal distribution. A disadvantage of the Robin Hood Index is that it is not able to register transfers between areas if both lie below or above the national mean. Thus such policy achievements would be undervalued. On the other hand, the advantage of the Robin Hood Index over the Gini coefficient is its clear health policy interpretation. The Robin Hood Index (RHI) is calculated by the formula:

$$RHI = \frac{1}{2}\sum_{i=1}^{n}|\pi_i - \rho_i|$$

where $\pi_i$ is the population proportion, $\rho_i$ is the resource proportion, and $n$ is the number of regions. The Robin Hood Index is usually expressed in percentages.

In some studies, the crude death rate (or other health indicator) was used as a more precise measure of health need by adjusting the number of regional population. It is assumed that the crude death rate (and the health need) will be higher in older populations than in younger populations, hence more health resources is required.

## 4 Results and Discussion

The Robin Hood Index was calculated for four Visegrad countries and three health resources: doctors, nurses, and hospital beds (Table 2). The Czech Republic has the highest value of the Robin Hood Index from the Visegrad countries in case of nurses. In total, more than 10 percent of Czech nurses should be redistributed among the regions to achieve equality. On the other hand, Hungary has the worst value of the Robin Hood Index for doctors. Finally, Poland has the worst value of the Robin Hood Index in case of hospital beds. So it seems that Slovakia achieves the best regional allocation in all three health resources. However, it has to be taken into account that the calculations for Slovakia are based only on three regions. On the average, the best allocation is observed for hospital beds and the worst for doctors.

**Table 2. Robin Hood Index (in %)**

| Country | Doctors | Nurses | Hospital Beds |
|---|---|---|---|
| Czech Republic | 6.38 | 10.32 | 2.45 |
| Hungary | 10.89 | 2.35 | 2.97 |
| Poland | 5.45 | 3.41 | 8.16 |
| Slovakia | 3.66 | 2.06 | 2.32 |
| Average | 6.59 | 4.54 | 3.97 |

## 5 Conclusion

The Robin Hood Index was used to evaluate regional inequalities in the Visegrad countries at the NUTS 2 level. Of course, the value of the Robin Hood Index will never be zero in the real health system; however, the values reaching 10% or more surely need the attention of the national government. In the case of Hungary we found the highest regional inequality in the distribution of doctors, the Czech Republic has an unequal distribution of nurses, and hospital beds are distributed unequally in Poland.

## Acknowledgements

The research was supported by the grant no. 16-01821S of the Czech Science Foundation.

## References

[1] DLOUHÝ, M. 2017. Inequalities in Geographic Distribution of Doctors and Hospital Beds in 13 European Countries. In MATEJOVA, L. (Ed.). *Proceedings of the 21st International Conference Current Trends in Public Sector Research 2017*. Brno, Masaryk University, pp. 254–259.

[2] EUROSTAT. 2016. *Regional statistics by NUTS classification*. European Commission, 2016. Available on http://ec.europa.eu/eurostat/web/regions/data/database.

[3] JOHNSTON, G., WILKINSON, D. 2001. Increasingly inequitable distribution of general practitioners in Australia, 1986–96. *Australian and New Zealand Journal of Public Health*; 25(1):66–70.

[4] OECD. 2014. *Geographic Variations in Health Care: What Do We Know and What Can Be Done to Improve Health System Performance?* OECD Health Policy Studies, OECD Publishing.

[5] PEDERSEN, P. B., LILLEENG, S. 2000. Resource distribution in mental health services: changes in geographic location and use of personnel in Norwegian mental health services 1979–1994. *Journal of Mental Health Policy and Economics*; 3:45–53.

[6] PEIRÓ, S., MAYNARD, A. 2015. Variations in health care delivery within the European Union. *European Journal of Public Health*; 25(Suppl 1):1–2.

[7] WILKINSON, J., BERGHMANS, L., IMBERT, F., LEDÉSERT, B., OCHOA, A., ET AL. 2008. Health indicators in the European regions—ISARE II. *European Journal of Public Health*; 18(2):178–183.

# Czech Healthcare from the European Perspective

Helena Hnilicová
Charles University Prague, First Faculty of Medicine, Institute of Public Health and Medical Law

## Abstract

The Czech healthcare system is doing quite well, it is designated "star performer" among the CEE countries. The equal access and availability of health service are the most significant advantages. In addition, basic healthcare package is comparable to the most developed EU countries while health expenditure is low and relatively stable in time. On the other hand, there is concern about the sustainability of healthcare financing. High prevalence of cardiovascular diseases and other civilization diseases as well as aging of a population make a threat in terms of financial sustainability. So much greater emphasis on prevention of behavioural risks is of urgent need. Unfortunately, this issue is not among priorities of a current health policy agenda. There is an ongoing political debate on a higher financial participation of patients, but this idea has no support among most of inhabitants.

**Keywords:** Czech healthcare, European Health Consumer Index, international comparison, positive and negative aspects of the Czech healthcare, sustainability.

## 1 Introduction: contextual information on the Czech Republic

The Czech Republic (CR) belongs to the Central and Eastern European (CEE) countries with significant industrial tradition. Between the 1st and 2nd World Wars, former Czechoslovakia was among the group of the 15 most developed and advanced countries of the world, although economic potential and output was not as high as the top countries. After implementation of the socialistic economy, Czechoslovakian growth and development declined, although it remained at the top level of the other Soviet bloc countries. Political, social and economic transformation in 1990s was accompanied by economic decline. However, current economic output is continuously increasing. In 2016, GDP per capita reached 38,800 USD in PPP ranking 35th position [3]. Standard of living of the Czech population was also improved although wages have not increased adequately to economic growth. Even 26 years after the fall of the Iron Curtain, Czech employees earn significantly less than Germans or Austrians counterparts. According to Eurostat data, the average gross wage in the Czech Republic reached only about quarter of German or Austrian values [5]. When more comprehensive indicator of the Human Development Index (HDI) is used as a criterion for assessment, the position of the country is better due to relatively high level of education. HDI value reaches 0.87 and the CR is on the 28th position among 174 countries [2]. The prognosis for the nearest future is quite optimistic. Continuing economic growth is expected for the nearest future [6].

## 2 Demographic and health trends

The demographic situation in the CR shows the same tendency as for the other developed countries in Europe. Typical trends are an aging population connected with a significant decrease in the birth rate. Actual demographic development in the CR over several recent years appears as relatively favorable. There is evidence of the increasing fertility rate (1.6 in 2015) and decreasing mortality resulting in slight increase of total population, incl. also immigration. Nevertheless, there are some negative features such as increasing age of mothers at first birth which has already reached 30 years on average. There are considerable mortality for civilization diseases, namely cardiovascular diseases and cancers. For morbidity patterns is typical high prevalence of “life style diseases” associated with persisting high rate of smoking and alcohol consumption as well as increasing prevalence of obesity. Behavioural health risks are highly prevalent among youths.

Due to above mentioned demographic trend, life expectancy increased significantly and reached 76 and 82 years for males and females respectively. These values are still below EU average, although they have been the second best in the CEE region. However, inequalities in life expectancy by education is high; difference between those with university education and those with lower secondary education is 5.5 years. As to children´s health, CR belongs to the countries with the best results. Infant mortality is one of the best in the world (2.5 ‰ in 2016) an under-five mortality is comparable to the most developed countries. Both positive indicators can be attributed, inter alia, to the quality of systematic prenatal, neonatal and child health care based on network of the GP´s for children and well developed network of perinatal centres.

## 3 Czech Healthcare - Basic Principles

In the Czech Republic, access to health care is considered a basic human right and guaranteed by the Constitution. Current neo-Bismarckian health system of pluralistic health services is based on mandatory health insurance for the entire population. Czech residents can make a free choice among seven publicly operating insurance funds and there is no difference in a scope of care guaranteed. The role of the public insurance funds is to purchase and to pay all needed health care for their clients. The regional authorities and the health insurance funds play the most important role in ensuring the accessibility of health care, the former by registering health care providers, the latter by contracting and paying them. Patients have a free choice among outpatient physicians as well as free choice of health facilities. Even the general practitioners do not act as gatekeepers. The basic element of the Czech health system is an independent health facility, which is in a contractual relationship with public health insurance fund/s. Such arrangement works for both outpatient and inpatient care. All providers are fully autonomous. Most of the outpatient care is provided by privately managed health facilities while the significant proportion of in-patient care has been in public ownership. The highly specialized health services are concentrated into the large (mostly) university hospitals managed by the government. All medically indicated health services provided within the network of health facilities contracted by public health insurance funds are reimbursed equally by these funds.

## 4 Health expenditures, financing and payment mechanism

Total health expenditures measured by the proportion of GDP have been more or less stable for the last fifteen years and oscillated at about 7 percent of GDP. In 2015 total health expenditures reached 7.3 percent of GDP which was in PPP US$ 2476 per capita [7]. Thus, the CR belongs to those OECD countries with lower health expenditure. The main source of health expenditures is public health insurance (84% in 2014). All Czech employees participate in the insurance program, but mandated premiums cover only the employee; family members obtain coverage through their own employment or be eligible for public subsidy. The insurance premium is set to 13.5 percent of the salary before taxation, from which the employer pays 9 percent and the employee 4.5 percent. The government covers premiums for state insurees including children, students, persons on parental leave, pensioners, the unemployed, prisoners, and recipients of social welfare benefits with an income under the poverty line and asylum seekers. All these groups represent about 55% of population. However, government pays for all these groups only about one quarter of average insurance premium. The self-employed and those with an income from their capital pay premiums directly from their profit up. Out of pocket payment makes about 15 percent of total health expenditures and required in the outpatient care setting; most co-payments are for drugs and for dental care.

## 5 European Health Consumer Index (EHCI)

The EHCI is a comparison and benchmarking of the health care systems across 35 European countries (28 EU and 7 non-EU) according to key health system's values from the patients and consumers prospective (EHCI 2008-2017) being done for more than ten years. Criteria used for assessment are focused primarily on patient's perspective. EHCI is accepted by the European Commission as well as by some national governments as a comprehensive evaluation of health care quality and efficiency. The index is constructed by scoring performance according to indicators as good (3 points), intermediate (2 points) or not good (1point). Scoring is based on the sum of achieved value of all indicators (48 as for 2016). Indicators are grouped into six sub-disciplines considered the most significant for patients' benefits. The sub-disciplines evaluated by the EHCI are the following: *Patient rights and information; Accessibility (based on waiting time for treatment); Outcomes; Range and reach of services provided; Prevention; Pharmaceuticals.* The sub-discipline score is calculated as a percentage of the maximum possible score (1000) before being multiplied by a specific weighted coefficient and summarized together to give the final country score. Accessibility and outcomes are weighted more as considered the most important from patient point of view.

## 6 Czech health care according to EHCI

In all years so far, the Czech health system is being assessed as one of the best among the CEE countries. CR maintains position in the middle of all participating countries keeping positions somewhere between the 17th and 13th place. In 2007 the country reached 15th place from the 29 countries. In the period 2009-2016 position of the Czech healthcare had been slightly improving. In 2016, country achieved the 13th position among 35 countries which was the best position up to now. In the same period, Czech health care was assessed as one of the most successful health system considering much less healthcare spending than in the most EU member states while providing a generous scope of care for entire population. The country was repeatedly scoring very well according to the so-called *"Bang for the Buck adjusted score*". By this specific assessment, Czechs are very well as regards the value of the health services provided for the money spent. However, it is to note that EHCI authors themselves consider the method used for construction of the *Bang for the Buck Score* as lacking strong scientific support (EHCI Report 2016, page 33).

## 7 Positive aspects of the Czech healthcare and what could be behind

Overall, the Czech results of the EHCI during 2008 - 2016 show that the Czech health system was steadily improving. The system provides a wide range of services (EHCI, 2016). Good accessibility to health services for an entire population together with high level of equity belong to the main strengths and have been contributing significantly to such positive international assessment. The most valued benefits include, above all, fair access and availability of health services. Also other sources confirm that share of Czechs indicating unmet health needs is low and there are little differences by income (0ECD, 2017). No surprise that the Czech health system has achieved good results in indicators included in sub-discipline of accessibility being country with no or short waiting times. The following indicators were evaluated as "good": visits to primary care doctors in the same day when required; less than 7 days waiting time for non-acute CT scan; less than 1 hour waiting time in Acute and Emergency Care Departments; direct access to specialists/without need for GP referral. Short or even no waiting time for health services could be explained by one of the highest rate of outpatient visits per person/per year reaching 11.1 visits on average [10]. Undoubtedly, good accessibility is also determined by the relatively favourable number of physicians per population, which is still above European average (3.7 per 100 000) although there are significant regional differences in medical staff. No co-payment for any kind of outpatient visits together with free access to specialists makes health services highly accessible. In general, in *outcomes and scope of care sub-disciplines* is remarkable focus on children and younger generation which explain low infant and child mortality and the best value of infant and HPV (Human Papiloma Virus) vaccination indicators in EHCI 2012 – 2016.

## 8 Negative aspects of Czech healthcare

However, in spite of undeniable success, there are some serious weaknesses pointed out by the EHCI reports which should be addressed in the nearest future to maintain quality, effectiveness as well as a good international reputation of the Czech health care. Among the worst-outcome indicator is a "non-declining trend of cardiovascular mortality". Since cardiovascular diseases in the Czech Republic have been leading cause of deaths for a long time, this is understood a serious failure of healthcare. In the recent years (EHCI, 2014 - 2016) it was pointed out that Czech health system did not addressed well known behavioural health risks and country has been failing in preventive medicine (EHCI, 2013). In 2014 the following statement was expressed in the EHCI report „The Czech Republic stands out as a bad example in the region in the sense that it does not work adequately in the area of health risks from smoking and alcohol and ineffective blood pressure measurement, which is manifested by a number of serious health problems". Up to now, there is no significant progress in this issue. Adoption of a new „anti-smoking law" prohibiting smoking in bars and restaurants can be understood as the first step, but still it is more or less only isolated measure. High alcohol consumption which is undoubtedly significant risk factor influencing many diseases and causing a lot of pathologies is not addressed. Availability of alcohol in terms of place of sales and price is still high.

There are also shortcomings in the field of pharmacotherapy (EHCI, 2016, OECD, 2017). The CR delays in access to new drugs. While restrictive drug policy keeps the costs of pharmacotherapy on the relatively low level, it is delaying the availability of new and more effective (and also more expensive) medicines. In particular, this concerns the latest cancer drugs and biological treatment for arthritis. There is more than 300 days between registration of a new drug and its coverage by public health insurance.

Other weak point is persistent delay in e-health, although some small progress has already been made in this regard. Since the beginning of 2018, prescription only by e-receipts was introduced in all health sector. Czech Republic should pay more attention to this issue as within healthcare supported by electronic processes is a higher chance to provide evidence based medical care (EHCI 2009). Last but not least, the Czech patients should more participate in health policy decision making.

## 9 Discussion and Conclusion

Compared with other European countries, the Czech health care is doing quite well. It is designated "star performer" among the CEE countries. The equal access and availability of health service are in particular, the most significant advantages. In addition, basic healthcare package is comparable to the most developed EU countries while health expenditure is low and relatively stable in time. On the other hand, there is concern about the sustainability of healthcare financing. High prevalence of cardiovascular diseases and other civilization diseases as well as aging of a population make a threat in terms of financial sustainability. So, much greater emphasis on prevention of behavioral risks is of urgent need. Unfortunately, this issue is not among priorities of a current health policy agenda. There is an ongoing political debate on a higher financial participation of patients, but this idea has no support among most of inhabitants. However, the experts agree that nor introduction of a larger co-payment will not be able to cover a gap in funding, and may be a barrier in access to health services for some patients.

## References

[1] CZECH STATISTICAL OFFICE. 2017. Retrieved from https://www.czso.cz/csu/czso/population

[2] UNITED NATIONS DEVELOPMENT. *Human Development Report 2016*. Retrieved from http://hdr.undp.org/en/search/node/HDI%20Czech%20Republic

[3] OECD. STATISTICS. *GDP per capita and productivity*. Retrieved from http://stats.oecd.org/index.aspx?DataSetCode=PDB_LV

[4] OECD. *Economic survey of Czech Republic 2016*. Retrieved from http://www.oecd.org/eco/surveys/economic-survey-czech-republic.htm

[5] EUROSTAT STATISTICS EXPLAINED. File:Estimated hourly labour costs, 2016 (EUR) YB17.png Retrieved from http://ec.europa.eu/eurostat/statistics-explained/images/f/f7/Estimated_hourly_labour_costs%2C_2016_%28EUR%29_YB17.png

[6] ČTK. 2017. *ČNB zlepšila odhad růstu ekonomiky pro letošní i příští rok/Czech National Bank improved estimate of economic growth for the future year*. Retrieved from http://www.ceskenoviny.cz/zpravy/cnb-zlepsila-odhad-rustu-ekonomiky-pro-letosni-i-pristi-rok/1546209

[7] OECD STATISTICS. *Health expenditure and financing 2015*. Retrieved from http://stats.oecd.org/index.aspx?DataSetCode=SHA

[8] OECD HEALTH AT A GLANCE: EUROPE 2016. Retrieved from http://www.oecd.org/health/health-systems/Health-at-a-Glance-Europe-2016-CHARTSET.pdf

[9] EUROPEAN HEALTH CONSUMER INDEX. 2008, 2009, 2013, 2016. Retrieved from https://healthpowerhouse.com/publications/

[10] WHO: EUROPEAN HEALTH INFORMATION GATEWAY. 2015. *Outpatient contacts per person per year*. Retrieved from https://gateway.euro.who.int/en/indicators/hfa_543-6300-outpatient-contacts-per-person-per-year/visualizations/#id=19638

[11] STATE OF HEALTH IN THE EU CZECH REPUBLIC: COUNTRY HEALTH PROFILE 2017. OECD, European Observatory on Health Systems and Policies. Country Profile Czech Republic. Retrieved from https://books.google.cz/books?id=9hlADwAAQBAJ&pg=PA7&dq=number+of++doctors+per+100+000+2014+Czech+Republic&hl=cs&sa=X&ved=0ahUKEwjdxOyiiIrZAhUHWywKHXl0A3sQ6AEIRzAE#v=onepage&q=number%20of%20%20doctors%20per%20100%20000%202014%20Czech%20Republic&f=false

# Health Literacy is an Important Determinant of Health

Jan Holčík
(holcik44@gmail.com)

## Abstract

Most of chronic diseases can be tackled cost-effectively through interventions aimed at modifying behavioural and life style risk factors. Policy and action for health need to address the health literacy, promoting health and attacking the cases of ill health before they can lead to problems. It is a challenging task for all components of society. The Working Group on Health Literacy was constituted by the Ministry of Health of the Czech Republic in 2014. Action Plan on health literacy was published in 2015. The Czech Health Literacy Institute was established in 2016. Health literacy is our common task. It is both important determinant of health and powerful tool for the development of a new type of relationship between individuals and the health system.

**Keywords:** health literacy, interval of health, healthy life years.

## 1 Introduction

Current development challenges health care system. We are confronted with the difficult task of providing health care services to everyone. Maximizing health through all stages of life is an asset for all individuals and a source of economic and social stability.

Improving health of the people and maintaining the quality of the health system will require the participation of all forces of the society. Policy at all levels – in government, public and private institutions, work places and the community – should take in account a wider responsibility for creating healthy societies. The greater involvement of individual citizens and families is necessary. Health literacy is one of the indispensable tools for the further development of health care.

The comparison of the healthy life years between the Czech Republic and Sweden shows that it is possible to extend the length of life in good health.

## 2 The trends in health care and tree models of health care

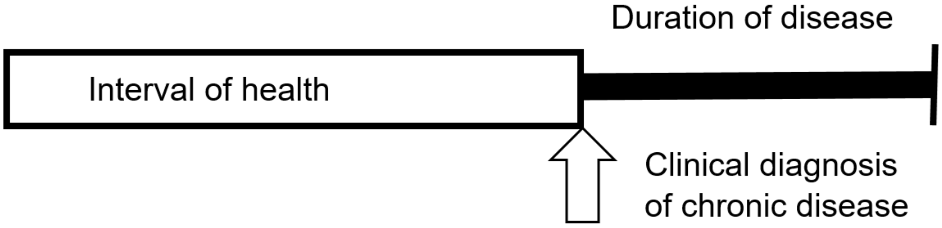
**Population aging** – It is not a problem. It is the best result of medical and social care. It could be a difficult issue if society ignore adequate action.

**Increasing rates of non-communicable disease** – It is the impact of better diagnosis and treatment of acute diseases.

**Raising health care expenditures** – Giving money to health care is helpful but there are economic limits.

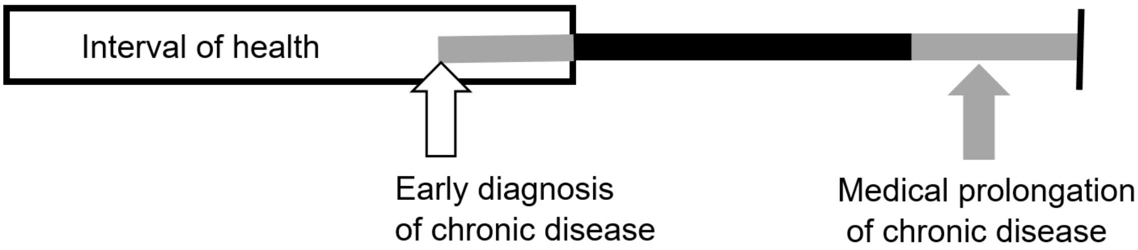
All these trends can be illustrated by simple models. Model A symbolized the human life from the beginning till the end (Figure 1).

**Figure 1. Model A**



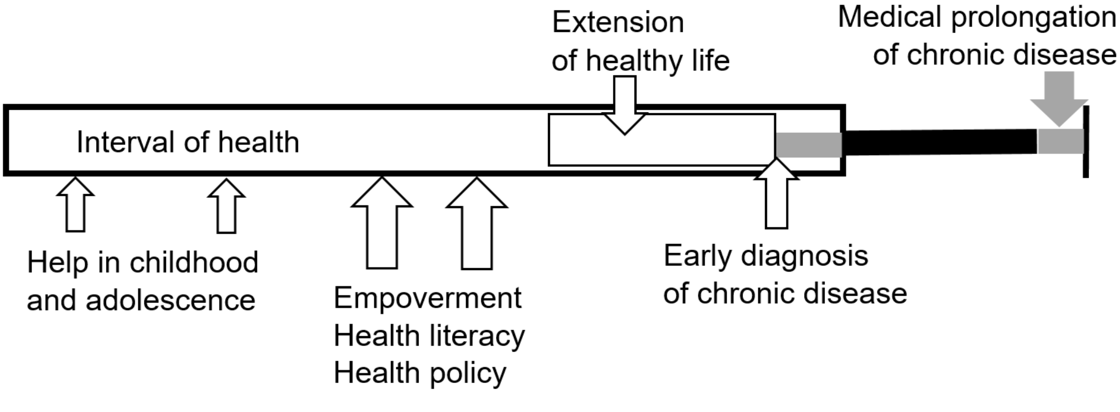
Model B demonstrates the strategy of clinical medicine which is able to establish early diagnosis and by effective treatment to prolong life of the patient (Figure 2).

**Figure 2. Model B**



This strategy is excellent for an individual patient. Early diagnosis and effective treatment help the patient to cope with disease and to live longer. But if this strategy is applied solely or predominantly it is the very expensive strategy of health care and one of the main cause of raising health care expenditure.

**Figure 3. Model C**



Model C is the health strategy for 21st century. At the first look it is like a dream but it can be reality. Table 1 and Figure 4 illustrate the comparison of the Czech Republic and Sweden by use of two indicators: Healthy Life Years and Life Expectancy (Table 1 and Figure 4).

## 3 The comparison of the Czech Republic and Sweden

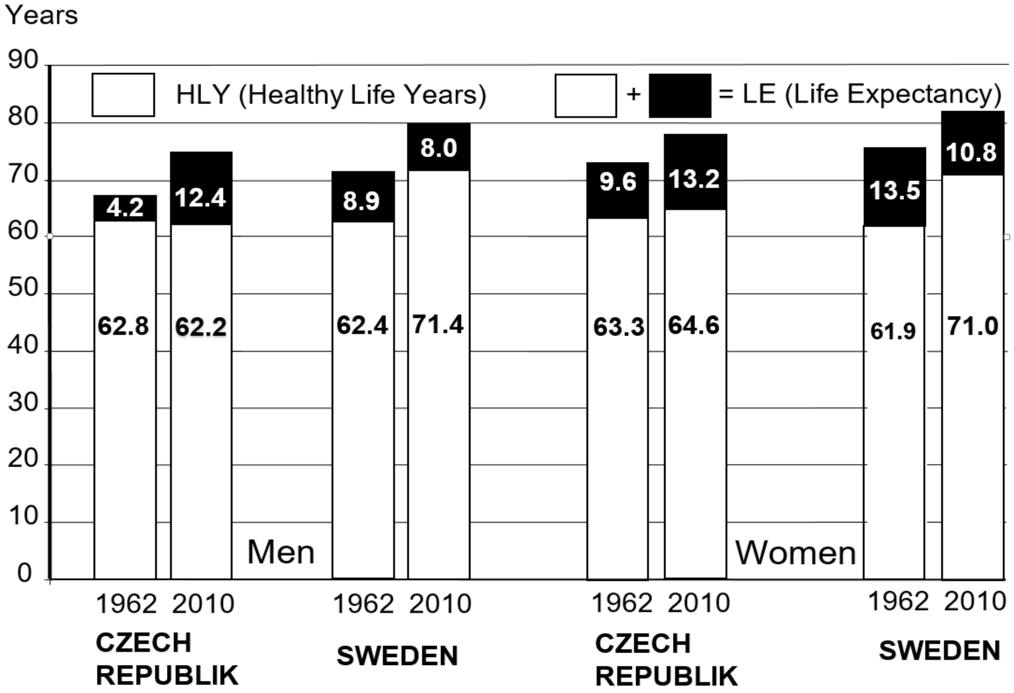
Table 1 and Figure 4 show the different development in the Czech Republic and in Sweden. Life Expectancy increased. It was a good result of medical care in the Czech Republic but in Sweden it was the excellent impact of health literacy and public health policy in Sweden. We can see that population aging is not automatically connected with increasing of morbidity.

**Table 1. Life Expectancy and Healthy Life Years of men and women in the Czech Republic and Sweden in 1962 a 2010 (sources: 1, 2, 3)**

| | | Men | | | Women | | |
|---|---|---|---|---|---|---|---|
| | | HLY | LE | DD | HLY | LE | DD |
| Czech Republic | 1962 | 62.8 | 67.0 | 4.2 | 63.3 | 72.9 | 9.6 |
| | 2010 | 62.2 | 74.6 | 12.4 | 64.6 | 77.8 | 13.2 |
| | Difference | - 0.6 | 7.6 | 8.2 | 1.3 | 4.9 | 3.6 |
| Sweden | 1962 | 62.4 | 71.3 | 8.9 | 61.9 | 75.4 | 13.5 |
| | 2010 | 71.7 | 79.7 | 8.0 | 71.0 | 81.8 | 10.8 |
| | Difference | 9.3 | 8.4 | - 0.9 | 9.1 | 6.4 | - 2.7 |

HLY = Healthy Life Years, LE = Life Expectancy, DD = Duration of Disease (LE – HLY = DD)

**Figure 4. Life Expectancy and Healthy Life Years of men and women in the Czech Republic and Sweden in 1962 a 2010 (sources: 1, 2, 3).**



Orienting health policy solely towards the health care sector is too limited. In Sweden, there is a half prevalence of obesity and the double consumption of vegetables than in the Czech Republic. The consumption of cigarettes and alcohol is twice higher in the Czech Republic than in Sweden. These differences cannot be eliminated by the activity of health institutions. One of the main strategic objectives of Health 2020 is improving leadership and participatory governance for health [4]. It is important to strengthen health literacy and health public policy in the Czech Republic.

## 4 Health literacy

The key step for better health literacy was done by the World Health Organization by publishing "Health literacy, Solid Facts" [5]. Health literacy represents the cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand and use information in ways which promote and maintain good health [5]. What is known [5]:

- High literacy rates in population groups benefits societies.
- The limited health literacy (as measured by reading skills) significantly affects health.
- The limited health literacy follows a social gradient and can further reinforce existing inequalities.
- Building personal health literacy skills and abilities is a lifelong process.
- Capacity and competence related to health literacy vary according to context, culture and setting.
- The limited health literacy is associated with high health system costs.
- Health literacy is a major component of the democratization of the health care system.

Health literacy in the Czech Republic is relatively low. Only 40.6% of population have a good health literacy [6]. There is no doubt that the low health literacy should be increased. We must also ask: How do people actually use health literacy? What is the health impact of people with good health literacy?

There are some important prerequisites for increasing the level of health literacy:

**a. Information**

- Creating and disseminating health information, accurate, accessible, and actionable.
- Health information remains essentially unregulated.
- E-health literacy – a foundational skill set that underpins the use of informational and communication technologies for health.
- The public are vulnerable to acting on inaccurate or incomplete health information and making ill-informed health decisions.

**b. Education**

- Educational interventions plays a central role in promoting and strengthening health literacy and health.
- Health education is an indispensable part of new lifelong learning.
- Health education is any combination of learning experiences designed to help individuals and communities improve their health, by increasing their knowledge or influencing their attitudes.

**c. Research and evaluation**

- Assessment of health literacy of individuals and groups (level of health literacy, distribution, determinants, and areas of action) is the foundation on which health programs should be build.
- Putting resources into research of health literacy, health policy and health programs is not expenditure. It is investment.

**d. Health communication**

- Doctor-patient relationship.
- Media.
- Social media and mobile health.
- Communication and education.
- Family, friends, co-workers.
- Culture of communication in society.

**e. Action for health**

- Good health literacy should be transform in good health policy and action.
- The improvement of health literacy is a powerful tool for the making of a new type of health policy and the development of relationship between individuals and the health system as well as between society and health.

**f. Action for creation and strengthening of health literacy-friendly settings**

- Healthy cities.
- Health literacy-friendly organizations.
- Educational settings.
- Work place settings.
- Health care settings.

**g. Working together**

- International collaboration.
- Help of the World Health Organization.
- The Czech Health Literacy Institute.
- Alliance of health literacy.
- Healthy Cities of the Czech Republic Network.
- The National Institute of Public Health.
- Activities of all subjects with good health literacy.

To be a health literate society we need a health literate public, teachers, librarians, media workers, health literate health professionals, and health literate politicians and policy-makers.

## 5 Conclusion

Most of chronic diseases can be tackled cost-effectively through interventions aimed at modifying behavioural and life style risk factors. Policy and action for health need to address the health literacy, promoting health and attacking the cases of ill health before they can lead to problems. It is a challenging task for all components of society.

There are some important initial steps to better health literacy. The Working Group on Health Literacy was constituted by the Ministry of Health of the Czech Republic in 2014. The Action Plan on Health Literacy was published in 2015. Our goal is to promote informed debate and action on health literacy.

The Czech Health Literacy Institute was established in 2016 (www.uzg.cz). The First National Conference on Health Literacy held in Prague in 2017 was a valuable tool for broadening and understanding of and stimulating debate and action on health literacy in the Czech Republic.

Health literacy is our common task. It is both the important determinant of health and the powerful tool for the development of a new type of relationship between individuals and the health system.

## References

[1] HEIDI DATA TOOL. http://ec.europa.eu/health/indicators/echi/list/index_en.htm#id1.

[2] UNITED NATIONS. 1965. *Demographic Yearbook 1964*. New York: United Nations, 1965.

[3] WHO. HFA-DB [online]. http://www.euro.who.int/en/what-we-do/data-and-evidence/databases/european-health-for-all-database-hfa-db2/offline-version.

[4] Euro WHO. *Health 2020: Health 2020. A European policy framework and strategy for the 21st century*. http://www.euro.who.int/__data/assets/pdf_file/0011/199532/Health2020-Long.pdf.

[5] WHO. 2013. *Health Literacy. The Solid Facts, 2013*. http://www.euro.who.int/data/assets/pdf_file/0008/190655/e96854.pdf.

[6] KUČERA, Z., PELIKAN, J., ŠTEFLOVÁ, A. 2016. Zdravotní gramotnost obyvatel ČR – výsledky komparativního reprezentativního šetření. *Časopis lékařů českých*; 155:233-241.

# The Importance of Fatigue and Depression for Quality of Life in Rheumatoid Arthritis Patients

Alexandra Husivargova[1], Zelmira Macejova[2], Jozef Benka[3], Dagmar Breznoscakova[4], Iveta Nagyova[1]

[1] Department of Social and Behavioural Medicine, Faculty of Medicine, PJ Safarik University, Kosice, Slovakia
[2] 1st Department of Internal Medicine, Faculty of Medicine, PJ Safarik University, Kosice, Slovakia
[3] Department of Educational Psychology and Health Psychology, Faculty of Arts, PJ Safarik University, Kosice, Slovakia
[4] 1st Department of Psychiatry, Faculty of Medicine, PJ Safarik University, Kosice, Slovakia

## Abstract

Background: Fatigue and depression are frequently reported symptoms of rheumatoid arthritis (RA). Both symptoms seem to be strongly associated with physical functioning, psychosocial factors, well-being and quality of life. Yet, fatigue is still a neglected symptom compared to depression. Therefore, the aim of this study was examine the importance of fatigue and depression for quality of life in RA patients.
Methods: Our sample consisted of 297 RA patients (80.8% female; mean age 56.03±11.57 years). All patients completed the Visual Analogue Scale - Fatigue (VAS), General Heath Questionnaire (GHQ-28) for assessing depression and the 36-Item Short Form Health Survey (SF-36) for assessing health related quality of life (HRQoL). Multiple linear regressions were used to analyse the data.
Findings: Sociodemographic (age, gender, education) and clinical variables (disease duration, HAQ and DAS-28-CRP) explained together 40.7% of total variance in physical dimension of HRQoL (PCS, SF-36). When VAS-fatigue was added a 4.2% boost in explained variance was achieved. Depression added just 0.8% to the total explained variance in PCS. Findings in mental HRQoL (MCS, SF-36) were different. Sociodemographic and clinical variables explained just 7.7% of total variance of MCS. VAS-fatigue added additional 13.1% and GHQ-depression another 10.9%.
Discussion: Our results confirm that fatigue and depression have a great impact on physical as well as mental dimensions of quality of life. In addition, these results clearly illustrate that it is important not to focus solely on depression but also to take notice of the fatigue experienced by chronically ill patients; especially when we consider patients' mental health.

**Keywords**: rheumatoid arthritis, fatigue, depression, physical health, mental health

## 1 Introduction

Rheumatoid Arthritis (RA) is a chronic progressive autoimmune disease which is characterized by systemic attacks of immune cells on the synovial tissue of the joints [1]. These attacks cause typical swelling and tenderness. As the disease progresses the cartilage, bone and ligaments become eroded and may result in a significant impairment or even a complete loss of function of the joint. This process is associated with experiencing pain, stiffness, fatigue, and leads to formation of visually noticeable deformities and physical impairment typically demonstrated by overall decreased functional status [2]. RA affecting 0.5–1% of the population, is more common in a women than men with ratio of approximately 3:1 [3].

The symptoms of RA and psychological aspects may cause problems in many areas of life and often are a source of great burden to the patient. These impacts may for example reduce or restrict one`s ability to perform roles in the family, maintain various social roles, maintain work position or work performance at the same level, lead to the loss of valued activities and overall negatively affect the quality of life of individual and his/her family[4, 5].

There is a long history of research into the relationship between psychological factors and RA[6]. The psychological well-being of patients with RA is an important issue, and the development of measurement tools has led to a better understanding of the mental aspects associated with this chronic illness. Patients with RA are more likely to suffer from depression [7, 8, 9], fatigue [10, 11, 12], low self-esteem [13], anxiety [10], psychological distress/ psychological well-being [10, 14], mortality and suicide [10].

Fatigue generally is associated with disease-related factors in RA, especially inflammation, and pain. Previous studies also showed fatigue to be associated with self-efficacy, the ability to mobilize help, and problematic social support [15]. More than 40 % of the RA patients report it as on of the most disturbing symptoms [16].

Risk of depression is increased two to three times when RA is diagnosed [17]. Estimate percentage of RA patients suffering from depression is 13 % -20 % [18], compare to general population, where depression occurs in 6.6 % [19]. The interaction between depression and RA is considered to be bidirectional [20]. Depression frequently depression goes unrecognized in RA [21].

The aim of this study was to examine the importance of fatigue and depression for quality of life in RA patients.

## 2 Data and Methods

Our sample consisted of 297 RA patients from rheumatology clinics of Louis Pasteur University Hospital in Kosice, who were invited to participate in the study. Mean age of patients were 56.03±11.57 years and 80.8% were female.

*Fatigue*

To measure fatigue we used a 10cm Visual Analogue Scale-Fatigue (VAS-Fatigue), with scoring 0=no fatigue and 10=the worst possible fatigue. Visual analogue lines are easily understood by subjects and require very little reading skill. The VAS-Fatigue has been shown to be a valid and reliable instrument for the quantitative assessment of fatigue in both healthy subjects and patients who suffer for example RA.

*Depression*

To measure depression General Heath Questionnaire (GHQ-28) was used. The GHQ-28 was developed by Goldberg in 1978 and has since been translated into 38 languages. GHQ-28 was developed as a screening tool to detect those likely to have or to be at risk of developing psychiatric disorders. GHQ-28 has four subscales: somatic symptoms; anxiety/insomnia; social dysfunction, and severe depression [22].

*Health-related quality of life (HRQoL)*

To measure Health-related quality of life the 36-item Short-Form (SF-36) health survey was used. The SF-36 measures eight domains: vitality, physical functioning, bodily pain, general health perceptions, physical role functioning, emotional role functioning, social role functioning and mental health. This domains can be summarized into a Physical Component Summary (PCS) and a Mental Component Summary (MCS).

### *Statistical analyses*

We examined the associations between fatigue, depression, PCS and MCS with linear regression analyses. We applied the enter method to determine the factors associated with summary scores of PCM and MCS. The first model of the variables included sociodemographic data (age, gender and education). The second model included clinical variables (disease duration a DAS28-crp) and functional status (HAQ - ). The third model included fatigue (VAS-fatigue). The last, fourth model included depression (GHQ-28 depression). All analyses were performed using the Statistical Package for the Social Sciences (IBM SPSS 23).

## 3 Results and Discussion

A basic description of the study population is given in Table 1 (N=297). The mean age of RA patients was 56.03±11.57 years (range 21-81). The mean disease duration was 10.26±6.91 years, range was between 0-39 years.

**Table 1. Description of the study population (N=297)**

| **Variables** | **N (%)** | **Mean** | **Std. Deviation** | **Range** |
|---|---|---|---|---|
| **Age** (years) | 297 | 56.03 | 11.57 | 21-83 |
| **Gender** | | | | |
| male | 57 (19.2%) | | | |
| female | 240 (80.8%) | | | |
| **Education** | | | | |
| elementary | 40 (14.4%) | | | |
| secondary | 199 (71.8%) | | | |
| university | 38 (13.7%) | | | |
| **Disease duration** (years) | | 10.26 | 6.91 | 0-39 |
| **Fatigue** | | | | |
| VAS - fatigue | | 5.40 | 2.35 | 0-10 |
| **Depression** | | | | |
| GHQ-depression | | 9,26 | 3,40 | 7-27 |
| **Quality of life** | | | | |
| PCS | | 29.7 | 9.54 | 10.16-60.21 |
| MCS | | 45.47 | 10.65 | 17.45-75.39 |

PCS – Physical Component Summary of SF-36, MCS – Mental Component Summary of SF-36

Model 1 (sociodemographic data) and Model 2 (clinical variables and HAQ) explained together 38.3% of total variance in PCS (Table 2). When Model 3 (fatigue) was added a 4.2% boost in explained variance was achieved. Model 4 (depression) added just 0.6% to the total explained variance in PCS.

Findings for MCS were different. Model 1 (sociodemographic data) and model 2 (clinical variables and HAQ) explained just 5.1% of the total variance of MCS. Model 3 (fatigue) added additional 13.1% and model 4 (depression) another 10.8%.

**Table 2. Explained variances for PCS, MCS**

| | **Total explained variance** | **Added variance** |
|---|---|---|
| PCS | | |
| Model 1 sociodemographic data | 8.8% | 8.8% |
| Model 2 clinical variables & HAQ | 38.3% | 29.5% |
| Model 3 fatigue | 42.5% | 4.2% |
| Model 4 depression | 43.1% | 0.6% |
| MCS | | |
| Model 1 sociodemographic data | 1.8% | 1.8% |
| Model 2 clinical variables & HAQ | 5.1% | 3.3% |
| Model 3 fatigue | 18.2% | 13.1% |
| Model 4 depression | 29% | 10.8% |

PCS – Physical Component Summary of SF-36; MCS – Mental Component Summary of SF-36, HAQ- Health Assessment Questionnaire

In the final model, Model 4 (Table 3), all variables together explained 43.1% of the total variance of PCS, and the significant variables were HAQ (functional status) and VAS-fatigue (fatigue). In MCS the total explained variance was 29%. For MCS, HAQ (functional status) was no longer significantly associated with the dependent variable, whereas VAS-Fatigue remained significant as well as depression.

**Table 3. Significant variables after including all variables into the equation (Model 4)**

| | **PCS** | | | **MCS** | | |
|---|---|---|---|---|---|---|
| | **Beta** | **F** | **Adjusted $R^2$** | **Beta** | **F** | **Adjusted $R^2$** |
| | | 21.42 | 0.431 | | 12.01 | 0.290 |
| Age | 0.02 | | | -0.02 | | |
| Gender | -0.1 | | | 0.00 | | |
| Education | **0.1*** | | | 0.03 | | |
| Disease duration | -0.09 | | | 0.04 | | |
| DAS28- CRP | -0.04 | | | 0.02 | | |
| HAQ | **-0.49***** | | | -0.02 | | |
| VAS-fatigue | **-0.25***** | | | **-0.31***** | | |
| GHQ 28- depression | 0.10 | | | **-0.36***** | | |

PCS – Physical Component Summary of SF-36; MCS – Mental Component Summary of SF-36, HAQ- Health Assessment Questionnaire, DAS28- CRP – Disease Activity Score 28 – C-reactive protein.

Our results confirm that fatigue have an impact on physical (PCS) and mental (MCS) quality of life of RA patients. The role of depression was significant only in MCS, whereas fatigue was important for both dimensions. These results clearly illustrate that it is important not to focus solely on depression [7, 8, 9], but also to take notice of the fatigue [10, 11, 12], experienced by chronically ill patients. In line with this, therapy aimed at management of fatigue can possibly alter both of these dimensions.

As such, Cognitive-Behavioural Therapy (CBT) that is focused on psychological well-being can be very beneficial for RA patients. CBT involves looking closely at patterns of behaviour, identifying the links between the patient's thoughts, feelings and behaviours, and then working out how they are driving a symptom or problem [14]. In a CBT programme for RA-related fatigue, this individualized, non-didactic approach made patients feel more in control of how they responded to their disease, and ensured they focused on the behavioural and emotional changes that reflected their personal priorities leading ultimately to better fatigue management and treatment adherence [14].

## 4 Conclusion

Fatigue seems to be more important symptom for RA patients than depression. This should be reflected in managing RA through introducing relevant interventions programmes. Based on studies worldwide RA patients report good experience with CBT that helping them with daily functioning and increased physical and mental quality of their lives.

### Acknowledgements

This work was supported by the Slovak Research and Development Agency under the contract No. APVV-15-0719.

### Contact

Mgr. Alexandra Husivargova; e-mail: alexandra.husivargova@upjs.sk

### References

[1] ANDERSON, K. O., ET AL. 1985. Rheumatoid arthritis: review of psychological factors related to etiology, effects, and treatment. *Psychol Bull;* 98:358-387.

[2] SALAFFI, F., ET AL. 2010. Health-related quality of life in patients with rheumatoid arthritis: assessment by an Italian version of the Arthritis Impact Measurement Scales, Version 2 (AIMS2). *Reumatismo*; 62:12-33.

[3] BENKA, J. 2012. *Living with Rheumatoid Arthritis: do personal and social resources make a difference?* (Doctoral dissertation, University of Groningen). ISBN 9789036759137.

[4] DOEGLAS, D., ET AL. 1995. Work disability in early rheumatoid arthritis. *Ann Rheum Dis*; 54:455460.

[5] KATZ, P. P., MORRIS, A., YELIN, E. H. 2006. Prevalence and predictors of disability in valued life activities among individuals with rheumatoid arthritis. *Ann Rheum Dis*; 65:763-769.

[6] LERMAN, C. E. 1987. Rheumatoid arthritis: psychological factors in the etiology, course and treatment. *Clin Psychol*; 7:413-425.

[7] BACCONNIER L., ET AL. 2015. Psychological distress over time in early rheumatoid arthritis: results from a longitudinal study in an early arthritis cohort. *Rheumatology*, *54*(3):520-527.

[8] MATCHAM, F., ET AL. 2013. The prevalence of depression in rheumatoid arthritis: a systematic review and meta-analysis. *Rheumatology*, *52*(12):2136-2148.

[9] MORRIS, A., ET AL. 2011. Long-term patterns of depression and associations with health and function in a panel study of rheumatoid arthritis. *Journal of Health Psychology* 16(4):667-677.

[10] VAN HOOGMOED, D., ET AL. 2010. Physical and psychosocial correlates of severe fatigue in rheumatoid arthritis. *Rheumatology (Oxford)*; 49:1294–302.

[11] POLLARD, L. C. ET AL. 2006. Fatigue in rheumatoid arthritis reflects pain, not disease activity. *Rheumatology (Oxford)*; 45:885–9.

[12] REPPING-WUTS, H., ET AL. 2007. Persistent severe fatigue in patients with rheumatoid arthritis. *J Clin Nurs*; 16:377-83.

[13] GETTINGS, L. 2010. Psychological well-being in rheumatoid arthritis: a review of the literature. *Musculoskeletal Care*; 8(2):99-106.

[14] DURES, E., HEWLETT, S. 2012. Cognitive–behavioural approaches to self-management in rheumatic disease. *Nature Reviews Rheumatology*; 8(9):553-559.

[15] SHEEHY, C., ET. AL. 2006. Depression in Rheumatoid Arthritis: Underscoring the Problem. *Rheumatology* 45(11): 1325–1327.

[16] RIEMSMA, R, P., ET AL. 1998. Fatigue in rheumatoid arthritis: the role of self-efficacy and problematic social support. *Br J Rheumatol*; 37:1042-6.

[17] DICKENS, C., ET AL. 2002. Depression in rheumatoid arthritis: a systematic review of the literature with metaanalysis. *Psychosom Med*; 64:52–60.

[18] KESSLER R. C., ET AL. 2003. The Epidemiology of Major Depressive Disorder: Results from the National Comorbidity Survey Replication (NCS-R*). JAMA*; 289(23): 3095–3105.

[19] CADENA, J., ET AL. 2003. The impact of disease activity on the quality of life, mental health status, and family dysfunction in Colombian patients with rheumatoid arthritis*. J Clin Rheumatol*; 9:142-50.

[20] RIFKIN, A. 1992. Depression in physically ill patients: don't dismiss it as 'understandable'. *Postgraduate medicine*; 92(3):147-154.

[21] GOLDBERG, D. 1978. *Manual of the general health questionnaire*. NFER Nelson.

[22] WARE, J. R, J. E., SHERBOURNE, C. D. 1992. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. *Medical care*; 473-483.

# Ethical Dilemmas of Czech Physicians as Related to the Hippocratic Oath

Kateřina Ivanová, Přemysl B. Hanák, Adéla Lemrová
Department of Social Medicine and Public Health
Faculty of Medicine and Dentistry, UP Olomouc, Czech Republic

## Abstract

The aim of the study is (1) to identify the ethical dilemmas from the viewpoint of the current Czech physicians and put them in the context of ethical principles of the Hippocratic Oath; (2) to analyse the ethical dilemmas of the current Czech doctors which impact the health care system. The research was designed as a two-stage project. The first qualitative phase included medical doctors (n=62) undergoing postgraduate medical education who based on the research question defined the most important ethical dilemmas supplementing them with their comments. In the course of the second, quantitative stage, general medicine PhD students (n=26) and Olomouc Military Hospital medical doctors (n=16) completed a questionnaire about the most important medical dilemmas defined in the qualitative part and they added their own ideas. The dilemmas were categorized through the thematic analysis and then ranked according to the response frequency. The basic ethical principles were then linked to them and possible correlation with the Hippocratic Oath explored. The categories expressed their focus on the doctors, patients, and the health system. There was a total of 104 survey respondents comprising 34 men of the average age of 38 years, age median 32, and 61 women of 32 years on average, age median 31 years; 9 questionnaires were unidentifiable from the socio-demographic viewpoint. The respondents depicted a total of 36 ethical dilemmas in 517 responses which were sorted in 3 categories: dilemmas concerning the doctor, the patient, and the health care system. The most frequent dilemmas, of the same amount (n=32 responses, i.e. 6.2% of the total number of responses), included: 1) who should be preferred when providing expensive health care; 2) treatment of seniors in high age; 3) euthanasia; 4) excessive administration. It is difficult to link an ethical principle to the individual dilemmas, however in general it is possible to state that in the depicted dilemmas, in majority there was the principle of justice, in the medium and the same rate there was the principle of nonmaleficence and autonomy; and the least there was the principle of beneficence. The Hippocratic Oath includes a quarter of the designated themes; out of the four most frequent ones, it is only euthanasia. In the ethical sphere of medicine, there has been a shift from the primary more general principles, such as beneficence and non-maleficence that are included in the Hippocratic Oath, towards justice and autonomy. The emphasis on the principles of beneficence and nonmaleficence should be crucial when setting the aims and content of medical ethics education, especially for the undergraduate study program. The philosophical focus on what is good for the patient and what is already harmful for her or him, should enable the doctors in practice to better differentiate and set the limits for the principles of autonomy and justice. Their primary ability to distinguish what is good creates a moral base for the organization and management of the health care system.

**Keywords*:*** ethical dilemma; ethical principle; Hippocratic Oath; doctors; health care system

## 1 Introduction

The Hippocratic Oath defines the ethical framework of the Western medicine. Its ethical principles have a constitutional and institutional character; even though they have remained unchanged for nearly 2,500 years they still define the present goals of health care policy. It has been defended as well as discussed. Various polemics were compiled into a scoping review [1] and they emphasize the necessity to revise the Oath so that it reflects the actual problems and ethical dilemmas of the current society, including the system of health care. Haškovcová stated:

“The functionality of the Hippocratic Oath lasting for centuries was based on the fact that it is valuable and thus accepted by the educated doctors”… and all the other and modern ethical codes, promises, and international declarations are based on the Oath [2]. Generally, it is possible to state that while many clinical procedures of the Hippocratic age are forever overcome, the ethical framework of the Oath remains [3].

The aim of the study is (1) to identify the ethical dilemmas from the viewpoint of the current Czech doctors and to put them in the context of the ethical principles of the Hippocratic Oath; (2) to analyse the ethical dilemmas of the current Czech doctors which impact the system of the health care.

The health care system is a complex, living organism whose aim is the most efficient use of appropriate resources to achieve an increase of the health potential of all inhabitants [4]. Ethical dilemmas can be found in all stated processes which the health care system should use to achieve this goal. Does the most efficient use of resources mean the expending of the maximum of resources in specific time for a specific patient or average resources for anyone so that everyone gets treated? [5]. Křížová states that the economic part of the health care system becomes a distinctive and newly formulated topic. In the health system of the so called western medicine, the doctors are still led to view the needs of the patient as the decisive impulse for their conduct. However, it is the organizational context which eventually decides about rationing [6]. What is the role of the current doctor in this process of rationing? Is he or she an economist, public fund caretaker, or a businessman? How does the Hippocratic Oath help or limit the physician in such a situation? Křížová emphasizes that working in today’s medical industrial complex means a great change for the independent profession of the doctors as it surely was in the Hippocrates’ times.

What are the appropriate resources? Are they interpreted from the individual viewpoint of the physicians, or patients? Or the systematic viewpoint of the health insurance company or the state? “The public protection of health is based on a different doctrine than the clinical care for the individual. The ethical parts of both views may seem different but in the developed health care system they are indistinguishable … When there are conflicts between the interests of the health insurance management or the health facility and the interests of the patient, there is a tendency to move the solving part to the executive doctors and to leave the dilemmas to them” [7]. The constant increase of the health potential of the population may be in contradiction to the quality of life which is sometimes confused for preserving human life almost for any price. However, it is becoming apparent that it is not possible to statistically validly evaluate the quality of life, and the qualitative findings of researches do not allow for generalization for the whole population. What is crucial for both methodological approaches is the interpretation of the findings [8]. An analysis and reflection of the operation of the whole health care system through the most frequent ethical dilemmas of the medical practice thus seems an adequate research design.

## 2 Data and Methods

The research took place from 2016 to 2017 in two phases. In the first phase, doctors who attended a compulsory course of the Foundations of the Health Legislation, Ethics, and Communication during their specialized education participated. The courses are organized at the Department of Social Medicine and Public Health, Faculty of Medicine and Dentistry UP Olomouc. During the course, based on the research question, the doctors (n=62) defined the most important ethical dilemmas and added their comments. In the second stage, PhD students (n=26) and Olomouc Military Hospital doctors (n=16) depicted the most significant dilemmas in medicine in a questionnaire selecting among the topics defined in the previous research. In case they did not find the intended response in the summarizing tables, they were offered an option to add a new dilemma. Afterwards, the dilemmas were ordered according to the frequency. Then, every dilemma with its comments underwent a qualitative analysis and was assigned one of the basic ethical principles as stated by Beauchamp a Childress [9]: beneficence, nonmaleficence, justice and respect to autonomy. For most of the ethical dilemmas, a conglomerate of several ethical principles could be perceived. Those principles that seemed major for the specific dilemma were then assigned to it. Finally, an analysis of how the dilemmas directly correlate to the Hippocratic Oath in its classical version was performed. In such a research design, the subjective role of a specific researcher and his or her pattern of inductive logic is legitimately applied [10].

## 3 Results and Discussion

A total of 104 respondents participated in the research, comprising 34 men of the average age of 38 years, age median 32, and 61 women of 32 years on average, age median 31 years; 9 questionnaires were unidentifiable from the socio-demographic viewpoint. The respondents identified 36 ethical dilemmas in 517 responses, which were sorted out in 3 determining categories – dilemmas concerning the person of the doctor, the person of the patient, and the health care system.

The category concerning the doctor was the most frequent one (280 responses, 19 designated dilemmas, which represented 54.2% of the responses); the most significant dilemmas are depicted in Table 1.

**Table 1. Ethical dilemmas in the current medicine – person of the doctor (5 most frequent dilemmas)**

| Dilemma | Frequency absolute / percentage within the ethical problems concerning the doctor / percentage of the total of responses | Ethical Principle | In HO yes, indirectly, no |
|---|---|---|---|
| 1) Who to provide expensive care to? | 32/ 11.4% / 6.2% | justice | no |
| 2) Treatment of seniors in very old age | 32/ 11.4%/ 6.2% | justice /nonmaleficence | indirectly |
| 3) Euthanasia | 32/ 11.4%/ 6.2% | autonomy | indirectly |
| 4) Lack of time for the patient | 25/ 8.9%/ 4.8% | justice | indirectly |
| 5) Long-term hospitalization | 22/ 7.9% /4.3% | beneficence | no |

In the area concerning the patient, there were depicted 10 dilemmas, 130 responses, which is 25.1% out of the total amount of responses. Most often the doctors depicted – unhealthy lifestyle (16.9% of the responses concerning the person of the patient), and requirement that the doctor heals everything (16.2%). The third most frequent issue of this category was the failure to follow the treatment as suggested (13.8%).

In the area concerning the health care system (see Table 2) there were depicted 7 dilemmas, 207 responses, which represents 20.7% of the total amount of responses. Because of the focus and aim of the study, all results of this category are depicted here.

**Table 2. Ethical dilemmas in the current medicine – health care system**

| Dilemma | Frequency absolute /percentage within the ethical problems concerning the doctor/ percentage of the total of responses | Ethical Principle | In HO yes, indirectly, no |
|---|---|---|---|
| 1) Excessive administration | 32/29.9%/ 6.2% | nonmaleficence | no |
| 2) Lack of money for treatment | 20/18.7%/ 3.9% | justice | no |
| 3) Low social position of doctors | 13/ 12.2%/ 2.5% | justice | no |
| 4) Wasting of finances | 13/ 12.2%/ 2.5% | justice | no |
| 5) Low salary in the health system | 12/ 11.2%/ 2.3% | justice | no |
| 6) Media impact | 12/ 11.2%/ 2.3% | nonmaleficence | no |
| 7) Permitting the funeral of a dead fetus | 5/ 4.7%/ 0.97% | beneficence | no |
|  | 107/ 100%/ from the total amount of responses 20.7% | 1x beneficence/ 2 x nonmaleficence /2 x autonomy/4 x justice |  |

On the first place, there is the excessive administration as the most significant ethical dilemma in the health care system, which is an interesting finding. The next most frequent topic, which correlates to the crucial ethical dilemmas stated in the literature review, is the lack of money for treatment, low social position of doctors, and wasting of financial resources.

Out of the four ethical principles, in all categories together, the most frequently designated principle was justice, then autonomy and nonmaleficence, and beneficence in the last position. The conclusion of the research ascertains the generally perceived trends of the growing tension in some areas of the Czech medicine [11]. The doctors increasingly regard the contemporary principles of justice and autonomy as dilemmatic. House et al. came to the same conclusion in 2015. When depicting the dilemmas, the medical students who had their practice at the University of Michigan Medical School ER most often named the principle of autonomy (41%), justice (32.4%), nonmaleficence (31.8%), and beneficence (26.6%) [12].

A review of research articles in the WoS database using the keywords of “ethical dilemmas and medicine” over the last 10 years show 88 results and corresponds to the preferences of doctors of the above mentioned research. Although the ethical dilemmas permeate all medical specializations, the theme of the care at the end of human life is linked to most of them. Among the crucial ethical dilemmas of the health care system appear to be the increasing financial demands of medical processes and thus the necessity of still more responsible rationing, but also the difficult finding of ethical solutions for the education of medical students and doctors. Stating the goals of education in the field of medical ethics is a very complicated task. The curriculum of the future doctors should be substantially revised so that it leads the students to the development of interpersonal relations, to problem solving principles, and humane aspects of health care, more than to memorizing some isolated facts; all this on the theoretical level, but also obligatorily in practice [13]. Human, ethical, and sensitive approach to ill people will still remain the basic human interaction, despite the technologizing and electronization of the society [14].

The Hippocratic Oath covers in summary only one fourth of the dilemmas that the doctors depicted in our research, among the four most frequently designated dilemmas there was only euthanasia (Table 3). It is difficult to link a major ethical principle to an individual dilemma. In every ethical principle, several levels of the observer's opinion and subjective evaluation interlink. The most exposed ethical principle for the given theme was connected to the dilemmas, which is in this sense the qualitative dimension of the research with all its consequences.

**Table 3. Most frequent dilemmas**

| Dilemma | Absolute frequency/ proportional frequency to the total amount of responses / frequency in the specific category | Ethical Principle |
|---|---|---|
| Who to provide expensive care to? | 32/6.2%/11.4% | justice |
| Treatment of seniors in very old age | 32/ 6.2%/ 11.4% | justice /nonmaleficence |
| Euthanasia | 32/ 6.2%/ 11.4% | autonomy |
| Excessive administration | 32/ 6.2%/ 29.9% | nonmaleficence |

The interpretation of the findings is based on the assumption that there are real pressures on the doctors so that they are able (and must) distinguish who they should give preference to when providing expensive medical care, or the necessity to distribute the resources among all patients in need. The treatment of seniors in very old age causes difficulties mostly in the sense of excessive examining and substituting the family care. This may lead up to the need of euthanasia as a "simple" solution. A significant amount of comments included the requirement of doctors to loosen the unprecedented ban on euthanasia in a legal way. The same preferences and demands were also found in the research by Sorta-Bilajac et al. [15].

Another rising phenomenon is the gradual dehumanization of the treatment process which is viewed as a market process in which health is a commodity and the patient or the family are the client. Thus, the mechanical economic system is applied to a system with biological specificity which leads to tensions and discontent [7]. Furthermore, the recognizable and irreversible digression from the paternalistic approach to the patients to the benefit of autonomy [16] results in considerably complicated authority of the doctor as the supreme expert in his or her field. For a long time, doctors and physicians have reached the top positions among the most respected professions as shown in the study Czech People 1990-2015 [17]. According to the qualitative responses of our research, the doctors perceived their social position as relatively low.

Respecting autonomy is an essential ethical principle, however it has its limits – both external (unconsciousness, life threatening states, dementia, effect of narcotics, age under 18 years, presence or absence of a curator in case of people with limited legal capacity) or internal (trust in the doctor, understanding the doctor's explanation, acute pain, low health literacy, psychic strain etc.). The respect to autonomy is emphasized in the Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine, which was ratified in 2001 in the Czech Republic as an international legal regulation together with the ethical and legal institute of the Informed consent [16]. Despite all respect to autonomy of every citizen it is not possible that the patients themselves decide about the adequate resources paid from the public health insurance. Similarly, the doctors' limitations for their decisions that the health insurance company or the state define in advance are also questionable.

One of the long-term and traditional themes is the demand of greater financial resources for treatment – in the ethical field it is especially the dilemma of the necessity to decide to whom and for how much, so that the system is maintained in the quality required by the patients and the society [7]. The gradual prolonging of human life and the aging of the Czech population, increasing care for the older part of the population lead to greater burden for the health system; the patients and the family sometimes demand the treatment even of the common symptoms of higher age. The overburdened doctors, as the research revealed, then seek support in the more precise legal specifications of their possibilities of how to treat the end of human life.

In the disciplines where strenuous and risky medical interventions are performed, solving of ethical dilemmas is also part of the everyday difficult and responsible practice. The research clearly shows the gradual progression from the primary, more general principles of beneficence and nonmaleficence that are directly included in the Hippocratic Oath, towards the modern, "younger" principles of justice and respect to autonomy. The question remains, to what extent it is necessary that the Hippocratic Oath reflects all medical ethical dilemmas without losing its validity and applicability in the modern ethical approach. Is the required revision of the form as well as interpretation of the Oath legitimate? [3] No traditional ethical code reflects all new specific dilemmas as they emerge; the most universal ones however create some heuristic algorithm applicable to the future as well.

## 4 Conclusion

The authority of the Hippocratic Oath should function as an equalizing weight, i.e. it should equalize the process of moral decision making in the medical practice to the benefit of the balanced ratio of all basic ethical principles. For that, the value orientation is important which is included in the primary Hippocrates' principles, i.e. to do good for the patient and not to harm him or her, in Hippocrates' words: "Into whatsoever houses I enter, I will enter to help the sick and I will abstain from all intentional wrong-doing and harm…" The authors of the study, based on the findings of the research preferring the principles of justice and autonomy but also based on the experience of years-long medical ethics teaching, believe that the emphasis on the principles of beneficence and nonmaleficence should be crucial when setting the aims and content of the medical ethics education, particularly for undergraduate study program. The philosophical orientation in the issue of what is good for the patient and what is already harmful will then enable the doctors in practice to determine and set the limits for the principles of autonomy and justice in a better way. Their primary ability to distinguish the good for a specific patient in the population forms a moral ground for the organization and management of health care. In the graduate study program, the doctors should be ascertained that the long-term ethical horizons and not the short-term emergency solutions, are the right direction.

Nevertheless, the field of medical ethics is only a minor part of the undergraduate education of physicians which means that the practical situation or the patients themselves force the doctors to participate or behave on the basis of ethical judgments where they are not and cannot be any experts. This fact corresponds to one of the conclusions of the research where the doctors depicted the excessive administration, which should help them defend their decision, as one of the most significant ethical problems. It is thus an important question whether the administration really fulfils such a role.

*Limitations of the Study and Ethical Aspects of the Study.* In the research, most of the respondents were students of specialized education which means that on average their age is significantly lower than the total average age of Czech doctors. The research sample is thus not representative by selection, nor by the socio-demographic features. However, the responses of younger doctors may reveal the trends of the current medicine. Before filling the questionnaires, all respondents were ascertained about their personal anonymity and the manner of publishing the findings which they did not have to agree with and they could decide not to fill the questionnaire.

## References

[1] HANÁK, P. IVANOVÁ, K. 2016. *Etické kodexy v lékařství – historie a současnost*. In *Seminář DSP ÚSL LF UP*. Olomouc.

[2] HAŠKOVCOVÁ, H. 2017. *Etické kodexy – tradice a současnost.* In: PTÁČEK, R. BARTŮNĚK, P. MACH, J. ET AL. *Informovaný souhlas. Etické, právní, psychologické a klinické aspekty.* Praha: Galén.

[3] HANÁK, P, IVANOVÁ, K, POTOMKOVÁ, J. 2015. *Hippokrates z Kósu – zakladatel moderní medicíny.* In *Pediatrie pro praxi*; 16(3):201–202.

[4] IVANOVÁ, K., JURÍČKOVÁ, L., GLADKIJ, I. 2013. *Medicína a společnost*. Olomouc: Univerzita Palackého v Olomouci.

[5] KŘÍŽOVÁ, E. 2006. *Proměny lékařské profese z pohledu sociologie*. Praha: Sociologické nakladatelství.

[6] HOLČÍK, J., KOUPILOVÁ, I. 1999. Určování priorit a přidělování služeb je otevřeným a naléhavým problémem. *Zdravotnictví v České republice*, 2 (1): 9-11.

[7] ŽALOUDÍK, J. 2014. Význam a šíře etiky v klinické praxi. In PTÁČEK, R., BARTŮNĚK, P., ET AL. *Etické problémy medicíny na prahu 21. století.* Praha: Grada. S. 35-50.

[8] FAYERS, P. M., MACHIN, D. 2009. *Quality of life*. Chichester: John Wiley.

[9] BEAUCHAMP, T. L. CHILDRESS, J. F. 2001. *Principles of Biomedical Ethics*. 5th Edition. Oxford, New York: Oxford University Press, Inc. 454.

[10] JURÍČKOVÁ, L. IVANOVÁ, K. 2015. Metodologie kvalitativního výzkumu. In VÉVODOVÁ, Š., IVANOVÁ K., ET AL. *Základy metodologie výzkumu pro nelékařské zdravotnické profese.* Olomouc: Univerzita Palackého v Olomouci.

[11] PTÁČEK, R. BARTŮNĚK, P. (EDS.). 2016. *Kontroverze současné medicíny*. Praha: Mladá fronta.

[12] HOUSE, J. THEYYUNNI, N. BARNOSKY, A., FUHREL-FORBYS, A. 2015. Understanding Ethical Dilemmas in the Emergency Department: Views from Medical Students' Essays. *Journal of Emergency Medicine;* 48(4):492-498.

[13] BERNABEO, E. 2014. *The 'special obligations' of the modern Hippocratic Oath for 21st century medicine.* Medical Education: Hoboken, Wiley-Blackwell.

[14] CALLAHAN, J. C. 1988. *Ethical Issues in Professional Life.* 1st edition, Oxford, New York, Toronto: Oxford University Press.

[15] SORTA-BILAJAC, I. BAŽDARIC, K. ŽAGROVIC, M. B. JANČIC, E. BROZOVIC, B. ČENGIC, T. ĆORLUKA, S. AGICH, G. J. 2011. How nurses and physicians face ethical dilemmas - the croatian experience. *Nursing Ethics;* 18(3): 341-355.

[16] HAŠKOVCOVÁ, H. 2007. *Informovaný souhlas. Proč a jak?* Praha: Galén.

[17] HOLANOVÁ, T. 2016. *Nejprestižnější povolání v Česku: Vojáci míří vzhůru, ministři ke dnu. Stálicí jsou lékaři.* Available on https://zpravy.aktualne.cz/ekonomika/nejprestiznejsi-povolani-v-cesku-vojaci-miri-vzhuru/

# Predictors of One-Year Mortality after Hip Fracture Surgery in Elderly Patients from Slovakia

Zuzana Katreniakova[1,2], Radoslav Morochovic[3], Stanislava Imrichova[3], Iveta Nagyova[1,2]
[1] Department of Social and Behavioural Medicine, Faculty of Medicine, PJ Safarik University in Kosice, Slovakia
[2] SAVEZ - Slovak Public Health Association, Kosice, Slovakia
[3] Department of Trauma Surgery, Faculty of Medicine, PJ Safarik University in Kosice and University Hospital of L Pasteur, Kosice, Slovakia

## Abstract

Background and aim: Hip fractures represent a worldwide public health problem among the elderly as one of the most important causes of morbidity, disability, and mortality. The aim of this study was to identify risk and protective factors of one-year mortality after trochanteric fracture surgery in elderly from Slovakia.
Methods: 173 patients (78.1% of females) 65 years and older (mean age 80.9±6.9 years) all treated with dynamic hip screw were involved in the study. A prospective cohort study was carried out between 2004 - 2009 years with the latest follow up of the cohort in December 2012. Source of admission, number of co-morbidities, number of regularly taken medications prior to the admission, weight, height, and new mobility score (NMS) were documented at the admission. The patient's abbreviated mental test score (AMTS) was obtained before the surgery. In-hospital waiting time for surgery, type of fracture, type of anaesthesia, overall health status using the American Society of Anaesthesiologist ratings (ASA), duration of surgery, postoperative length of stay, in-hospital medical complications, and type of discharge disposition were recorded at the end of hospitalisation. Cox proportional hazards models with a forward selection procedure were used for analysis.
Results: The one-year mortality reached 30.1%. Multivariate analysis revealed poor mental state (HR 2.83), presence of in-hospital medical complication (HR 2.76), male gender (HR 1.98), more than 2 comorbidities (HR 1.83) as statistically significant risk factors for one-year mortality with protective effect of good pre-injury mobility score (HR 0.31).
Conclusion: Our findings indicate that optimizing after-surgery care and treatment by performing a rapid and inexpensive assessment of health status of patients and better comorbidities managing, as well as public health interventions focused on mental health promotion with special attention to males can play a significant role in reducing one-year mortality after hip fracture in elderly.

**Keywords:** One-year mortality; Trochanteric fracture; Elderly; Public health interventions

## 1 Introduction

Since 1990 approximately 1.6 million hip fractures occur annually. By 2050 this number could reach between 4.5 million [1] and 6.3 million [2], even if age-adjusted incidence rates remain stable. Hip fractures represent a worldwide public health problem [3].

The hip fracture incidence increases exponentially in both men and women with advancing age [4]. The average age of a patient with hip fracture is 82 years [5]. Nearly 75% of all hip fractures occur in women [6] and most of all hip fractures are linked to low-energy trauma combined with osteoporosis [3, 7].

Over the second half of the 20th century and at the beginning of the 21st century hip fractures in the population above 65 years of age are becoming emerging problems for health care and long-term care systems worldwide as they represent one of the most important causes of morbidity, disability, decreased independence and mortality among this age group [8]. The mortality rate in hip fracture patients depends on a variety factors including age, gender, co-morbidity and pre-fracture functional state mostly level of cognitive functions and of pre-injury mobility [9].

The aim of the study was to identify risk and protective factors of one-year mortality after trochanteric fracture surgery in elderly patients from Slovakia.

## 2 Data and Methods

A prospective cohort study was carried out between January 2004 and December 2009 with the latest follow up of the cohort in December 2012. All 182 patients with trochanteric fractures after low-energy trauma, surgically treated with dynamic hip screw (DHS) in Department of Trauma Surgery, Faculty of Medicine, PJ Safarik University in Kosice and examined by one of the authors (Morochovic or Imrichova) were involved into the study. Nine patients were lost to follow up. The mean age of the cohort was 80.9 years and 57 (33.0%) patients were older than 84 years. The patients with known oncological disease, with repeated fracture of the same bone and without pre-operative examination of cognitive functions were excluded from the study. The study was approved by the Ethical committee of Faculty of Medicine, PJ Safarik University in Kosice.

Age, gender, weight, height, source of admission (home, social or healthcare facility), number of comorbidities divided into 5 categories (cardiovascular, central nervous system, metabolic, pulmonary, renal), number of regularly taken medications prior to the admission and a new mobility score – NMS [10], was documented at the admission. Body mass index was calculated and a value between 22 and 30 kg/m2 was considered as age-appropriate [11]. The patient's abbreviated mental test score was obtained before the surgery. The patient's abbreviated mental test score measured by the Abbreviated Mental Test – AMT [12] was obtained before the surgery.

In-hospital waiting time for surgery, type of fracture (AO/OTA 31-A1-A3), type of anaesthesia, overall health status using the American Society of Anaesthesiologist ratings (ASA), duration of surgery, postoperative length of stay, in-hospital non-surgery medical complications, and type of discharge disposition were recorded at the end of hospitalisation.

For statistical analyses Chi-square tests or Fisher exact tests were used for the comparison of categorical variables, t-tests for the comparison of continuous variables, and Mann-Whitney Rank Sum Test for abnormally distributed data. A p-value lower than 0.05 was considered significant. To find the one-year mortality predictive factors Cox proportional hazards models with a forward selection procedure were used. Endpoint for the analysis was death of the patient during the study time frame. If endpoint was not reached, then time from surgery to the last follow-up was used as censored data. All variables but age were dichotomised.

## 3 Results and Discussion

The majority of the 173 patients were: females (78.1%), admitted from home environment (70.0%), with ASA grade to III (85.0%), with around 50% reported normal weight. The main characteristics of patients and surgery are presented in Table 1.

**Table 1. Characteristics of patients and surgery - % (n)**

| PATIENTS | | |
|---|---|---|
| **Gender** | Males | 21.9 (38) |
| | Females | 78.1 (135) |
| **BMI** (kg/m$^2$) | ≥ 22 to < 30 | 51.4 (89) |
| | < 20 or ≥ 30 kg/m$^2$ | 48.6 (84) |
| **ASA** (grade) | I-II-III | 85.0 (147) |
| | IV-V | 15.0 (26) |
| **AMTS** (points) | ≥ 9 | 65.3 (113) |
| | < 9 | 34.7 (60) |
| **NMS** (points) | ≥ 7 | 39.9 (69) |
| | < 7 | 60.1 (104) |
| **N. of comorbidities** | 0 to 2 | 59.0 (102) |
| | > 2 | 41.0 (71) |
| **N. of medications** | 0 to 2 | 23.7 (41) |
| | > 2 | 76.3 (132) |
| **Admission from** | home | 70.0 (121) |
| | health/social care | 27.7 (48) |
| SURGERY | | |
| **Time to surgery** (hours) | ≤ 24 h | 47.4 (82) |
| ∅ 42.7 (SD 45.6) | > 24 h | 52.6 (91) |
| **Type of anaesthesia** | general | 48.6 (84) |
| | regional | 51.4 (89) |
| **Duration of surgery** (min) | ≤ 60 | 75.1 (130) |
| ∅ 56.0 (SD 19.0) | > 60 | 24.9 (43) |
| **Duration of in-hospital stay** | overall | ∅ 12.3 (SD 4.4) |
| | after surgery | ∅ 11.0 (SD 4.2) |
| **Discharge to *** | pre-fracture residence | 33.1 (56) |
| | other | 66.9 (113) |
| **Discharge to **** | home | 44.8 (56) |
| | other | 55.2 (69) |
| ** Except in-hospital deaths, ** Admitted from home (125)* | | |

The one-year mortality reached 30.1%. To compare differences in characteristics between group of patients who died within 1 year following surgery and of patients who survived that period the cohort was divided in two groups. Significant differences were observed in age ($p<0.01$), cognitive functions - AMTS ($p<0.01$), mobility state - NMS ($p<0.01$), number of in-hospital medical complications ($p<0.01$), number of comorbidities ($p=0.02$), time to surgery ($p=0.02$), source of admission ($p=0.03$), and overall health status - ASA grade ($p=0.03$) between patients who died within one year after surgery compared to those who did not (Table 2).

**Table 2. Between groups comparisons**

| | Group 1 (n=52)<br>Deceased within 1 year | Group 2 (n=121)<br>Survived over 1 year | P-value |
|---|---|---|---|
| **Age** (years) | 83.2 (SD 6.6) | 79.8 (SD 6.7) | <0.01 |
| **Admission from** | | | |
| home | 31 (59.6%) | 94 (77.7%) | 0.03 |
| other than own home | 21 (40.4%) | 27 (22.3%) | |
| **AMTS** (points 0-13) | 6.8 (SD 4.3) | 10.3 (SD 3.2) | <0.01 |
| ≥ 9 | 19 (36.5%) | 94 (77.7%) | <0.01 |
| < 9 | 33 (63.5%) | 27 (22.3%) | |
| **NMS** (points 0-9) | 3.9 (SD 2.3) | 6.3 (SD 2.7) | <0.01 |
| ≥ 7 | 8 (15.4%) | 61 (50.4%) | <0.01 |
| < 7 | 44 (84.6%) | 60 (49.6%) | |
| **N. of comorbidities** | | | |
| 0 to 2 | 23 (44.2%) | 79 (65.3%) | 0.02 |
| > 2 | 29 (55.8%) | 42 (34.7%) | |
| **Overall health status** | | | |
| ASA I+II+III | 39 (75.0%) | 108 (89.3%) | ns. |
| ASA IV+V | 13 (25.0%) | 13 (10.7%) | 0.03 |
| **Time to surgery** (hours) | 57.8 (SD 59.8) | 36.2 (SD 36.4) | 0.02 |
| ≤ 24 | 17 (32.7%) | 65 (53.7%) | 0.02 |
| > 24 | 35 (67.3%) | 56 (46.3%) | |
| **In-hospital complications** | 27 (52.9%) | 25 (20.7%) | <0.01 |
| acute confusional state | 13 (25.0%) | 13 (10.7%) | 0.03 |
| cardiovascular | 5 (9.6%) | 1 (0.8%) | 0.02 |

Multivariate Cox regression analysis revealed poor mental state - AMTS less than 9 (HR 2.83), presence of in-hospital medical complication (HR 2.76), male gender (HR 1.98), more than two comorbidities (HR 1.83) as statistically significant risk factors for one-year mortality with protective effect of good pre-injury mobility score - NMS 7 or higher (HR 0.31) (Table 3).

**Table 3. Significant risk/protective factors for one-year mortality after hip surgery**

| Risk/Protective factor | Hazard ratio (95% CI) | P-value |
|---|---|---|
| AMTS (< 9) | 2.83 (1.56 - 5.14) | <0.01 |
| In-hospital medical complication | 2.76 (1.59 - 4.79) | <0.01 |
| Gender (male) | 1.98 (1.07 - 3.67) | 0.03 |
| Number of diseases (>2) | 1.83 (1.05 - 3.18) | 0.03 |
| New mobility score (≥ 7) | 0.31 (0.14 - 0.70) | <0.01 |

In our study sample one-year mortality reached 30.1%. This result is in accordance with the published literature, in which one-year mortality rates were from 12.5% to 35.7% [13, 14, 15, 16].

Between patients who died within one year after surgery compared to those who did not significant differences were observed in age, cognitive functions, mobility state, number of in-hospital medical complications, number of comorbidities, time to surgery, source of admission, and overall health status. These findings are in line with previous studies in which as independent predictors of mortality after hip fracture following patient related factors were identified: age and number of comorbidities [16], mobility state [10, 17, 18], cognitive functions [10, 18], and overall health status [18].

By multivariate analysis, in our study sample the four risk factors associated with one-year mortality were lower level of pre-injury cognitive functions, presence of in-hospital medical complication, male gender, and more than two comorbidities. Good level of pre-injury mobility was recognized as the most important protective factor. These findings support previously published studies in which dementia [17], the development of one or more in-hospital postoperative complications [19], male gender [17], and comorbidity [20] remained in multivariate models the independent and significant risk factors associated with a one-year mortality after hip surgery.

## 4 Conclusion

Our findings indicate that tertiary prevention of reducing one-year mortality after hip fracture in elderly should be tailored to those with higher risk. Optimizing after-surgery care and treatment by performing a rapid and inexpensive assessment of health status of patients and better comorbidities managing, as well as public health interventions focused on mental health promotion with special attention to males can play a significant role.

## Acknowledgements

This work was supported by the Slovak Research and Development Agency under the contract APVV-15-0719.

## Contact

Zuzana Katreniakova, MD, PhD.; e-mail: zuzana.katreniakova@upjs.sk

## References

[1] GULLBERG, B., JOHNELL, O., KANIS, J. A. 1997. World-wide projections for hip fracture. *Osteoporos Int*; 7:407.

[2] COOPER, C., CAMPION, G., MELTON, L. J. 1992. Hip fractures in the elderly: a world-wide projection. *Osteoporos Int*; 2:285.

[3] SAMBROOK, P., COOPER, C. 2006. *Osteoporosis*. Lancet; 367:2010-18.

[4] HORII, M. et al. 2013. Urban versus rural differences in the occurrence of hip fractures in Japan's Kyoto prefecture during 2008-2010: A comparison of femoral neck and trochanteric fractures. *BMC Musculoskeletal Disorders*; 14:304. http://www.biomedcentral.com/1471-2474/14/304.

[5] HALTER, J. B., OUSLANDER, J. G., TINETTI, M. E., STUDENSKI, S., HIGH, K. P., ASTHANA, S. (Eds.). 2009. *Hazzard's Geriatric Medicine & Gerontology*, 6th ed. New York : McGraw Hill.

[6] JORDAN, K. M., COOPER, C. 2002. Epidemiology of osteoporosis. *Best Pract Res Clin Rheumatol*; 16:795.

[7] NORRING-AGERSKOV, D., LAULUND, A. S., LAURITZEN, J. B. et al. 2013. Metaanalysis of risk factors for mortality in patients with hip fracture. *Dan Med J*; 60(8):A4675.

[8] RADOSAVLJEVIC, N., NIKOLIC, D.*, LAZOVIC, M., JEREMIC, A. 2014. Hip Fractures in a Geriatric Population - Rehabilitation Based on Patient's Needs. *Aging Dis*; 5(3):177–182. doi: 10.14336/AD.2014.0500177.

[9] MAGGI, S., SIVIERO, P., WETLE, T., et al. 2010. A multicenter survey on profile of care for hip fracture: predictors of mortality and disability. *Osteoporos Int*; 21(2):223-31. doi: 10.1007/s00198-009-0936-8. Epub 2009 May 5.

[10] PARKER, M. J., PALMER, C. R. 1993. A new mobility score for predicting mortality after hip fracture. *J Bone Joint Surg Br*; 75:797-8.

[11] SMEKTALA, R., ENDRES, H. G., DASCH, B., et al. 2008. The effect of time-to-surgery on outcome in elderly patients with proximal femoral fractures. *BMC Musculoskelet Disord*; 9:171.

[12] DAVISON, J. N., CALDER, S. J., ANDERSON, G. H., et al. 2001. Treatment for displaced intracapsular fracture of the proximal femur. A prospective, randomised trial in patients aged 65 to 79 years. *J Bone Joint Surg Br*; 83:206-12.

[13] COOPER, C., ATKINSON, E. J., JACOBSEN, S. J. et al. 1993. Population-based study of survival after osteoporotic fractures. *Am J Epidemiol*; 137:1001.

[14] LEIBSON, C. L., TOSTESON, A. N., GABRIEL, S. E. et al. 2002. Mortality, disability, and nursing home use for persons with and without hip fracture: a population-based study. *J Am Geriatr Soc*; 50:1644.

[15] DZUPA, V., BARTONICEK, J., SKALA-ROSENBAUM, J., PRIKAZSKY, V. 2002. Mortality in patients with proximal femoral fractures during the first year after the injury. *Acta Chir Orthop Traumatol Cech*; 69:39-44.

[16] GEIGER, F., ZIMMERMANN-STENZEL, M., HEISEL, C., LEHNER, B., DAECKE, W. 2007. Trochanteric fractures in the elderly: the influence of primary hip arthroplasty on 1-year mortality. *Arch Orthop Trauma Surg*; 127:959-966.

[17] HASEGAWA, Y., SUZUKI, S., WINGSTRAND, H. 2007. Risk of mortality following hip fracture in Japan. *J Orthop Sci*; 12:113-117.

[18] KRISTENSEN, M. T., FOSS, N. B., EKDAHL, C., KEHLET, H. 2010. Prefracture functional level evaluated by the New Mobility Score predicts in-hospital outcome after hip fracture surgery. *Acta Orthop*; 81:296-302.

[19] AHARONOFF, G. B., KOVAL, K. J., SKOVRON, M. L., ZUCKERMAN, J. D. 1997. Hip fractures in the elderly: predictors of one year mortality. *J Orthop Trauma*; 11(3):162-5.

[20] PIOLI, G., BARONE, A., GIUSTI, A., ET AL. 2016. Predictors of mortality after hip fracture: results from 1-year follow-up. *Aging Clin Exp Res*; 18:381.

# Quo Vadis, Polish Healthcare System?

Kamila Kocańda,

Attorney At Law, Jan Kochanowski University in Kielce, District Hospital in Kielce, Poland

**Abstract**

Poland has just implemented a crucial change of its healthcare system. Current financial system in the public health sector was based on contracts with certain maximum amount entered into between National Health Fund (hereinafter called as: NHF) and public health benefits providers. In practice the maximum amount was an estimated value, as law provisions enabled the medical entities to pursue claims for the value of health procedures which exceed the contract maximum limit. The essence of the reform is the change of financing system which will be now based on a lump sum established in each health contract that the contract party must not exceed. The question applies to the maximum of patients' health needs which cannot be regulated by order from superior authority.

**Keywords:** healthcare system, insurance model, lump sum.

## 1 Introduction

Until 1999, the Polish Healthcare System had been based on budgetary funding. The annual budgetary bill had included health expenses, both funds dedicated for central disposal as well as funds allocated for local use and managed by particular governors. Subsequently, the insurance healthcare system was implemented, introducing general, obligatory insurance contributions.[3] Each insured person had a right to guaranteed health benefits provided by those medical entities which were the NHF contractors in the legal relationship[4].

Within the above mentioned agreement each patient had a third party status based on an general and obligatory insurance in NHF. In the insurance system, the benefit principle stated that the same health benefits are patients' due in spite of the differences in the actual income of the insured and the state of his or her health. The insurance premium was paid by each insured person in a fixed amount, irrespective of the frequency of health benefits, their type and quality[5].

In the lump sum healthcare system, public funds for guaranteed health services are also generated by insurance contributions, however the general rule of financing the public healthcare system differs a lot. The above mentioned lump sum of each public healthcare contract is the upper limit of the financial obligation of the NHF towards a particular medical entity. Consequently, those health needs of the beneficiaries which exceed the lump sum defined in the contract shall not be financed by the public payer and remain an expense of a medical entity.

---

[3] Judgment of the Supreme Court of 13 May 2005, I CK 691/04, LEX No. 603867; P. Dobroczek, Gloss to the judgment of the Supreme Court of 17 March 2005, III CK 405/04.

[4] Judgment of the Court of Appeals in Poznań of May 23, 2006, I ACa 1266/05, LEX No. 214245; Judgment of the Court of Appeal in Warsaw of 5 December 2007, I ACa 512/07, Apel.-W-wa 2008, No. 3, p. 47; Śliwka M., Patient's right to health care services in case of an emergency, Law and Medicine, 2008:2; Zagrosik M., The right to health services within the general health insurance system, Law and medicine, 1999:3.

[5] Strus Z., The role and civil liability of the National Health Fund in relation to health insurance, Judicial Review, 2005:9; Śliwka M., Gałęska - Śliwka A., The order of providing health benefits in Polish and European law, Law and Medicine, 2008:3.

## 2 Data and Methods

Description and comparison of adequate obligations under the two models of financing of public healthcare system.

## 3 Results and Discussion

According to the provision of the art. 19 of the Act on health benefits provided from public funds (Journal of Laws 2017:2110) in emergency cases, health care services are provided immediately, and in the event emergency health care services are provided by a healthcare provider without outside a contractual relation with the NHF, the beneficiary is entitled to these benefits to the extent necessary.[6] The above mentioned regulation is in force also in cases the NHF contractor has exceeded the maximum amount stipulated in the agreement within the guaranteed healthcare system[7]. In such cases the medical entity has a claim for the payment of the amount spent for the medical procedures provided in emergency for a patient who is entitled to guaranteed health benefits[8]. However, notwithstanding emergency cases, health benefits providers perform planned procedures as well using the same resources. Planned healthcare services are to be provided constantly within the framework of the contract, while emergency procedures occur regardless those previously planned and can be neither controlled nor limited[9].

The sudden state of the beneficiary in the meaning of the above mentioned article 19 is an unexpected condition, which does not concern chronic diseases requiring regular medical treatment. Thus there is the inability to postpone medical intervention as the immediate medical procedure is essential. Pursuant to the provisions of the art. 15 of the Act on Medical Activity (Journal of Laws 2016:1638), the medical entity cannot refuse to provide a health service to a person who needs immediate medical procedure due to a threat to life or health[10]. The case law indicates that the obligations arising from the provisions of the art. 15 are absolute and exceed the limits resulting from contracts for health care services, so that the costs of benefits provided to insured under statutory pressure should be charged to the National Health Fund[11].

In the current legal status The Ministry of Health Order on the method of determining the lump sum of the basic hospital insurance system for healthcare services (Journal of Laws 2017:1783) determines the method of the lump sum calculation. Each medical entity, providing health services, cannot refuse necessary medical procedures under criminal, civil and ethic

---

[6] Śliwka M., Standard of health services, Legal Information System LEX Nr 97620; Safjan M., Compensation liability for improper quality of medical services, Law and Medicine, 2001:9:5.

[7] Judgment of the Supreme Court of January 18, 2006, V CSK 60/05, LEX No. 258665; Judgment of the Supreme Court of 28 June 2005, I CK 821/04, LEX No. 603868; Dukiet – Nagórska T., Legal consequences of not taking medical intervention or providing health care in an inappropriate way due to lack of financial resources in a public healthcare institution, Law and Medicine, 2000:6-7:12.

[8] Judgment of the Supreme Court of July 14, 2006, II CSK 68/06, LEX No. 398407; Judgment of the Supreme Court of May 25, 2006, II CSK 93/05, LEX No. 398429; Judgment of the Supreme Court of May 25, 2006, II CK 343/05, LEX No. 200917.

[9] Judgment of the Supreme Court of May 30, 2007. IV CSK 60/07, LEX No. 1108516; Judgment of the Supreme Court of 5 July 2007 II CSK 141/07, LEX No. 306763.

[10] Judgment of the Poznań Court of Appeal of 2 September 2009, I ACa 518/09, LEX No. 756637; Judgment of the Supreme Court of December 21, 2005, IV CK 312/05, LEX No. 1108514; Judgment of the Supreme Court of December 15, 2005, II CSK 21/05, Biul.SN 2006/5/10.

[11] Judgment of the Supreme Court of 16 April 2008, V CSK 533/07, LEX No. 515717; Judgment of the Supreme Court of 10 January 2014, I CSK 161/13, LEX No. 1438639; Judgment of the Court of Appeal in Wrocław of December 11, 2013, I ACa 1205/13, LEX No. 1451886.

liability. The lump sum is not an explanation. The question is whether the public payer mays bear responsibility for not financing reasonable health procedures provided in conditions of medical necessity. It is also questionable if the public payer may refuse payment for such medical procedures with reference to the lump sum financial system. If the patient suffers damage as a result of inadequate quality of health services or improper organization of health care system, the liability of the National Health Fund is possible, pursuant to the art. 417 of the Polish Civil Code. The public payer is responsible for proper organization of health benefits, bearing the risk associated with inadequate number of healthcare funds allocated in healthcare contracts[12].

## 4 Conclusion

In the judiciary, it was pointed out that the article 15 of the Act on Medical Activity states the obligation of the public payer to finance these healthcare procedures which have exceeded the contractual limit but had been medically justified[13]. Therefore, the payer's obligation to finance such procedures also applies to those which a health service provider has been obliged to comply with for medical reasons, even if they had not been specified in his contract and subjected to the agreed remuneration, however under the absolute obligation to provide in a specific time – with no delay.

A medical entity cannot bear financial consequences of the risk of unhealthy state of the society, as his only obligation is to provide health benefits, while the task to finance them belongs to the payer[14]. On the other hand a medical entity has no right not to perform planned health services, because his obligation to conduct patients' list to planned procedures is a part of the contract and the system itself. According to each contract between the NHF and a medical entity provisions, healthcare service provider guarantees health benefits throughout the term of the contract[15].

Legal and ethic obligations to provide necessary health procedures in case of an emergency shall prevail in any case, no matter the financial construction of the healthcare system. As emphasized in the doctrine, this obligation also results from the paradigm of the highest ethical command that are a physician's due: a patient's best interest. Thus, the lump sum financial direction of the healthcare system, even in connection with administrative requirements and legal limitations, shall not prevail the obligation to provide medical services in case on emergency. However, the problem of financing of such procedures will remain constantly unsolved.

## Acknowledgments

The legal status of this paper is valid at the date: December 10th, 2017.

---

[12] Judgment of the Supreme Court of 10 May 2006, III CSK 53/05, LEX No. 258669; Judgment of the Supreme Court of November 3, 2004, III CK 546/03, LEX No. 182096.

[13] Verdict of the Appeal Court in Rzeszów of February 7, 2013, I ACa 463/12, LEX No. 1362820; Sentence of the Voivodship Administrative Court in Bydgoszcz of January 5, 2010, I SA / Bd 847/09, LEX No. 559362.

[14] Judgment of the Court of Appeals in Poznań of 24 May 2006, I ACa 1422/05, LEX No. 298597; Judgment of the Supreme Court of November 10, 2006, I CSK 229/06 LEX No. 398443.

[15] Safjan M., In what direction civil liability in medicine is heading, Antidotum, 1992:1:2; Zatyka E., Medical obligation to provide health services in the light of criminal law, Warsaw 2011.

# Noise Pollution and its Impact on Health in Slovak Urban Population

Lucia Kuzmova[1], Zuzana Katreniakova[2,3], Tatiana Kimakova[1]
[1] Department of Public Health and Hygiene, Faculty of Medicine, Faculty of Medicine, PJ Safarik University in Kosice, Slovakia
[2] Department of Social and Behavioural Medicine, Faculty of Medicine, PJ Safarik University in Kosice, Slovakia
[3] SAVEZ - Slovak Public Health Association, Kosice, Slovakia

## Abstract

Background and aim: The noise endangers even unborn children and can cause both auditory and non-auditory health effects. Noise is pervasive in urban environments and the availability of quiet areas is decreasing. The aim of the study was to analyse the impact of noise pollution on self-reported health in Slovak population living in urban area.
Methods: The study was realized in 2012. The study sample consisted of 751 people aged 13-78 years (mean age 31.12 ± 15.22) living in Kosice – the second largest city in Slovakia. To obtain noise pollution data samples 479 streets in Kosice were monitored using certified and calibrated Sound level meter (Peaktech 8005) and subsequently processed by notebook. The self-reported questionnaire contained 71 questions focused on perception of environmental noise pollution, lifestyle behaviour and health status.
Results: Objectively measured increased noise intensity was significantly linked to increased number of respondents reporting disturbance from noise in place of residence, disturbance from motoring, day and night noise disturbance, and noise disturbance with opened window. Increased noise intensity was linked to increased number of respondents with an overweight, as well as to those having decreased activity of thyroid gland, hay fever, migraine, eczema and asthma, but the differences were not significant. In terms of subjective perception of noise intensity, significant differences were observed e.g. in sensitivity to noise, disturbance from traffic noise, ventilation limitation, acute and chronic diseases, headache, stomach problems, and immune system.
Conclusion: The study results support the need of adequate environmental noise prevention and mitigation strategies for urban public health. A new way of determining acceptable equivalent levels of sound pressure for time intervals (morning, noon, afternoon, evening, night) in protected environment should be adopted by public health legislation.

**Keywords:** noise pollution, noise disturbance, chronic diseases, urban population

## 1 Introduction

Hearing is the first human sense that is fully functional even before the child’s birth. Noise is very harmful, disturbing and undesirable sound, with severe auditory and non-auditory health effects. Medical consequences caused by noise therefore increasingly attract the attention of public health professionals.

The major preventable auditory health effect is noise-induced hearing loss linked to the loss of auditory sensory cells in the cochlea, and tinnitus. The noise-induced hearing loss can have a severe social effect, affect cognitive performance, decrease attention to tasks, and also cause accidents and falls [1]. Being the 13th most important contributor to the global years lived with disability (YLDs) it is a public health problem [2]. Tinnitus can lead to sleep disturbance, depression, or the inability to sustain attention [3]. The most investigated non-auditory health outcomes are sleep disturbance, perceived annoyance, ischaemic heart disease, and cognitive impairment in children [1].

Although the prevalence of hearing loss is highly related to age [4], the most important risk factor is environmental noise, especially occupational noise (e.g. in industrial settings, among musicians, or military workers), social noise (e.g. heard in bars and night clubs (recreational), or through personal music players), and other environmental noise (e.g. from road, rail, and air traffic, and industrial construction) [1].

Noise is pervasive in urban environments and the availability of quiet areas is decreasing. Intensity of noise in cities increases with the increase of urbanisation [1]. Based on available data it is estimated that 65% of Europeans living in major urban areas are exposed to high noise levels exceeding Lden 60 dBA, and that more than 20% are exposed to night-time noise levels exceeding 55 dBA [5].

The aim of the study was to analyse levels of environmental noise exposure, and main causes of perceived noise disturbance, as well as noise-related health effects in Slovak adolescents and adults living in urban area.

## 2 Data and Methods

The study was realized in 2012 among citizens living in Kosice – the second largest city in Slovakia (240 6888 inhabitants). The study sample consisted of 751 people aged 13-78 years (mean age 31.12 ± 15.22) living in Kosice at least 5 years.

The noise exposure was measured in front of 12 floor apartment building on the publicly accessible balconies. There was a free space in front of the building. To obtain noise pollution data samples 479 streets in Kosice were monitored using certified and calibrated Sound level meter Peaktech 8005 and subsequently processed by notebook. The self-reported questionnaire contained 71 questions focused on perception of environmental noise pollution, lifestyle behaviour and health status.

## 3 Results and Discussion

Our study found increased sound pressure level with increasing floor numbers. Based upon the measured results a mild increase of the noise intensity levels LAeq was observed as the floor increased (Figure1).

Objectively measured increased noise intensity, categorised up to 47 dBA, 57 dBA, and 67 dBA, was significantly linked to increased prevalence of different self-reported noise disturbance with the highest differences in the disturbance from noise in place of residence, disturbance from motoring, day and night noise disturbance, and noise disturbance with opened window (Table 1).

The most important sources of noise disturbance self-reported by respondents were: motoring - 42% (n=317), barking dogs - 30% (n=225), noisy neighbours - 30% (n=224), loud music in the neighbourhood - 22% (n=165), and source of noise inside the building - 12% (n=89).

**Figure 1. The noise intensity levels measured by 12 floor apartment building**

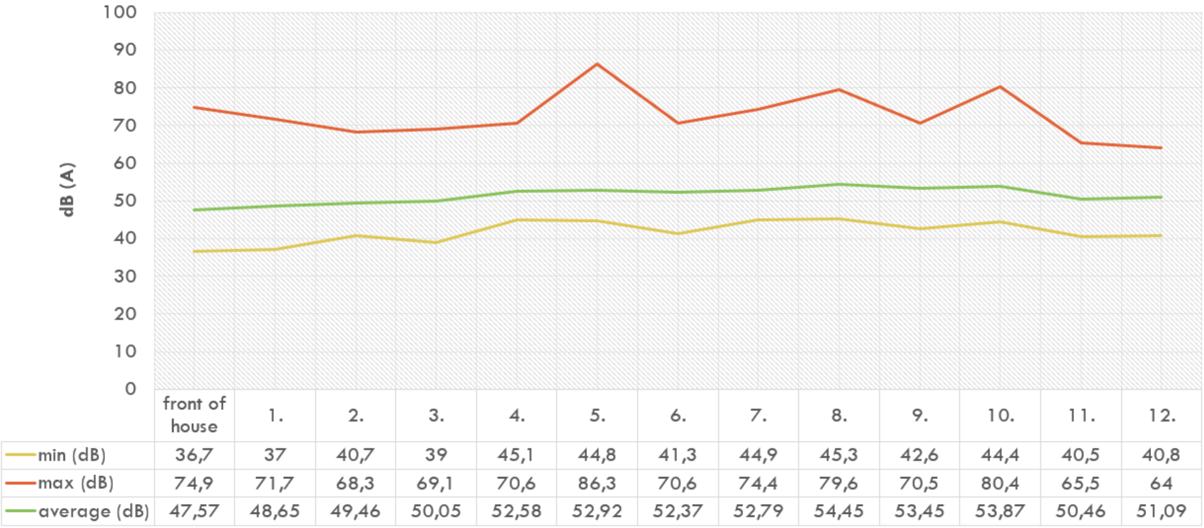


**Table 1. Between groups comparisons**

| | < 47 dBA (n=175) | < 57 dBA (n=254) | < 67 dBA (n=50) | P-value |
|---|---|---|---|---|
| The noise in place of residence - disturb | 38 (22%) | 95 (37%) | 28 (56%) | 0.000*** |
| Motoring - disturb | 56 (32%) | 114 (45%) | 32 (64%) | 0.000*** |
| Day noise disturbance - yes | 33 (19%) | 52 (21%) | 11 (22%) | 0.000*** |
| Day and night noise disturbance - yes | 19 (11%) | 54 (21%) | 20 (40%) | 0.000*** |
| Rest time noise disturbance - yes | 50 (29%) | 68 (27%) | 15 (30%) | 0.004** |
| Noise disturbance with opened window - yes | 38 (22%) | 71 (28%) | 26 (52%) | 0.000*** |
| The noise nuisance at open window - yes | 10 (6%) | 22 (9%) | 11 (22%) | 0.004** |

****p<0.001, **p<0.01*

Based on the objectively measured increased noise intensity - up to 47 dBA, 57 dBA, and 67 dBA, there was an increase in the number of respondents reporting acute health problems such as cold, inflammation of stomach, angina, flu and inflammation of urinary tract, however the differences were not significant. Similarly, there was not significant increase in the occurrence of self-reported chronic diseases or other health problems e.g. decreased activity of thyroid gland, hay fever, migraine, eczema, and asthma examined in the study.

Despite not having the possibility of measuring the exposition to noise in the household environment of the respondents the self-reported noise perception was took into account in the prevalence of self-reported health problems. Significant differences were observed in the prevalence of different health related problems, mainly stomach problems, wake during sleep, sleep quality, heart palpitation, inflammation in the body, and decreased immune system between those who perceived being disturbed and not being disturbed by environmental noise (Table 2).

**Table 2. Differences in self-reported health status by the self-reported noise perception**

| Disturbed vs Not disturbed | P-value |
|---|---|
| Acute diseases | 0,002 ** |
| Chronic diseases | 0,042 ** |
| Vertigo | 0,005 ** |
| Headache | 0,003 ** |
| Stomach problems | 0,000 *** |
| Wake during sleep | 0,000 *** |
| Sleep quality | 0,000 *** |
| Heart palpitation | 0,001 *** |
| Tingling of extremities | 0,014 * |
| Constipation | 0,012 * |
| Inflammation in the body | 0,000 *** |
| Decreased immune system | 0,000 *** |
| Increased cholesterol level | 0,011 * |
| Weary | 0,032 * |
| Receiving sedatives | 0,032 * |

****p<0.001, **p<0.01*

Our study results are in line with other researches. There is evidence available showing that noise exposure related stress and sleep disturbance are recognized as pathways to cardiovascular disease [5].

## 4 Conclusion

There is no exact boundary when the noise is detrimental and when not. It depends on many acoustic and non-acoustic factors. Noise is everywhere and the experts do not expect any decrease of noise with regards to a strong influence of technology on modern life.

The study results support the need of adequate environmental noise prevention and mitigation strategies for urban public health. A new way of determining acceptable equivalent levels of sound pressure for time intervals (morning, noon, afternoon, evening, night) in protected environment should be adopted by public health legislation e.g. it should be based on acceptable fraction of people annoyed by the environmental noise pollution [5].

## Contact

Lucia Kuzmova, MSc.; e-mail: lucka.kuzmova@gmail.com

## References

[1] BASNER, M., BABISCH, W., DAVIS, A., ET AL. 2014. Auditory and non-auditory effects of noise on health. *Lancet*; 383:1325-31.

[2] VOS, T., FLAXMAN, A.D., NAGHAVI, M., ET AL. 2012. Years lived with disability (YLDs) for 1160 sequelae of 289 diseases and injuries 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010. *Lancet*; 380:2163-96.

[3] DAVIS, A., EL REFAIE, A. 2000. The epidemiology of tinnitus. In: Tyler R, ed. *Tinnitus handbook*. Hampshire: Cengage Learning; 1-23.

[4] DAVIS, A., SMITH, P., FERGUSON, M., ET AL. 2007. Acceptability, benefit and costs of early screening for hearing disability: a study of potential screening tests and models. *Health Technol Assess*; 11:1-294.

[5] EUROPEAN UNION. 2015. *Science for Environment Policy. Thematic Issue: Noise impacts on health*. Issue 47. ISBN 978-92-79-43693-2.

# Associations between Depression, Anxiety, Fatigue and Health-Related Quality of Life in People with Multiple Sclerosis

Pavol Mikula[1], Iveta Nagyova[1]
[1] Department of Social and behavioural Medicine, Faculty of Medicine, PJ Safarik university, Košice, Slovakia

## Abstract

The aim of this study is to describe associations between physical and mental domains of health-related quality of life (PCS, MCS) and fatigue, depression and anxiety in people with multiple sclerosis (MS). Sample consisted of 156 participants. Health-related quality of life was assessed by 36-item Short-Form Health Survey (SF-36), fatigue was assessed by general fatigue subscale of Multidimensional Fatigue Inventory (MFI-20) and depression and anxiety were assessed using Hospital Anxiety and Depression Scale (HADS). Multiple linear regressions were performed in IBM SPSS Statistics 23 software. The total explained variance for both PCS and MCS model was over 50%. The role of anxiety and depression was significant only in MCS. Fatigue was on the other hand significant in both PCS and MCS. This symptom affects both dimensions and thus therapy aimed at management of fatigue can possibly alter both of these dimensions.

**Keywords:** multiple sclerosis, fatigue, anxiety, depression.

## 1 Introduction

Multiple Sclerosis (MS) is causing neurological dysfunctions, which can manifest in a wide range of symptoms including fatigue, balance impairments, sleep problems and pain [1]. Besides, these physical symptoms, psychological ones are common as well, including depression, anxiety, low self-esteem or somatization [2]. All of these symptoms affect health-related quality of life (HRQoL) in both the physical (PCS) and mental (MCS) domain [3].

Fatigue is very prominent symptom in multiple sclerosis patients. It affects majority of MS population and many patients consider it as their most serious symptom with very severe consequences on their life [4]. Fatigue is closely tied to physical quality of life [5] and can lead to longitudinal changes in activity of MS patients [6]. Various activities, such as exercise, can be difficult to perform because of constant fatigue, which only deepen adverse effects of MS on physical quality of life (PCS) [7]. When it comes to mental component of quality of life, fatigue seems to affect this domain as well [8]. Fatigue goes hand in hand with depression, causing inactivity and worsening mental quality of life [9]. Mood disorders, especially depression, are among the clinical symptoms of MS, affecting 27–54 % of MS patients [10] and anxiety also shows higher prevalence compared to general population [11]. A study by Goretti et al. [12] shows that depression had a negative impact on all QoL domains and anxiety on the mental domains in MS patients.

The aim of this study was to describe association between physical and mental domains of health-related quality of life and fatigue, depression and anxiety in people with multiple sclerosis.

## 2 Data and Methods

MS patients from the Department of Neurology of Louis Pasteur University Hospital in Košice were asked to participate in the study (n=214). Out of these, 58 patients (60.3% women) refused to participate (response rate: 72.9%), and the exclusion criteria were applied to the remaining patients. These were as follows: the presence of a psychiatric diagnosis, the score on the Mini-Mental State Examination (MMSE) <24, pregnancy and the inability to speak Slovak.

The final sample (N=156) had a median age of 40±3 years and consisted of 75.0% women. There were no statistically significant differences between respondents and non-respondents in terms of gender and age.

*Health-related quality of life (HRQoL)*

HRQoL was assessed using the 36-item Short-Form (SF-36) health survey [13]. Various aspects of HRQoL are covered in 8 scales, which then can be summarised into two main components. The subscales included in the questionnaire are: 1. Physical functioning (ten items), 2. Role limitation due to physical health (four items), 3. Bodily pain (two items), 4. General mental health (five items), 5. Social functioning (two items), 6. Psychological distress and well-being (five items), 7. Role limitations due to emotional problems (three items), and 8. Vitality, energy or fatigue (four items). Two summary scores are calculated, namely a Physical Component Summary (PCS) and a Mental Component Summary (MCS).

*Fatigue*

Fatigue was assessed with the Multidimensional Fatigue Inventory (MFI) [14]. It consists of 5 dimensions: General Fatigue (4 items), Physical Fatigue (4 items), Mental Fatigue (4 items), Reduced Motivation (4 items) and Reduced Activity (4 items). Patients were asked to share how much they agree with statements like: "I feel fit", "I feel very active" or "Physically I feel only able to do a little" on a 5-point scale anchored in quotes: "Yes, that is true" and "No, that is not true", where higher score indicated more prevalent fatigue in all 5 scales.

*Anxiety and Depression*

The fourteen-item Hospital Anxiety and Depression Scale (HADS) was used for assessing anxiety and depression in non-psychiatric hospital departments [15]. Seven items are related to the depression and 7 to anxiety. Patients responded on a 4-point scale (from 0 = absent to 3 = definitely present/severe). Scores ranged from 0 to 21 for each scale where a higher score implied more depression or anxiety.

Multiple linear regressions with collinearity tests were performed in software IBM SPSS Statistics 23.

## 3 Results and Discussion

A basic description of the study population is given in Table 1 (N=156). The median age of MS respondents was 40 years, and the sample consisted of 75.0% women. The median EDSS score was 3, and the median disease duration was 6 years. The majority of patients (68%) belonged to relapse-remitting clinical course (Table 1).

### Table 1. Description of the study population (N=156)

| Variables | N (%) | Mean | Range |
|---|---|---|---|
| **Age** (years) | | 40.1±9.7 | 18-61 |
| **Gender** | | | |
| male | 39(25.0%) | | |
| female | 117(75.0%) | | |
| **Education** | | | |
| elementary | 6(3.8%) | | |
| secondary | 113(72.4%) | | |
| university | 37(23.7%) | | |
| **Disease duration** (years) | | 7.5±5.7 | 1-28 |
| **MS course** | | | |
| CIS | 19(12.4%) | | |
| RRMS | 104(68.0%) | | |
| SPMS | 30(19.6%) | | |
| **EDSS** | | 3.0±1.3 | 1.0-8.0 |
| **Quality of life** | | | |
| PCS | | 38.7±11.3 | 16.0-60.0 |
| MCS | | 42.8±12.1 | 17.3-69.8 |

CIS – Clinically Isolated Syndrome; RRMS – Relapse-Remitting Multiple Sclerosis; SPMS – Simple Progressive Multiple Sclerosis; EDSS – Expanded Disability Status Scale; PCS – Physical Component Summary; MCS – Mental Component Summary.

Due to high collinearity between anxiety and depression, analyses were performed in two separate models. In the case of PCS, the final model explained 58% of the total variance in both models. Variables that added significant amount of explained variance to the model were age, EDSS and general fatigue. MCS models explained 59.5% (for the depression) and 53.1% (for the anxiety) of the total variance. Age was no longer significantly associated with the dependent variable, but education, depression and anxiety were. Fatigue significantly contributed to the explained variance in all the models under study (Table 2).

**Table 2. Multiple linear regressions between variables under study**

| | PCS | | | MCS | | |
|---|---|---|---|---|---|---|
| | **Beta** | **F** | **Adjusted $R^2$** | **Beta** | **F** | **Adjusted $R^2$** |
| **Model: Depression** | | 28.79 | 0.58 | | 30.19 | 0.59 |
| Age | **-.20*** | | | .03 | | |
| Gender | .02 | | | .03 | | |
| Education | -.02 | | | **.13*** | | |
| EDSS | **-.45*** | | | **.21*** | | |
| Disease duration | .09 | | | .00 | | |
| Fatigue | **-.39*** | | | **-.15*** | | |
| Depression | -.04 | | | **-.68*** | | |
| **Model: Anxiety** | | 28.73 | 0.58 | | 23.50 | 0.53 |
| Age | **-.20*** | | | -.03 | | |
| Gender | .02 | | | .00 | | |
| Education | -.02 | | | **.16*** | | |
| EDSS | **-.46*** | | | **.15*** | | |
| Disease duration | .08 | | | -.02 | | |
| Fatigue | **-.40*** | | | **-.16*** | | |
| Anxiety | -.03 | | | **-.60*** | | |

EDSS – Expanded Disability Status Scale; PCS – Physical Component Summary of SF-36; MCS – Mental Component Summary of SF-36.

Role of anxiety and depression was significant only in MCS, which is in line with previous research suggesting that these psychological variables are key variables in mental component of HRQoL [16]. Since QoL outcomes seem to be affected by interventions focused on anxiety and depression [17], focusing on these variables may be helpful for patients in a complex way. Various studies show that Cognitive-Behavioural Therapy (CBT) may yield good results when used in interventions focused on HRQoL [17, 18].

Fatigue was on the other hand is an important explanatory variable in both PCS and MCS because this symptom affects both dimensions. A therapy aimed at management of fatigue can possibly alter both of these dimensions. Focusing on fatigue during interventions has potential to improve quality of life in a significant way, since approximately 50%-60% of MS patients consider fatigue as very severe symptom and about 15%-40% of patients consider it the most debilitating one [19]. Thus, exercises, practical tips, education and even informal information exchange in group sessions in MS self-help groups, can lead to better fatigue management either through e.g. good treatment adherence or physical activity. MS self-help groups can utilize various ways in diminishing adverse effects of fatigue ranging from walking programs and multimodal exercise to cognitive-behavioural psychosocial programs.

## 4 Conclusions

Fatigue, anxiety and depression are important concomitants of MS. While the role of anxiety and depression was significant only in MCS, fatigue on the other hand was significant in both PCS and MCS. Interventions aimed at management of fatigue can therefore possibly alter both of these dimensions.

## Acknowledgements

This work was supported by the Scientific Grant Agency of the Ministry of Education of Slovak Republic under grant No. VEGA 1/0594/17 (50%); Slovak Research and Development Agency under Grant APVV-15-0719 (50%).

## Contact

Mgr. Pavol Mikula, PhD; e-mail: pavol.mikula@upjs.sk

## References

[1] NEWLAND, P. K., FEARING, A., RILEY, M., NEATH, A. 2012. Symptom clusters in women with relaps-remitting multiple sclerosis. *The Journal of Neuroscience Nursing: Journal of the American Association of Neuroscience Nurses*; 44(2):66-71.

[2] SARISOY, G., TERZI, M., GŪMŪȘ, K., PAZVANTOĞLU, O. 2013. Psychiatric symptoms in patients with multiple sclerosis. *General Hospital Psychiatry*; 35(2):134-140.

[3] SHAWARYN, M. A., SCHIAFFINO, K.M., LAROCCA, N. G., JOHNSTON, M. V. 2002. Determinants of health-related quality of life in multiple sclerosis: the role of illness intrusiveness. *Multiple Sclerosis*; 8(4):310-318.

[4] AMATO, M. P., PORTACCIO, E. 2012. Management options in multiple sclerosis-associated fatigue. *Expert Opinion on Pharmacotherapy*; 13(2):207-216.

[5] KARATEPE, A. G., KAYA, T., GUNAYDIN, R., DEMIRHAN A., CE, P., GENDIZLIOGLU M. 2011. Quality of life in patients with multiple sclerosis: the impact of depression, fatigue and disability. *International Journal of Rehabilitation Research*; 34(4):290-298.

[6] MOTL, R. W., MCAULEY, E., WYNN, D., SUH, Y., WEIKERT, M. 2011. Effects of change in fatigue and depression on physical activity over time in relapsing-remitting multiple sclerosis. *Psychology, Health & Medicine*; 16(1):1-11.

[7] ANDREASEN, A. K., STENAGER, E., DALGAS, U. 2011. The effect of exercise therapy on fatigue in multiple sclerosis. *Multiple Sclerosis Journal*; 17(9):1041-1054.

[8] KARGARFARD, M., EETEMADIFAR, M., MEHRAB, I. M., MAGHZI, A.H., HAYATBAKKHSH, M. R. 2012. Fatigue, depression, and health-related quality of life in patients with multiple sclerosis in Isfahan, Iran. *European Journal of Neurology*; 19(3):431-437.

[9] MILETIC, S., TONCEY, G., JEVDHIC, J., JOVANOVIC, B., CANOVIC, D. 2011. Fatigue and depression in multiple sclerosis: Correlation with quality of life. *Archives of Biological Sciences;* 63(3):617-622.

[10] SIEGERT, R. J., ABERNETHY, D. A. 2005. Depression in multiple sclerosis: A review. *Journal of Neurology, Neurosurgery and Psychiatry*; 76(4):469–475.

[11] BROWN, R. F., VALPIANI, E. M., TENNANT, C. C., DUNN, S. M., SHARROCK, M., HODGKINSON, S., POLLARD, J. D. 2009. Longitudinal assessment of anxiety, depression, and fatigue in people with multiple sclerosis. *Psychology and Psychotherapy*; 82(1):41–56.

[12] GORETTI, B., PORTACCIO, E., ZIPOLI, V., HAKIKI, B., SIRACUSA, G., SORBI, S., AMATO, M. P. 2009. Coping strategies, psychological variables and their relationship with quality of life in multiple sclerosis. *Neurological Sciences*; 30(1):15–20.

[13] WARE, J. E., SHERBOURNE, C. D. 1992. The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual Framework and Item Selection. *Medical Care;* 30(6):473-483.

[14] SMETS, E. M. A., GARSSEN, B., BONKE, B., DE HAES, J. C. J. M. 1995. The multidimensional fatigue inventory (MFI) psychometric qualities of an instrument to assess fatigue. *Journal of Psychosomatic Research*; 39(3):315-325.

[15] ZIGMOND, S., SNAITH, R. 1983. The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*; 67(6):361–370.

[16] DUBAYOVA, T., KROKAVCOVA, M., NAGYOVA, I., ROSENBERGER, J., GDOVINOVA, Z., MIDDEL, B., GROOTHOFF, J. W., VAN DIJK, J. P. 2013. Type D, anxiety and depression in association with quality of life in patients with Parkinson's disease and patients with multiple sclerosis. *Quality of Life Research*; 22(6):1353-1360.

[17] HIND, D., COTTER, J., THAKE, A., BRADBURN, M., COOPER, C., ISAAC, C., HOUSE, A. 2014. Cognitive behavioural therapy for the treatment of depression in people with multiple sclerosis: a systematic review and meta-analysis. *BMC psychiatry*; 14(1), DOI: 10.1186/1471-244X-14-5.

[18] MINDEN, S. L., FEINSTEIN, A., KALB, R. C., MILLER, D., MOHR, D. C., PATTEN, S. B., BEVER, C., SCHIFFER, R. B., GRONSETH, G. S., NARAYANASWAMI, P. 2014. Evidence-based guideline: Assessment and management of psychiatric disorders in individuals with MS Report of the Guideline Development Subcommittee of the American Academy of Neurology. *Neurology*; 82(2):174–81.

[19] SALEHPOOR, G., KAFI, S. M., REZAI, S., HOSSEININEZHAD, M., SALEHI, I. 2012. The relation between fatigue severity with psychological symptoms and quality of life in multiple sclerosis**.** *Zahedan Journal of Research in Medical Sciences*; 14(9):80-86.

# The Socioeconomic Costs and Health-Related Quality of Life in Patients with Multiple Sclerosis

Iveta Nagyova[1,2], Katarina Sitkova[1], Martina Chylova[3], Miriam Polanova[1]

[1] Department of Social and behavioural Medicine, Faculty of Medicine, PJ Safarik university, Kosice, Slovakia
[2] Slovak Public Health Association – SAVEZ, Kosice. Slovakia
[3] 1st Department of Psychiatry, Faculty of Medicine, PJ Safarik University, Kosice, Slovakia

## Abstract

Background: Multiple sclerosis (MS) is associated with significant socioeconomic burden, high rates of unemployment, and physical and mental hardship. This study evaluated patient and disease characteristics associated with work loss, disability pension, and quality of life.

Methods: Eligible participants included 192 patients (67% females, mean age 39.3±10.6 years, mean disease duration 5.8±5.0 years). Health-related quality of life was assessed by 36-item Short-Form Health Survey (SF-36), fatigue using Multidimensional Fatigue Inventory (MFI), and depression and anxiety were assessed using Hospital Anxiety and Depression Scale (HADS). One-way Analysis of Variance (ANOVA) with Post-Hoc Tests (Scheffe, Least Significant Difference) were used to analyse data.

Results: Our study shows that almost 27% of patients lost their job and become disabled since they were diagnosed, 31% were continuously employed, 32% were not employed, and 10% found a job. Factors associated with loss of employment included age, education, disease duration, functional status, depression, and quality of life. No significant associations were found with gender, fatigue or anxiety.

Conclusions: Specific physical and mental health limitations convene risk of employment cessation over time. This study has implications for rehabilitation interventions to target specific MS factors that place patients at greater risk for loss of a paid job.

**Keywords:** multiple sclerosis, loss of employment, health-related quality of life, fatigue, anxiety, depression

## 1 Introduction

Multiple Sclerosis (MS) is a degenerative neurological disease of chronic nature, which can manifest in a wide range of symptoms including fatigue, balance impairments, sensory problems, sleep problems, loss of mobility, and pain [1]. In addition, cognitive symptoms, such as problems with attention, information processing efficiency, general executive functioning, processing speed and long-term memory, are common in MS [2]. These diseases-related symptoms can seriously disrupt persons' professional and social life and negatively influence quality of life [3].

A disruption of patients' professional life leads to high socioeconomic costs. For MS they are higher than those for other neurological diseases, such as stroke or Alzheimer's disease, because of the longer disease duration, the higher prevalence and incidence among young adults, and the subsequent early loss of productivity due to mental and physical disability, fatigue, and comorbidity [4]. People with MS are more likely to leave employment earlier than the usual population. Around 15 years after the onset of MS between 60-80% of patients would have lost their jobs [5]. Kobelt et al. found an estimated 35% of MS patients in Europe retired early because of the condition and the loss is on average of over 10 working years [6]. The prevalence of unemployment rates among MS patients is around 55% [7] and the prevalence of disability pension has been estimated to range between 33–45% in European countries [8]. These insufficiencies in employment status are reflected also in income, with people with MS identified as much more likely to have a 'below average' household income [9].

Several previous studies have examined which aspects of MS influence people's ability or inability to continue working. One of the most frequently mentioned is disease severity. A study by Nazi et al. (2010) highlights that almost 37% of individuals with mild MS are employed compared to the employment rate of just 4% of those with severe MS [10]. Previous studies have further identified that older age, higher levels of disability and depression are associated with early retirement among people with MS [11].

The aim of this study was to examine patient and disease characteristics related to work loss, disability pension, and quality of life in persons with MS in Slovakia.

## 2 Data and Methods

The study sample consisted of 192 eligible MS patients from hospitals, outpatient clinic and MS clubs and in the eastern part of Slovakia. Exclusion criteria were cognitive impairment (determined by a Mini-Mental State Examination (MMSE) score of < 24), a history of psychiatric or medical conditions affecting the outcomes of the study, pregnancy, under 18 years of age or not speaking Slovak. Data collection consisted of a medical examination carried out by a neurologist and an interview conducted with each participant by a psychologist or a trained research assistant to obtain information about sociodemographic characteristics.

### *Health-related quality of life (HRQoL)*

HRQoL was assessed using the 36-item Short-Form (SF-36) health survey [12]. Various aspects of HRQoL are covered in 8 scales, which then can be summarised into two main components. The subscales included in the questionnaire are: 1. Physical functioning, 2. Role limitation due to physical health, 3. Bodily pain, 4. General mental health, 5. Social functioning, 6. Psychological distress and well-being, 7. Role limitations due to emotional problems, and 8. Vitality, energy or fatigue. Two summary scores are calculated, namely a Physical Component Summary (PCS) and a Mental Component Summary (MCS); with higher scores indicating better quality of life.

### *Fatigue*

Fatigue was assessed with the Multidimensional Fatigue Inventory (MFI) – General fatigue [13]. Patients were asked to share how much they agree with statements like: "I feel fit", "I feel very active" or "Physically I feel only able to do a little" on a 5-point scale anchored in quotes: "Yes, that is true" and "No, that is not true"; where higher score indicated more prevalent fatigue.

### *Anxiety and Depression*

The fourteen-item Hospital Anxiety and Depression Scale (HADS) was used for assessing anxiety and depression in non-psychiatric hospital departments [14]. Seven items are related to the depression and 7 to anxiety. Patients responded on a 4-point scale (from 0 = absent to 3 = definitely present/severe). Scores ranged from 0 to 21 for each scale; where a higher score implied more depression or anxiety.

Statistical analyses were performed in IBM SPSS 23 software. Descriptive statistics (means and standard deviations) and one-way Analysis of Variance (ANOVA) with Post-Hoc Tests (Scheffe, Least Significant Difference) were used to analyse data.

## 3 Results and Discussion

A basic description of the study population is given in Table 1. The sample (N=192) consisted of 67% women, the mean age of MS patients was 39 years and the majority of patients had secondary education (55%). The mean EDSS score was 3 and the mean disease duration was 6 years. Most of the patients (71%) belonged to relapse-remitting clinical course group.

**Table 1. Description of the study population (N=192)**

| Variables | N (%) | Mean | Range |
|---|---|---|---|
| **Age** (years) | | 39.3±10.6 | 18-65 |
| **Gender** | | | |
| Male | 61(31.8%) | | |
| Female | 131(67.2%) | | |
| **Education** | | | |
| Elementary | 51(27.4%) | | |
| Secondary | 102(54.8%) | | |
| University | 33(17.7%) | | |
| **Disease duration** (years) | | 5.8±5.0 | 1-37 |
| **EDSS** | | 3.0±1.5 | 1.0-8.5 |
| **MS clinical course** | | | |
| Relapsing-Remitting | 134(70.9%) | | |
| Secondary Progressive | 26(13.8%) | | |
| Primary Progressive | 29(15.3%) | | |
| **Employment status** | | | |
| Lost Job | 51(26.6%) | | |
| Employed | 59(30.7%) | | |
| Not Employed | 62(32.3%) | | |
| Found Job | 20(10.4%) | | |
| **Quality of life** | | | |
| PCS | | 32.2±10.9 | 13.3-67.3 |
| MCS | | 45.6±9.8 | 19.5-64.0 |

EDSS – Expanded Disability Status Scale; PCS – Physical Component Summary SF-36; MCS – Mental Component Summary SF-36.

With regard to employment status, our study shows that almost 27% of patients lost their job and become disabled since they were diagnosed, 31% were continuously employed, 32% were not employed (patients on disability pension, housewives, students, unemployed), and 10% found a job (Table 1). These results are in live with previous studies. Although unemployment rates for people with MS vary across Europe, it is obvious that they are much higher than the employment rates of the usual population [15]. A review of MS across nine countries in Europe found employment rates highest in Italy (42%) and the lowest in Spain (26%) [6].

Table 2 displays outcomes of the one-way ANOVA with Post-Hoc tests (Least Significant Difference, and Scheffe) comparing patients who lost their job since they were diagnosed (group 1), who are employed (group 2), who were not employed (on disability pension, housewives, students, unemployed) (group 3), and those who found a job (group 4). The results of pairwise comparisons (Least Significant Difference test) revealed that factors associated with loss of employment comprise age, education, disease duration, functional status, psychological well-being, and quality of life. No significant differences were found for gender or fatigue.

When controlled for multiple comparisons with Scheffe Post-Hoc test, significant differences were detected between patients who lost their job (group 1) and those who are still employed (group 2) in disease duration, functional status (EDSS), and physical component of quality of life (PCS). Those who are employed had significantly shorter disease duration, better functional status, and had higher scores in PCS. Furthermore, significant differences were found between those who lost their job (group 1) and those who found a job (group 4) in age and depression; the latter were significantly younger and less depressed. Also, those who lost their job (group 1) had significantly longer disease duration compared to patients who were employed (group 2), but also those who were not employed (group 3).

With regard to person's characteristics, patients who lost their job (group 1) or those who were not employed (group 3) were more likely to have lower education. In addition, patients who lost their job (group 1) and not employed (group 3) were similarly depressed. Moreover, these groups of patients (groups 1, 3) were significantly more depressed compared to patients who are still employed or those who found a job (groups 2, 4). There were no significant differences in gender, fatigue, anxiety or mental component of quality of life (MCS) between any groups of patients in multiple comparisons.

**Table 2. Employment status in relation to physical and mental health limitations (N=192)**

|  | Lost Job (1) | Employed (2) | Not Employed (3) | Found Job (4) | F/ $\chi^2$ | Post Hoc tests |
|---|---|---|---|---|---|---|
| **Age** | 42.8±8.5 | 39.1±8.9 | 38.3±13.3 | 34.0±8.2 | **3.827**** | 1-3,**1-4** |
| **Gender** |  |  |  |  | .867 |  |
| Male | 17(27.5) | 19(32.2) | 22(35) | 6(30.0) |  |  |
| Female | 37(72.5) | 40(67.8) | 40(64.5) | 14(70.0) |  |  |
| **Education** |  |  |  |  | **49.914**** |  |
| Elementary | 17(33.3) | 4(7.4) | 27(43.5) | 3(15.8) |  |  |
| Secondary | 30(58.8) | 32(59.3) | 34(54.8) | 6(31.6) |  |  |
| University | 4(7.8) | 18(33.3) | 1(1.6) | 10(52.6) |  |  |
| **Disease duration** | 7.9±4.8 | 4.4±3.7 | 4.8±5.7 | 5.6±5.1 | **5.915***** | **1-2, 1-3** |
| **EDSS** | 3.4±1.3 | 2.4±0.9 | 3.5±1.7 | 2.7±1.4 | **8.906***** | **1-2,** 1-4, **2-3,** 3-4 |
| **Fatigue** | 14.2±2.7 | 12.7±4.1 | 13.1±3.1 | 13.7±3.4 | 1.719 | 1-2 |
| **Anxiety** | 8.2±4.0 | 6.2±4.1 | 8.1±4.6 | 6.0±3.4 | **3.625**** | 1-2, 1-4, 2-3, 3-4 |
| **Depression** | 5.4±3.2 | 3.9±3.3 | 5.5±4.5 | 2.6±2.5 | **4.737**** | 1-2, **1-4,** 2-3, **3-4** |
| **Quality of life** |  |  |  |  |  |  |
| PCS | 31.7±7.5 | 40.3±11.4 | 35.7±12.0 | 37.5±9.9 | **6.151***** | **1-2**, 1-4, 2-3 |
| MCS | 44.8±9.8 | 47.7±9.2 | 42.8±9.4 | 49.2±10. | **3.548**** | 2-3, 3-4 |

Displayed values are Means ± Standard Deviations or N(%), EDSS – Expanded Disability Status Scale; PCS – Physical Component Summary SF-36; MCS – Mental Component Summary SF-36; Post Hoc Tests: Least Significant Difference (normal and bold), Scheffe (bold only).

This study confirms that people with MS are more likely to leave employment earlier than the usual population. Factors associated with loss of employment correspond with earlier findings and include disease characteristics such as diseases duration, more disability or more severe type of MS as well as person's characteristics such as psychological distress and depression.

Our findings correspond with previous studies regarding higher rates of unemployment to be associated with more disability/higher scores in EDSS. A study by Naci et al. (2010) highlights that less than four in ten (37%) of individuals with mild MS are employed, with the employment rate dropping to just 4 per cent for those with severe MS [10]. Similarly, Karampampa et al. (2011) identified higher levels of disability (EDSS score of 5 or more) to be associated with early retirement among people with MS [16]. A study by O'Connor et al. (2005) found that unemployment rates increase with longer duration of MS [17].

With regard to patient characteristics a study by Karampampa et al. (2011) identified that those who have retired early due to having MS were more likely than those who were still employed to have depression - found in 53% compared to 30% those employed [16]. Similarly, outcomes of a study by Glad et al. (2010) show that depression was significantly associated with not being employed. This association remained stable even when controlled for the influence of cognitive impairment, fatigue, functional status (EDSS), and pain [18].

Differences in quality of life were smaller than expected. Significant difference was detected only in physical component of quality of life (PCS) between patients losing their job (group 1) and those who were employed (group 2); with latter group having significantly higher quality of life, which is consistent with earlier research [19]. On the other hand, no significant differences were found between the four groups in mental component of quality of life (MCS). According to Zwibel (2009), on factors relating to MS and quality of life, symptoms of MS, including impaired mobility, pain, fatigue, depression, and spasticity appear to be key factors in the reduction of quality of life of those with MS, and may be related to increased cost of care [5].

## 4 Conclusions

MS causes both increased healthcare use and reduction of work capacity. It is one of the most costly neurological diseases, due to its early onset, long duration and significant effects on work and daily activities. Distinct physical and mental health limitations have a direct impact on the ability to maintain a job. These include both disease and patient characteristics, such as longer diseases duration, more severe type of MS, more disability, and also more depression. This study has implications for rehabilitation interventions to target specific MS factors that affect employment rates, success in sustaining, job retention, and return to work efforts.

## Acknowledgements

This work was supported by the Slovak Research and Development Agency under Grant APVV-15-0719.

## Contact

Dr. Iveta Nagyova; e-mail: iveta.nagyova@upjs.sk

## References

[1] MULTIPLE SCLEROSIS INTERNATIONAL FEDERATION (MSIF). 2014. Atlas of MS 2013: Mapping Multiple Sclerosis around the world, 2013. Available at: www.msif.org/wp-content/uploads/2014/09/Atlas-of- MS.pdf (last accessed 18/01/2018)

[2] CHIARAVALLOTI, N. D., DELUCA, J. 2008. Cognitive impairment in multiple sclerosis. *The Lancet Neurology*; 7:1139-51.

[3] AMATO, M. P., BATTAGLIA, M. A., CAPUTO, D., ET AL. 2002.The costs of multiple sclerosis: a cross-sectional, multicenter cost-of-illness study in Italy. *Journal of Neurology*; 249(2):152–63.

[4] PUGLIATTI, M., ROSATI G., CARTON, H., ET AL. 2006.The epidemiology of multiple sclerosis in Europe. *European Journal of Neurology*; 13:700-22.

[5] ZWIBEL, H. 2009. Health and quality of life in patients with relapsing multiple sclerosis: making the intangible tangible. *Journal of the Neurological Sciences*; 287:S11-S16.

[6] KOBELT, G., BERG, J., LINDGREN, P., ET AL. 2006. Costs and quality of life of multiple sclerosis in the United Kingdom. *The European Journal of Health Economics*; 7(2):96-104.

[7] LUNDE, H. M. B., TELSTAD, W., GRYTTEN, N., ET AL. 2014. Employment among patients with multiple sclerosis-a population study. *PLOS ONE*; 9(7):Article Number: e103317.

[8] TINGHÖG, P., HILLERT, J., KJELDGÅRD, L., ET AL. 2013. High prevalence of sickness absence and disability pension among multiple sclerosis patients: a nationwide population-based study. *Multiple Sclerosis*; 19(14):1923-30.

[9] GREEN, G., TODD, J., PEVALIN, D. 2007. Biographical disruption associated with multiple sclerosis: Using propensity scoring to assess the impact. *Social Science and Medicine*; 65:524-35.

[10] NACI, H., FLEURENCE, R., BIRT, J., ET AL. 2010. Economic burden of multiple sclerosis. A systematic review of literature. *Pharmacoeconomics*; 28(5):363-79.

[11] BEVAN, S., STEADMAN, K. 2015. *Multiple Sclerosis and Employment in Europe: Literature Summary*. The Work Foundation, Lancaster University, 2015.

[12] WARE, J. E., SHERBOURNE, C. D. 1992. The MOS 36-Item Short-Form Health Survey (SF-36): I. Conceptual Framework and Item Selection. *Medical Care*; 30(6):473-83.

[13] SMETS, E. M. A., GARSSEN, B., BONKE, B., ET AL. 1995. The multidimensional fatigue inventory (MFI) psychometric qualities of an instrument to assess fatigue. *Journal of Psychosomatic Research*; 39(3):315-25.

[14] ZIGMOND, S., SNAITH, R. 1983. The hospital anxiety and depression scale. *Acta Psychiatrica Scandinavica*; 67(6):361–70.

[15] JULIAN, L. J, VELLA, L., VOLLMER, T., ET AL. 2008. Employment in multiple sclerosis: Exiting and re-entering the work force. *Journal of Neurology*; 255:1354-60.

[16] KARAMPAMPA, K., GUSTAVSSON, A., MILTENBURGER, C., ET AL. 2012. Treatment experience, burden and unmet needs (TRIBUNE) in MS study: results from five European countries. *Multiple Sclerosis*; 18(Suppl 2):7-15.

[17] O'CONNOR, R. J., CANO, S. J., TORRENTA, L. R., ET AL. 2005. Factors influencing work retention for people with multiple sclerosis. *Journal of Neurology*; 252(8):892-6.

[18] GLAD, S. B., NYLAND, H., AARSETH, J. H., ET AL. 2010. How long can you keep working with benign multiple sclerosis? *Journal of Neurology, Neurosurgery & Psychiatry*; 82(1):78-82

[19] PACK, T. G., SZIRONY, G; KUSHNER, J. D., ET AL. 2014.Quality of life and employment in persons with multiple sclerosis. *Work-A Journal of Prevention Assessment & Rehabilitation*; 49(2):281-7.

# Resource Management under a Budget Cap – How Institutional Changes Affect the Way Hospitals Are Managed in Poland

Monika Raulinajtys-Grzybek, Gertruda Krystyna Świderska
Department of Management Accounting, Warsaw School of Economics, Warsaw, Poland

**Abstract**

The objective of this study is to indicate what actions in the area of resource management can be taken by hospitals under a budget cap. The example of Poland has been used where the new institutional conditions were introduced in the end of 2017. A variable payment model per case with a budget cap has been replaced by a fixed budget. The introduction of a fixed budget should turn manager's attention to a contribution margin report as well as the need to link the use of committed resources with specific services to control their capacity.

**Keywords:** hospitals, budget cap, resource management

## 1 Introduction

Recent changes in the Polish healthcare system include introducing a "net of hospitals" and transforming a payment model in relation to most of inpatient and outpatient services. In the end of 2017 a variable payment model per case with a budget cap has been replaced by a fixed budget. This institutional change has three main consequences. The first is stiffening the total revenue of hospital. In the past, the hospital's revenue was also limited by a budget cap but in practice hospitals received an additional revenue for additional services above the cap (although usually not in full amount). The second consequence is moving the budget cap from the level of a single department to a level of a hospital. So far, hospitals can choose the product mix they provide – of course this impact on the product structure is limited by the health needs of the society. The third consequence is that the level of revenue became independent from costs incurred for the provision of services. The amount of revenue is determined prospectively.

Payment method affects the way managers make decisions (see Table 1). WHO [7] indicated how a reimbursement mechanism affects the following issues: (1) preventing health problems, (2) responding to legitimate expectations, (3) service delivery and (4) cost containment. Most basic models of variable and fixed payments have been compared. None of the reimbursement mechanisms can achieve all four objectives simultaneously [4].

**Table 1. Provider payment mechanisms and provider behaviour**

| Provider behaviour mechanisms | Prevent health problems | Respond to legitimate expectations | Deliver services | Contain costs |
|---|---|---|---|---|
| Diagnosis related payment | +/ – | ++ | ++ | ++ |
| Line item budget | +/ – | +/ – | – – | +++ |
| Global budget | ++ | +/ – | – – | +++ |

Key: (+++) very positive effects; (++) some positive effects; (+/ – ) little or no effect; ( –– ) some negative effects; ( ––– ) very negative effects.

Source: [7].

So far in Poland a mixture of diagnosis related payment and line item budget was used. Mixed forms of reimbursement mechanisms can minimise the disadvantages of individual models [4].

Payment per case has little or no effect on preventing health problems and has some positive effects in all other areas. Its positive effects are, however, related to whether there are mechanisms that encourage a more flexible resource management at the provider level, such as policies favouring the free choice of providers by patients. Lack of necessary political conditions was the reason for a fiasco of per case payment system in such areas as India, Mexico, Papua New Guinea, South Africa, and Thailand [7].

Line item budgets (budgets set for an organizational unit) are effective in controlling costs, but they provide few incentives to achieve the other three objectives. They are the main reimbursement mechanism for public providers in developing countries. However, line item budgets as a sole method are criticised for restricting health system efficiency [5].

Global budgets as the only method shall lead to effective cost containment and should have some positive effects on prevention, but there is a high risk that providers will limit the number of services and their delivery will be negatively affected. Financing hospitals using global budgets (set based on DRGs provided by a hospital) is used e.g. in Austria, Ireland or Catalonia [2].

The impact of the payment method also depends on whether the level of revenue is determined retrospectively and in relation to the level of costs or is independent of it. In the first case providers are not encouraged to control their costs. In prospective systems there is an incentive to stimulate efficiency but there is a risk that providers might take decisions that will be aimed at improving their financial standing to the detriment of the quality of care. The risk of such behaviours is higher if prospective reimbursement is not cost-neutral [3]. Previous research has proven that such a case occurred in Poland in relation to outpatient services [6]

As hospitals' income is under pressure as a result of rising health care costs and more restrictive budget constraints, hospitals are looking for options to become more cost efficient [1]. The aim of the article is to present how those institutional changes affect the income function of individual providers. Income has been calculated using the resource-based approach where all costs were grouped by resources. Authors indicate what actions in the area of resource management can be taken by service providers in Poland under new institutional conditions and how they differ to actions taken previously.

## 2 Data and Methods

The article analyses the formulas of revenues, operating costs and the income on sales using the resource-based approach to cost classification. According to this concept, the costs incurred by the company are grouped into resource categories. The basic classification of resources include human resources, rooms and equipment as well as materials. These resources are classified into two basic groups: flexible and committed resources. This division results from a different approach to managing these resources.

Committed resources are supplied in advance of usage. Organization obtains a given quantity of resource, but if it exceeds the demand for the resource – unused capacity occurs. In hospitals most of resources are committed – these are mainly human resources, rooms and equipment. Flexible resources are supplied as used and needed; they are acquired from the outside sources. These are all materials, as well as external services.

## 3 Results and Discussion

In the per case payment model the revenue function has been set at the department level and was built as follows:

$$R_{D1} = \sum_{i=1}^{n} Q_i \times T_i + \left(\sum_{j=1}^{m} Q_j \times T_j\right) \times p \times r$$

where:
R – revenue

Q – number of services
i – services within the budget cap
j – services above the budget cap
T – tariff (unit price)
p – probability that services above a budget cap will be paid
r – percentage of a price that will be paid
D - department

The cost function in the same model is built as follows:

$$C_{D1} = \sum_{i=1}^{n} UCFR_i \times Q_i + CCR + \sum_{j=1}^{m} UCFR_j \times Q_j$$

where:
C – cost
UCFR – unit cost of flexible resources
CCR – cost of committed resources

The above two functions determine the income function, as the income is the revenue minus the costs. The income function is built as follows:

$$I_{D1} = \sum_{i=1}^{n} Q_i \times (T_i - UCFR_i) - CCR_{D1} + \sum_{j=1}^{m} Q_j \times (T_j \times p \times r - UCFR_j)$$

where: I – income.

The main cost management strategies in this model were: 1) to maximize the total contribution margin, which is the difference between a tariff (unit price) and costs of flexible resources, and 2) to control the total cost of committed resources. The total contribution margin in this model is highly dependent on the volume of services. It also depends on the relation between the unit price and the unit cost of flexible resources, but this ratio is different for each type of the service and its control is more complicated than controlling only the volume.

For this reason many hospitals were trying to maximize the volume of services (even above the budget cap) as long as the expected revenue – taken the probability of payment (p) and the expected level of payment (r) – was higher than the unit cost of flexible resources. It was possible if there was enough capacity of committed resources to provide additional services.

As the total cost of committed resources is also one of the conditions for a higher income, additional capacity was achieved primarily by increasing the efficiency of using these resources and only secondarily by acquiring additional committed resources.

In the fixed budget payment model the revenue function is set at the hospital level and is built as follows:

$$R = B = \sum_{i=1}^{n} Q_i \times T_i$$

where: B – fixed budget.

The budget is still defined in terms of number of services and their unit prices, but the realization of the budget does not affect its current level – it results in eventual limiting of the future budget.

The cost function in the same model is built as follows:

$$C = \sum_{i=1}^{n} UCFR_i \times Q_i + CCR_{D1} + CCR_{D2} + \cdots + CCR_{Dn}$$

The income function is built as follows:

$$I = B - \sum_{i=1}^{n} Q_i \times UCFR_i - (CCR_{D1} + CCR_{D2} + \cdots + CCR_{Dn})$$

In this model the total contribution margin is less affected by the volume of services. Increasing the number of services increases the total cost of flexible resources (calculated as Q times UCFR) but does not affect the level of revenues as it is fixed. Therefore, hospitals should look for more efficient tools of impacting a total contribution margin.

The first area will probably the control of unit costs of flexible resources. The lower the cost the higher the contribution margin. However, these steps may have a negative consequence on the quality of care as flexible costs are mainly drugs and medical materials. Cost reduction might be related to the undesirable reduction in quality.

A second probable scenario will be to maximize the provision of those services that guarantee highest contribution margin, i.e. guarantee the highest difference between the unit price and the unit flexible resources. As the income function is set on the hospital level, there is a possibility to search for such services within the total product mix. If there is any bottleneck in the hospital – such as the availability of beds or capacity of the operating theatre, the hospital should choose services that guarantee a highest margin per one unit of a scarce resource.

If the price system includes “cherries” and “lemons” (which means there are more and less profitable products) there is a risk that such a behaviour, encouraged by a fixed budget, might limit access to some services while creating an over-demand for others.

Fixed revenue function combined with a strategic management of a product mix on the hospital’s level will affect the use of the committed resources. While some resources might be used extensively (with possible bottlenecks), other might be underused (and the unused capacity might occur). In order to plan and control the use of committed resources the knowledge on their consumption by specific services is necessary.

## 4 Conclusion

The article presented changes in the income function of individual providers that occurred in Poland due to the institutional changes in the financing method. This change will affect the decisions that healthcare managers make in order to maximise the profit. As the revenue is still, actions will most probably concentrate on resource management. The introduction of a fixed budget will probably lead to some changes in the use of resource management tools. So far hospitals mainly based on the “pro volume” approach which was reflected by the maximization of the number of services up to the level which was accessible within the capacity of committed resources available. These steps were taken in each of the departments simultaneously as they were separate profitability centres.

Now, as the level of revenue is stiffened and set for the whole hospital, it will be more beneficial to search for services that guarantee a highest contribution margin. These services can be chosen among a total product mix that a hospital provides as no line item budgets are present. Such a behaviour might improve access to some services, but might deteriorate access to services with the least favourable ratio of costs of flexible resources to the unit price.

Shifting the product mix decisions from the level of the department to the level of hospital creates a need to link the use of committed resources with specific services to control their capacity – and foresee both bottlenecks and unused capacity.

## References

[1] CARDINAELS, E., ROODHOOFT, F., VAN HERCK, G. 2004. Drivers of cost system development in hospitals: results of a survey. *Health Policy*; 69(2):239-252.

[2] GEISSLER, A. 2012. *Cost accounting and DRG-based payment approaches across Europe*. Available on http://www.mig.tu-berlin.de/fileadmin/a38331600/2012.lectures/Seoul2012.05.21.ag.pdf

[3] JEGERS, M., KESTELOOT, K., DE GRAEVE, D., GILLES, W. 2002. A typology for provider payment systems in health care. *Health Policy*; 60(3):255-273.

[4] LEISTER, J. E., STAUSBERG, J. 2005. Comparison of cost accounting methods from different DRG systems and their effect on health care quality. *Health Policy*; 74 (1):46-55.

[5] RAJAN, D., BARROY, H., STENBERG, K. 2016. *Budgeting for health*. In: SCHMETS, G., RAJAN, D., KADANDALE, S. (EDS.). *Strategizing national health in the 21st century: a handbook*. Geneva: World Health Organization.

[6] RAULINAJTYS-GRZYBEK, M. 2014. *Wycena usług ambulatoryjnej opieki specjalistycznej*. ABC.

[7] WHO. 2000. *The world health report 2000 – health systems: improving performance*. Geneva: World Health Organization.

# Daily Physical Education as Part of Holistic Health Promotion in Hungarian Schools

Annamária Somhegyi
National Center for Spinal Disorders, Budapest, Hungary

## Abstract

The objective of this paper is to show the way how public health actors were able to reach the mandatory prescription and gradual implementation of daily physical education for all school children in Hungary and how the implementation was helped by the medical professionals and by some huge projects; and how they could reach that also holistic health promotion became prescription for all educational institutions. Good intersectoral cooperation was of utmost importance in all these public health struggles. Now our task is to give a permanent and organized professional help from the side of public health institutions and actors – as teachers are in need for it. (The author is working on behalf and with the authorization of dr. Zoltán Ónodi-Szűcs, the State Secretary, Health Department, Ministry of Human Capacities.)

**Keywords:** health promoting criteria of daily physical education, holistic health promotion in schools, intersectoral cooperation.

## 1 Daily physical education

Physical inactivity has been identified as one of the leading risk factors for non-communicable diseases, which are by far the primary causes of death in the world and their impact is steadily growing. Children are not immune to this burden, and effective interventions are urgently required. Several documents were there to urge physical activity (ide több régebbit). The Global Strategy on Diet, Physical Activity an Health [1] states in 49.§: „Schools are encouraged to provide students with daily physical education." After several newer documents [2, 3, 4, 5, 6, 7] the Physical Activity Strategy for the WHO European Region 2016-2025 [8] highlights the need of at least 60 minutes physical activity for children and young people and recommends that schools should provide "an appropriate number of regular physical education lessons, in line with the available scientific evidence". "Nationwide implementation of quality physical education classes" and "legislation" is also recommended.

According to several recommendations of WHO and with wide consensus of several medical societies in Hungary we made daily physical education (DPE) an important goal of the National Public Health Program in 2001 [9]. As the education sector was not convinced if schools were able to organize DPE, we organized in 2001 an intersectoral application for schools (Ministry of Health, Ministry of Education, and Ministry of Sports). More than 700 schools applicated and this convinced the colleagues in the Ministry of Education that schools may organize DPE if they are given the missing finances. Thereafter DPE was included in the national education plan (2006), but we had to wait until 2010 when DPE became part of the Government's Program. The new National Education Act Nr. 190 of 2011 prescribed daily physical education for all schools, and after a 4 year long gradual implementation now all students take part in DPE since September 2015. Health promoting criteria of DPE became part of the basic ruling documents of public education in 2012. After a long work of the health sector also holistic health promotion (HHP) in all educational institutes was prescribed in 2012.

<u>Health promoting criteria of DPE:</u>

To achieve the expected health gains of DPE it must fulfil some special health-promoting criteria which we laid down together with several medical societies in 2012 [10, 11]:

1. Every student must take part in daily physical education classes. Namely, the number of unexcused and excused absences must be reduced. On the one hand, this is the parents'

obligation and, on the other, this applies to the doctor who, lacking in sports knowhow but wanting to be helpful and please, writes an excused note at the request of the student or parent. It is important that our medical colleagues consider the current sedentary life style that now requires a change in our thinking. For instance, a student with a musculoskeletal disorder who needs as much physical activity as possible should not be excused from physical education classes (of course, it is the physician's responsibility and right to decide otherwise in individual cases).

2. Every physical class should contain enough exercise to properly strain the students' cardiovascular and respiratory systems (indicated by: flushing, perspiration, panting) and the classes planned so that time spent by the students waiting (i.e., not moving) to take their turns be reduced to as little as possible.
3. Every physical education class should contain gymnastics including special posture correction exercises for every student for the development of biomechanically correct posture, and exercises for developing good breathing techniques. (The special posture correction exercises do not change with age and cannot be replaced with something else at any age, at most it may be supplemented with playful or diversified exercises.) The rules for protecting the spine and joints must be observed at all times.
4. Special attention should be given to the age-related weight bearing capacity of the spine and the joints while exercising.
5. Relaxation exercises should also be part of every student's daily physical education class (the method used for ages 1-4 varies from the others).
6. Awareness of our body and muscles during the special posture correction and relaxation exercises will intensify the effect of physical education on the general wellbeing of our body and soul. It is important, therefore, that the physical education teachers emphasize this awareness and encourage its verbal expression.
7. The physical education teachers should also impart their knowledge between the connection of physical activity and the healthy psyche and the development of the ability to learn.
8. Dance classes could also be part of the daily physical education classes, if possible. Folk dancing for classes 1-4 and folk dancing and ball room dancing for classes 5-12. These encourage healthy psychological development.
9. It is important to also teach, as part of the daily physical education, sports that the students would want to continue practicing even throughout their entire lives (i.e., lifestyle sports). The schools can help choose these sports according to their facilities and possibilities.
10. Every physical education class should include disciplined work, joyful playfulness and a sense of achievement for each student, even those of less than average physical talent. In order to achieve this, such pedagogical and psychological methods should be followed that give each student activities suited to his or her capabilities; i.e., create work and play conditions that will allow each student to experience the sense of achievement and pleasure after a job well done.
11. The physical education teacher is in a singular position to make the students understand, through their own experiences, the effect that the activities of the class have on the healthy development of their system, body and soul. For this reason, in order for health skills to be effective and be internalized by the students, it is important that it be taught as an integral part of the physical education class. Personal hygiene, showering, or other cleansing methods, after physical activities and fluid replacement are especially important topics to be included.
12. When evaluating physical education it should be done in such a way that encourages the student to take an active part. Each student should be evaluated according to his or her own capabilities and based on his or her own personal results.
13. The quality of daily physical education is best ensured if the physical education class is taught by a physical education teacher or a teacher especially trained in physical education.
14. It is important that the students become familiar with the history of Hungarian sports. That the outstanding sports figures may be a motivation for them when choosing a sport outside school.

15. In Hungary, there is still much to be done on the part of the government in improving the physical conditions of daily physical education and in replacing missing items. Since the improvement of the conditions takes time and can only be accomplished gradually, many physical education rooms may, at the moment, not be set up adequately. In these situations, it rests upon the creativity of the teaching staff and the physical education teachers to come up with acceptable solutions for daily physical education classes. Worse than the lack of a perfect location is the lack of daily physical exercise.

All the above health-promoting criteria for daily physical education are contained in the national education rulings. Now is the time for the public health sector to ensure that these criteria are met and are part of all school children's daily life.

Project to enhance the quality of DPE:

To enhance the quality of DPE the Government launched a huge project in 2013, which was realized through the Hungarian School Sport Federation (HSSF).

HSSF produced seven very important methodological publications to help PE-teachers in using new methods according the health promoting criteria of daily physical education. All Hungarian schools (ca. 3800) were given these publications, and nearly 8.000 teachers took part in postgraduate courses to practice these new PE-methods.

HSSF in cooperation with the Cooper Institute (USA) created a new national measurement tool (NETFIT) for PE teachers to monitor physical fitness of schoolchildren from 10 to 18 years. Online input of data and online analysis of results was made available for the public [12]. The devices for NETFIT were given to all Hungarian schools (more than 3800 schools). The use of this measurement tool is compulsory according to the Decree No. 20/2012 of the Ministry for Human Capacities.

HSSF together with the education, sports and health sector (all in the Ministry for Human Capacities) produced a strategy to further development of quality daily physical education.

Professional review in education was ceased in Hungary since 1985. Now it is reintroduced as monitoring and supervision, while graduate and postgraduate education of PE teachers is also renewed – all these are tools to enhance the quality of DPE.

In or outside of gyms?

We do not have enough gyms for all school classes to have their DPE in them. At the beginning we could here quite often, that we should have waited with the prescription of DPE until we have built enough gyms for that. We communicated intensively the opposite opinion: not the gym, but the physical activity is needed daily for the children. As part of the above project, all schools were given a special methodologic publication „Alternative sport-games" in which HSSF introduced 87 types of interesting and enjoyable sport-games to be used outside of the gym. Today we know that we have won this communication-game.

Of course it is needed to increase the number of gyms and the Government is building new gymnasiums and swimming pools and improving equipments of DPE – but nevertheless PE teacher's creativity is also needed for PE classes outside the gymnasium.

Monitoring of DPE:

The new national measuring tool "NETFIT" was developed by HSSF in cooperation with the Cooper Institute (USA) on a correct scientific basis and with protection of the spine. This is an appropriate tool for monitoring DPE. NETFIT is a yearly compulsory measurement for PE-teachers, for all 10-18 years old school-children. It has four profiles:

- Body composition
- Aerobe fitness
- Musculosceletal fitness
- Flexibility

In May 2014 NETFIT was measured at the first time (623.026 schoolchildren took part with 13.543 teachers); in May 2015 it was measured on 651 431 school-children by 14.685 teachers. (Results of measurements made in May 2016 and in May 2017 are still under analysis.)

Main statements of the analysis after the first and second measurement are [12, 13]:

- Overweight and obese children were in 25.8 % - and this was in 2015 worse than in 2014. (BMI was calculated and bioimpedance was measured by using OMRON BF511.)
- Worst results were seen in:
  - Progressive aerobic capacity endurance test (PACER-test) – in health zone were only 61.8 % of the children.
  - Trunk lift test – in health zone were only 51 % of the children.
- We could detect development of PACER test in 2015: girls developed in PACER-test by 10%, especially those who already have taken part in DPE.

## 2 Holistic health promotion in schools

In 2001, Healthy Nation Public Health Program [9] and the Public Health Interministerial Board was launched with the Government Resolution No. 1066/2001 (VII.10.). In 2003, corresponding to the Parliamentary decision No. 46/2003. (IV.16.), and to the Public Health Interministerial Board's decisions the Ministry of Health in consensus with other competent departments (Ministry of Education, Ministry of Children, Youth and Sport, Ministry of Finance) made the plan of holistic health promotion (HHP) in schools, which – mainly because of lacking political commitment from the side of education – was not implemented until 2010. In 2010 the Program of Government, in 2011 the Act Nr. 190 on National Education, and in 2012 the Decree No. 20/2012 of the Minister for Education prescribed the institutionalized implementation of holistic school health promotion in Hungarian educational institutions. In 2015 three huge projects gave significant professional assistance and motivation to schools to further their daily work in health promotion. For this result an efficient intersectoral cooperation was needed, which worked on the basis of the "giga-ministry": the Ministry of Human Capacities containing 8 human sectors (health, education, sport, higher education, youth and family, social integration, culture, church and civil society).

Essential elements of HHP:

Holistic health promotion means a holistic, whole school approach where health promotion has to be part of the everyday life of the school. There are four main health promoting tasks for schools to do in their daily work - with participation of the whole school, of parents and the public environment:

I.) Healthy eating - potentially based on local food products;

II.) Daily physical education fulfilling health promotion criteria and other forms of physical activity (see above);

III.) Appropriate pedagogic methods (including also the use of arts) to enhance mental health;

IV.) Improving health literacy and health competencies of the children.

Follow-up of HHP:

We have to follow up the effects of HHP with measurements of the 4 health promoting tasks:

- for healthy eating we have the results of National Institute of Pharmacy and Nutrition, and the results of HBSC;
- for daily physical education we have the new national measuring tool "NETFIT" (see above)
- for mental health we have HBSC and ESPAD
- for health literacy we have no significant measurement till now, but in a new project we are producing it.

Benefits of HHP in several sectors:

The key strategic goal of HHP is to reach for all school-children a better physical, mental and spiritual health; better academic achievement; better social inclusion; better social well-being; primary prevention of NCDS. All participating sectors (health, education, sport, higher education, youth and family, social integration, culture, church and civil society) co-benefit from an efficient implementation of HHP, the gains for each are obvious:

- Health: primary prevention of most NCD-s, better physical, mental, spiritual and social well-being and health for all children.
- Education: better health for all children = better academic achievements, more effective pedagogic work of teachers, better social inclusion, less drop-out, less agressivity.
- Sport: better basis for later sportsmen.
- Higher education: better health, better academic achievements.
- Youth and family: better health of children needs much cooperation from parents and families - this means shared tasks.
- Social integration: children from poor social background can be reached mostly in the schools; better health=better social integration.
- Culture: mental health promotion of the children is served by the application of arts in the school-days.
- Church and civil society: churches have schools, where health promotion is also prescribed; better health=better academic achievements.

Key points of our public health struggle for HHP:

The key lessons we learnt may be helpful for other countries also:

- The highest political commitment was needed, in our case this was the commitment of the prime minister and of the leader of education sector. Commitment of the health sector is naturally needed, and this was always given since 2001.
- Good cooperation between sectors was helped by the giga-ministry for human resources (Ministry for Human Capacities with 8 sectors: health, education, sport, higher education, youth and family, social integration, culture, church and civil society).
- Persistent struggle of civil medical societies in cooperation with the civil society of physical education teachers was also an important basis.
- Agrar-sector's work to strengthen the social functions of agriculture was in good interaction with several goals of public health.
- We had several facilitating factors from the international professional sites:
    - The lessons learnt from the European Network for Health Promoting Schools, now Schools for Health in Europe [14, 15, 16].
    - The supporting works of WHO European Region in several fields: healthy eating, physical activity, mental health, health literacy, "whole school, whole child, whole society" approach in Health 2020 [17].

Our next tasks:

Between 2012 and 2015 there were 3 huge projects to help the implementation of HHP: one for DPE (see above) and two other projects producing materials on some health topics mainly for teachers. Now we have a new project in which we are producing materials on all other health topics and not only for teachers but also for children – using gamification through the modern ICT devices.

We have still to work hardly to organize the official helping network from the public health side – as schools need our professional help continuously, not only during our projects [18, 19]. After the appropriate legislation in the education sector we have now a new challenge:

teachers are highly loaded with their work, so building the "whole school approach" in their daily routine work is not easy. The new quality management in education and the ongoing whole renewal of the national education are important helping structures and factors for us.

## 3 Conclusion

Commitment of several medical professionals was the starting point, which was followed by the highest political commitment. Since 2010 governmental cooperation has been working effectively through the Ministry of Human Capacities responsible for health, education, sport, youth, family, social integration, culture, church and civil society. Our next tasks are the organization of the continuous professional help from the public health institutions to the teachers; and the motivation of teachers to change their routine and accustomed pedagogic methods.

## References

[1] WHO. 2004. *Global strategy on diet, physical activity and health.* Available on http://www.who.int/dietphysicalactivity/goals/en/index.html

[2] WHO. 2007. *A Guide for population-based approaches to increasing levels of physical activity. Implementation of the Global Strategy on Diet, Physical Activity and Health.* Available on http://www.who.int/dietphysicalactivity/PA-promotionguide-2007.pdf

[3] WHO. 2008. *School policy framework. Implementation of the WHO Global strategy on diet, physical activity and health.* Available on http://www.who.int/dietphysicalactivity/schools/en/index.html

[4] WHO. 2008. *Action plan for The Global Strategy for the Prevention and Control of Non-communicable Diseases 2008-2013.* Available on http://www.who.int/nmh/publications/9789241597418/en/

[5] EUROPEAN COMMISSION. 2008. *EU Physical Activity Guidelines. Recommended policy actions in support of health-enhancing physical activity.* Available on http://www.eupea.com/nl/x/289/eu-physical-activity-guidelines

[6] WHO. 2010. *Global recommendations on physical activity for health.* Available on http://www.who.int/dietphysicalactivity/factsheet_recommendations/en/index.html

[7] EUROPEAN COMMISSION. 2013. *Physical education and sport at school in Europe. Eurydice report.* Available on http://eacea.ec.europa.eu/education/eurydice/documents/thematic_reports/150EN.pdf

[8] WHO. 2015. *Physical Activity Strategy for the WHO European Region 2016-2025.* Available on http://www.euro.who.int/__data/assets/pdf_file/0010/282961/65wd09e_PhysicalActivityStrategy_150474.pdf?ua=1

[9] MINISTRY OF HEALTH. 2001. *Healthy Nation Public Health Program 2001-2010.* Budapest.

[10] SOMHEGYI, A. 2014. Health promoting criteria of daily physical education: present state of implementation. English abstract available. *Népegészségügy;* 92:4-10.

[11] SOMHEGYI, A., LAZÁRY, Á., FESZTHAMMER, A., ET AL. 2014. Application of special exercises in physical education to develop, automatize and maintain the biomechanically correct posture. English abstract available. *Népegészségügy;* 92:11-19.

[12] HUNGARIAN SCHOOL SPORT FEDERATION (HSSF) WEBSITE: http://www.mdsz.hu/en/netfit-2/about-netfit/

[13] CSÁNYI, T., FINN K., WELK G. J., ET AL. 2015. Overview of the Hungarian National Youth Fitness Study. *Research Quarterly for Exercise and Sport;* 86 (Sup 1): S3-S12.

[14] SCHOOLS FOR HEALTH (SHE) WEBSITE: http://www.schools-for-health.eu/she-network

[15] YOUNG, I., ST LEGER, L., BUIJS, G. 2013. School health promotion: evidence for effective action. *Background paper SHE Factsheet 2*. Available on http://www.schools-for-health.eu/uploads/files/SHE%20Factsheet_2_Background%20paper_School%20health%20promotion_Evidence.pdf

[16] SULDO, S. M., GORMLEY, M. J., DUPAUL, G. J., ET AL. 2014. The impact of school mental health on student and school-level academic outcomes: current status of the research and future directions. *School Mental Health;* DOI: 10.1007/s12310-9116-2. Available on www.researchgate.net/publication/262571894

[17] WHO REGIONAL OFFICE FOR EUROPE. 2014. *Health 2020: education and early development. Synergy between sectors: Fostering better education and health outcomes*. Available on http://www.euro.who.int/__data/assets/pdf_file/0004/257881/H2020-SectoralBrief-Education_11-09-Eng.pdf

[18] SOMHEGYI, A. 2017. Daily physical education (DPE) as part of holistic school health promotion (HHP) in Hungary. *The 19th EUSUHM Congress Youth Health Care in Europe, Leuven*. Abstract and presentation later will be available on https://kuleuvencongres.be/EUSUHM2017/

[19] SOMHEGYI, A. 2017. Furthering role of public health experts and institutions in holistic school health promotion. English abstract available. *Népegészségügy;* accepted for publication, 2017.

# The Lifestyle of Families as a Determinant of V4 Countries' Health – Preamble to a Longitudinal Research

Klára Tarkó, Zsuzsanna Benkő
University of Szeged, Juhász Gyula Faculty of Education, Institute of Applied Health Sciences and Health Promotion, Szeged, Hungary

**Abstract**

Between 2004 and 2007, lead by the University of Szeged (HU) and with the participation of the University of Silesia (PL), the University of Hradec Králové (CZ), and the Constantine the Philosopher University in Nitra (SK), a representative research into the Traditional and modern lifestyle elements of the families in the Visegrad Countries was performed, revealing the predominance of traditional lifestyle practices. Since 2007 considerable social, political, economic and demographic changes affected the previously observed lifestyle elements (nutrition, leisure habits, family customs, cultural habits and the value system of families), that is why the idea of repeating this research 'more than a decade after' attracted the cooperating researchers. This second empirical stage in the longitudinal research will start in autumn, 2018. The originally used structured assisted questionnaire will be revised and completed based on experiences gained and new phenomena arising, keeping the comparability of the two researches unattended. Sampling will be done in the same towns as 15 years before: Szeged (Hungary), Rybnyk (Poland), Hradec Králové (Czech Republic), Nitra (Slovakia). From each town respondents will be chosen from 5 districts, 100-100 families from each, meaning minimum 500 families in each country, minimum 300 out of which should correspond to the criteria: adult(s) with a child (regardless of age) living together in one household. New research hypotheses will be formed on the basis of the revealed past social, demographical, political and economic changes, considering the effect they exercise on the background lifestyle elements affecting the public health indicators in the Visegrad Countries. The Lalonde Report has already stated that lifestyle is the strongest 'health field' determining our health. Effective health policy recommendations should be based on the knowledge of current Central-East European characteristics of lifestyle practices.

**Keywords:** family, lifestyle, tradition, modernity, Visegrad 4.

## 1 Introduction

During it's more than 22 years tradition the Institute of Applied Health Sciences and Health Promotion at the University of Szeged, Juhász Gyula Faculty of Education has carried out educational and research activities covering the main areas of holistic health and health promotion. In nowadays modern societies the holistic concept of health includes elements like physical, mental, emotional, spiritual, social and societal health. This complexity of health domains is reflected in our lifestyle and our lifestyle is partly influenced by our value system. The expressions tradition and modernity in the title of the present paper bring together the fundamental norms and values guiding the life of the European traditional societies.

Family – as a microsocial unit – reflects the macro society. Changes in the macrosystem are in turn reflected in the microsystem. Social structure, economic conditions, needs of the labour market, changes in norms and values and technological development all influence the life of this small group. Family itself still has a leading position in the hierarchy of values, though the scientific and everyday understanding of the concept of family is changing, and there are contradictions among these understandings: crisis or a change that carries value.

We had the idea to bring together macrosocial features and changes, families and lifestyle and that is how the first phase of our research was born and carried out between 2004 and 2007. Under our leadership, research groups from the 'Visegrad Four' studied the lifestyle and value system of families in Hungary, Poland, the Czech Republic and Slovakia. The social and lifestyle history of these four countries are very similar, which fact enabled transnational comparison. Research results of the first phase clearly proved, that the lifestyle of families in the Visegrad Countries is tradition-directed [1]. This result is very important for the health promoter and public health professionals, as it calls attention, that it is essential to consider traditional values and practices for planning health promotion.

More than a decade has passed since the first phase and these years brought considerable socio-economic and demographic changes in all four countries, which made us think about revealing the effect of these macrosocial changes on family structure, functions, roles, value system and lifestyle (nutrition, leisure, cultural habits, and family customs). This longitudinal research makes it possible to capture the dynamics of social changes and to compare the lifestyle of families altered due to these changes. The aim of our transnational longitudinal research is to reveal how the process of past years' socio-economic changes altered the components of families' lifestyle, their ability to adapt, as well as the similarities and differences between the more than a decade history of social changes in the four countries of the region.

According to our main hypothesis, due to the similarities in lifestyle and family history processes, the lifestyle and value choices of Central East European countries has a lot in common. We also suppose, that the studied lifestyle elements and values continue to shift towards tradition, that is, the consumption and value choices of families in our transnational sample is tradition directed. We suppose that lifestyle indices objectively defined on the basis of the theoretical knowledge and professional empirical experiences of the transnational research group correspond to the self-categorisation of families along the tradition and modernity axis. In addition we hypothesize, that the extent of tradition and modernity is less influenced by socio-demographic factors (age, family type, level of education, occupation, settlement, residential area) compared to the more than a decade before research. We also forecast a considerable divergence in the extent of prejudice in each country.

## 2 Data and Methods

Two research methods will be used in our longitudinal research. First the theoretical review and statistical analysis of past years' socio-economic and demographic changes will be explored. Second, a structured assisted questionnaire interview of 500-500 families in each country will be carried out. The location of the research will be what the Hungarian sociologist Ferenc Erdei [3] calls "town and the surrounding rural areas". This concept ensures that people living in 'urban' and 'rural' areas also have the possibility to be part of the sample. When choosing the participating towns we will strive at reaching comparability of all four countries' settlements. The towns selected before were: Szeged (Hungary), Rybnik (Poland), Hradec Králové (Czech Republic), Nitra (Slovakia) and the international research groups came from the University of Szeged (HU), University of Silezia, Katowicze (PL), University of Hrádec Králové (CZ), and Constantine the Philosopher University in Nitra (SK). Each research group expressed its will to continue the longitudinal research. The sample will comprise of 500 families in each country, and in each selected family 1 adult will be interviewed. The research unit of our survey will be the family.

The second phase of our transnational longitudinal research has just begun, and we are at the stage of revealing the socio-economic and demographic changes in each Visegrad Country that happened during the past years. As a preamble to the second phase of our longitudinal research, the following results and discussion part focuses on the summary of socio-economic and demographic changes in Hungary.

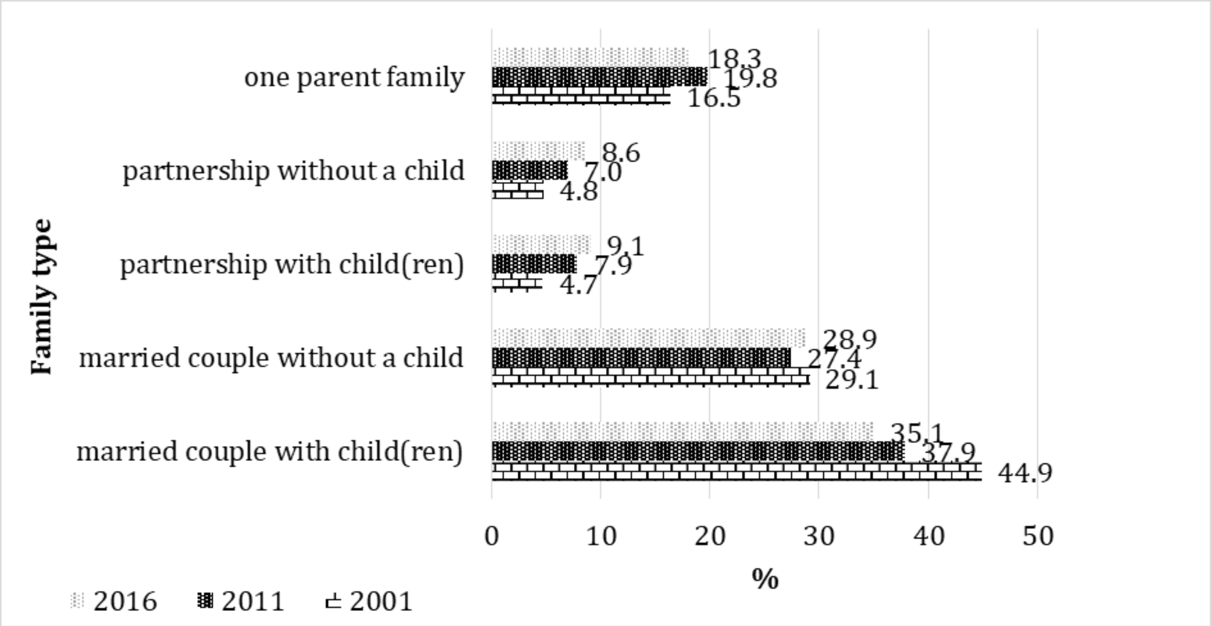
## 3 Results and Discussion

The legal definition of family is different by countries; however the international research group needs to understand family in the same way. Therefore the following core definition was formulated: family is a small group of minimum 2 people living together in one household. The 2 people could be 2 adults (husband and wife or partners living together) or 1 adult (father or mother) and 1 child (regardless of age). Partnership can also mean the registered partnership of same sex people if it is legal in the given country. The Hungarian, Czech and Slovakian partners accepted this definition as it is, and the Polish researchers added that from among the 500 families selected in each country, min. 300 should correspond to the criteria: adult(s) with a child (regardless of age) living together in one house. As the first step in our research, the socio-economic and demographic situation of families defined so has to be explored on the bases of reviewing literature and official reports. In the followings we give a brief situation report concerning Hungary.

The Hungarian population is aging. Since 2007 the ratio of those aged 65 and more years has risen. The number of children aged 0 to 14 is decreasing. In 2007 the number of live birth per 10000 inhabitants was 9.7, while by 2016 it was only 9. The ratio of deaths by 1000 inhabitants was 13.2 in 2007 and remained so in 2016 also. It indicates a natural decrease of the population [4].

This decrease in the population is accompanied by a decrease in the number of married couples. However the number of marriages per year shows an increasing tendency. The ratio of legally married couples is continuously decreasing since 2001, while the ratio of partners living together without marriage is increasing. There is also a considerable ratio of one parent families (Figure 1).

**Figure 1. Family structures in Hungary (2001, 2011, 2016)**



(Based on [5] and [6])

According to estimates the Central Statistical Office of Hungary used until 2014, 40% of Hungarian families live under the poverty line. In the European Union the relative approach based on income is accepted for measuring poverty that is why Hungary has also chosen that method [7]. In this method the poverty line is defined as 60% of the median income of the country which results at much less amount than the poverty line estimate of the previous years. According to the results of the stratification research carried out in 2014 the structure of the

Hungarian society was depicted as a pear, indicating the increasing predominance of the lower strata, and a giant gap between large cities and small settlements [8].

As there are more and more people living under worse financial conditions, there must be expenses that have to be reduced. People spend less on hygiene, body care, washing powder, detergents, culture, education, private tutoring, cable TV, health-care expenses, clothing, food and home maintenance. At the same time expenditure spent on travelling, overheads of the home, and taxes has slightly risen [8]. These are all especially important information when talking about lifestyle.

As Max Weber [10] conceptualised in his model about lifestyle, there are life opportunities and life chances that are objective determinants provided by our social status, and there are life choices to be made among the given tighter or narrower range of opportunities we have (see also [11])). As the previously presented trend indicates, most of the population has less and less range of choices. But it is also important to teach people to make the healthy choices from the range at their disposal.

## 4 Conclusion

The Lalonde Report [2] has already stated that lifestyle is the strongest 'health field' determining our health. The first stage of our longitudinal research confirmed the strength of traditionality in the lifestyle of the families in the Visegrad Countries. The global international processes of the past one and a half decades revealed an intensified prevalence of conservativism and traditionality, which made our research group even more motivated to grasp the effect these global processes exercise on our lifestyle. The scientific thinking of the 21st century, the different fashionable lifestyle practices exaggerated by the media (e.g. fashionable diets like Atkins, Hay, blood-type or celebrity methods; fashionable new phenomena, like e-sports etc.) overwhelm the discourse on lifestyle.

In lifestyle all elements of health manifest. Our thinking in terms of health promotion is health-centred. Thinking like Aaron Antonovsky does, we need to understand the factors promoting health (12). Such factor is the integration of existing and emphasised traditional lifestyle elements - we found in the Visegrad Countries - into the health promotion process. Effective health policy recommendations should be based on the knowledge of current Central-East European characteristics of lifestyle, and to acquire and reinforce that knowledge is our main aim with this longitudinal research.

## References

[1] BENKŐ, ZS. (ED.). 2007. *Tradition and Modernity in the life-style of the families of the Visegrád countries*, Szeged: JGYF Kiadó.

[2] LALONDE, M. 1974. *A New Perspective on the Health of Canadians*. Ottawa, Ontario, Canada: Minister of Supply and Services.

[3] ERDEI, F. 1971. *Város és vidéke (Town and the surrounding rural areas)*, Budapest: Szépirodalmi Kiadó.

[4] WORLD BANK. 2017. *Population estimates and projections*. Available on https://data.worldbank.org/data-catalog/population-projection-tables

[5] KSH 2011. *Népszámlálás 2011 (Population census 2011)* Available on http://www.ksh.hu/nepszamlalas/tablak_teruleti_00

[6] KSH. 2017. *Mikrocenzus 2016. 2. A népesség és a lakások jellemzői (Micro census 2016. 2. Population and housing characteristics)*. KSH: Budapest.

[7] KSH. 2015. A létminimum-számítás megújítása (Renewal of subsistence minimum calculation). *Műhelytanulmányok 9*,Budapest: KSH.

[8] BÁNÓCZI, E., LABAI, I., KOVÁSSY, K. 2015. A "körte" (The "Pear"). *Jel-Kép. Kommunikáció, közvélemény, media*; 3: 121-144.

[9] SZIVÓS, P., TÓTH, I. GY. 2015. *Jól nézünk ki (...?!). Háztartások helyzete a válság után (We look good (...?!) Situation of households after the crisis)*. Tárki Monitoring Jelentések 2014, Budapest: TÁRKI.

[10] WEBER, M. 1967. *Gazdaság és társadalom (Economy and Society)*, Budapest: Közgazdasági és Jogi Könyvkiadó.

[11] BENKŐ, ZS. 2000. A családok életmódját meghatározó társadalmi tényezők (Social factors determining the lifestyle of families). *Szenvedélybetegségek*. 2000. VIII. (1.): 54-57.

[12] BENKŐ, ZS. 2016. Homo Sanus: az egészséggel megáldott ember (Homo Sanus: the person blessed with health). In: TARKÓ, K., BENKŐ, ZS. (EDS.). "Az egészség nem egyetlen tett, hanem szokásaink összessége". Szemelvények egy egészségfejlesztő műhely munkáiból. ("Health is not a single act, but the totality of our habits." Exerpts from the works of a health promotion workshop. ) Szegedi Egyetemi Kiadó, Juhász Gyula Felsőoktatási Kiadó, Szeged.

# Are Disease Severity, Sleep-Related Problems and Mastery Associated with Work Functioning in Patients with Obstructive Sleep Apnea?

Vladimira Timkova[1,2], Iveta Nagyova[1], Sijmen A. Reijneveld[3], Ruzena Tkacova[4], Jitse P. van Dijk[2,3], Ute Bültmann[3]

[1]Department of Social and Behavioural Medicine, Faculty of Medicine, PJ Safarik University in Kosice, Slovakia
[2]Graduate School Kosice Institute for Society and Health, PJ Safarik University in Kosice, Slovakia
[3]Department of Health Sciences, Community & Occupational Medicine, University Medical Center Groningen, University of Groningen, Groningen, the Netherlands
[4]Department of Pneumology and Phtiseology, Faculty of Medicine, PJ Safarik University in Kosice, Slovakia

## Abstract

Background: Obstructive Sleep Apnea (OSA) is associated with an increase of healthcare costs, reduced work capacity, work disability and job-related accidents. A diminished sense of mastery may be related to poor physical, mental, and social functioning and to increased mortality rates in patients with various chronic conditions.
Methods: We included 105 patients (70% male; mean age 47.53±9.81 years) with the diagnosis of OSA (Apnea-Hypopnea Index – AHI≥5) based on a full-night polysomnography. All patients completed the Pittsburgh Sleep Quality Index, the Epworth Sleepiness Scale, the Pearlin Mastery Scale and the Work Role Functioning Questionnaire-2.0. To analyse data multiple linear regression was used.
Results: Impaired work functioning was present among 79% of OSA patients. OSA severity, poor sleep quality and mastery were univariately associated with impaired work functioning. Multiple linear regression analysis showed that mastery was more strongly associated with impaired work functioning than poor sleep quality. After adding mastery, the explained work functioning variance rose from 17.9% to 27.5%.
Conclusions: Poor sleep quality and mastery were strongly associated with impaired work functioning in OSA patients. The study implies that screening for sleep quality in clinical and workplace environment may help to identify a reversible cause of impaired work functioning. OSA patients and their physicians should be educated about mastery and its positive association with work functioning. The findings may help to optimize management, standard treatment and work functioning OSA patients when confirmed in longitudinal studies.

**Keywords:** obstructive sleep apnea, work functioning, nighttime sleep quality, daytime sleepiness, mastery.

## 1 Introduction

Obstructive sleep apnea (OSA) is a common underdiagnosed respiratory disorder characterized by recurrent upper airway obstruction during sleep [1]. The prevalence of OSA is high and it affects 9% of female and 24% of male working age population [2]. While OSA is a non-occupational disease, given its frequency, comorbidities, and potential to impair work functioning, it is inevitable that it may manifest as an important health and safety issue in the workplace [3]. The economic costs of OSA on healthcare systems as well as on individuals and their households have substantial relevance. Untreated OSA increases healthcare utilization and is associated with occupational injuries, accidents and reduced work performance [4-8].

The association between Apnea-Hypopnea index (AHI) and the individual experience of work limitations was found to be dependent on job type [6]; i.e. OSA severity did not affect work performance in white-collar workers, while it did in blue-collar workers. Most of the previous research on work correlates in OSA patients has quantified the outcomes using objective variables, such as absenteeism [7] or occupational accidents [9, 10], which may be lower-incidence events when compared to work functioning impairment.

As OSA patients have very little control over the disease and its symptoms and have to learn how to cope with it, effective mastery may help them to reduce the stress that breathing and sleep-related symptoms bring about, and may thus improve their overall functional status, including work functioning. Mastery is defined as a general sense of control over one's life and circumstances [11]. In line with this, a diminished sense of mastery was found to be associated with a decrease in overall functional ability [12]. In OSA patients with comorbid insomnia, the positive associations between mastery and both physical and mental quality of life remained significant even after adjustment for sociodemographic and clinical variables [13].

Insight into which OSA-related symptoms are associated with impaired work functioning, may provide opportunities for preventive strategies for productivity-loss among OSA working age population. To do that, we first need to understand how these symptoms relate to functioning in OSA untreated patients. Thus, the aims of this study were 1) to assess the prevalence of impaired work functioning in OSA patients, and 2) to examine whether OSA severity, sleep-related problems and mastery are associated with work functioning in OSA patients, when controlled for age, gender and type of occupation.

## 2 Sample and procedure

This cross-sectional study was conducted at the Department of Pneumology and Phtiseology, L. Pasteur University Hospital and the Medical Faculty of PJ Safarik University in Kosice, Slovak Republic. All patients who visited the Department for a one-night polysomnography (PSG) from July 2013 to April 2016 and underwent PSG were eligible for the study. Indication for PSG was based on a general practitioner referral form. OSA was diagnosed based on an overnight sleep study. PSG was used to determine whether the diagnosis of OSA was present and to identify the severity of the disorder. The study sample consisted of working patients with an Apnea Hypopnea Index (AHI; number of apneas + hypopneas per hour of sleep) score of 5 or more [19] who had not undergone any previous continuous positive airway pressure (CPAP) therapy or other OSA treatment, were Slovak-speaking and had no major comorbidities. Patients with non-respiratory sleep-related complaints (e.g. narcolepsy, insomnia) were routinely referred to another group of clinical specialists and were therefore not represented in our sample.

Out of N=152 OSA patients, a total of N=33 were excluded because of major comorbidities (a coexisting major sleep disorder such as narcolepsy, insomnia, or circadian rhythm sleep disorder; major cardiovascular diseases, primary pulmonary hypertension, chronic obstructive pulmonary disease, diabetes, Pickwick syndrome, a history of cancer in the past twelve months, neurological deficit, a major psychiatric diagnosis in the medical record, and/or current usage of psychiatric medications, or drug abuse in the past six months) and regular shift work. Clinical diagnosis of comorbidities were stated according to International Classification of Diseases-10 codes. Screening on comorbidities was based on medical data and an initial clinical interview prior to data collection. Another N=14 refused to participate in the study (response rate 89%). Data were obtained from medical examinations conducted by a pulmonologist specialized in sleep-disordered breathing and self-reporting questionnaires.

All patients signed a written informed consent prior to study participation. Participation in the study was fully voluntary, with no incentives for participation. The study was approved by the Ethics Committee of PJ Safarik University (approval no. 115/2011).

## 3 Measures

***Sleep-related problems.*** Sleep-related problems concerned night-time sleep quality and daytime sleepiness. *Night-time sleep quality* was measured using the Pittsburgh Sleep Quality Index (PSQI) [14]. The PSQI is a self-rated questionnaire to assess sleep quality and disturbances over a one-month time interval. The PSQI consists of 19 self-report questions which cover seven domains: subjective sleep quality, sleep duration, sleep latency, habitual sleep efficiency, sleep disturbances, use of sleep medication and daytime dysfunction. The score ranges from 0 to 21, with higher scores reflecting poor night-time sleep quality [14]. Cronbach's alpha in our sample was 0.85.

*Daytime sleepiness* was measured using the self-report Epworth Sleepiness Scale (ESS), an eight-item questionnaire assessing the tendency to fall asleep in various daytime scenarios [15]. The score ranges from 0 to 24, with higher scores indicating greater daytime sleepiness [15]. Cronbach's alpha in our sample was 0.86.

***Mastery.*** Mastery was measured using the Pearlin Mastery Scale (PMS) [11]. The PMS measures an individual's level of mastery, a psychological resource that has been defined as "the extent to which one regards one's life-chances as being under one's own control in contrast to being fatalistically ruled" [11]. The scale includes 7 items (five negatively-worded items and two positively-worded items), e.g. "You have little control over the things that happen to you", and "What happens to you in the future mostly depends upon you". The negatively-worded items require reverse coding prior to scoring, resulting in a score range of 7 to 28, with higher scores indicating higher levels of mastery [11]. Cronbach's alpha of the total scale was 0.87.

***Work functioning.*** Work functioning was assessed with the Work Role Functioning Questionnaire (WRFQ 2.0) [16]. The WRFQ measures the perceived difficulties in performing work demands among workers, given their emotional or physical health problems. The WRFQ consists of 27 items divided into subscales: work scheduling demands and output demands, physical demands, mental and social demands, and flexibility demands. Items are answered on a five-point scale: 0= difficult all the time (100%), 1= difficult most of the time (75%), 2= difficult half of the time (50%), 3= difficult some of the time (25%), 4= difficult none of the time (0%). There is also a response option 'Does not apply to my job'. The total score is calculated by adding all answers and dividing by the number of items and then multiplying by 25 to obtain percentages between 0 and 100. Higher scores indicate better work functioning. The scores on 'Does not apply to my job' are transformed into missing values [16]. To assess the prevalence of impaired work functioning, we used the cut-off value (<90) for patients with a chronic disease following Amick et al. [17]. In our sample, Cronbach's alpha was 0.98 for the total scale.

***Sociodemographic and clinical data.*** Information on age and gender was obtained from patient records. Patients were asked to identify the one industry that best characterized their current employment (over the last 24 months) from a list of International Standard Classification of Occupations [18]. Patients were also asked to specify their occupation to reduce the obtaining of incorrect or inconsistent information. OSA patients in the following industries were classified as blue-collar workers: primary resource industry, manufacturing industry, construction industry, warehousing, transportation and trade. Patients employed in public administration, armed forces, government and the service sector (education, healthcare, including tourism, business services, legislators, managerial occupations, professional and utilities) were classified as white-collar workers. OSA severity was determined using PSG and was based on an AHI (number of apneas + hypopneas per hour of sleep) score of 5 or more, according to standard criteria [19]. According to this, OSA severity is mild (AHI≥5≤15), moderate (AHI>15≤30) or severe (AHI>30).

### *Statistical analyses*

All analyses were performed using the Statistical Package for the Social Sciences (IBM SPSS 23). We started with a description of the background characteristics of the sample and determined the prevalence of impaired work functioning (WRFQ). Descriptive procedures included frequencies, percentage for categorical variables and means and standard deviations (SD) for continuous variables.

Then, we examined the associations between OSA severity, nighttime sleep quality, daytime sleepiness, mastery and work functioning in crude and adjusted linear regression analyses. We applied the enter method in linear regression to determine the factors associated with summary scores of work functioning in total and in the subscales. For each factor, beta coefficients represent the mean variation of work functioning. A first model of the variables included sociodemographic data (age, gender). A second model included type of occupation; a third model included clinical variable (OSA severity). Next model included nighttime sleep quality and daytime sleepiness. Finally, mastery was included to assess the increase in the explained amount of total variance in work functioning. Multicollinearity was assessed using the variance inflation factor (VIF<2.0). A p-value of <0.05 was considered to be statistically significant. Power analysis revealed that the statistical power for multivariate analysis exceed 87% at α=0.05. The statistical power for univariate analyses was 94% [20].

## 4 Results and Discussion

A total of N=105 OSA patients (mean age 47.53±9.81 years) constituted the final study sample. Most of the patients were male (70%) and had a secondary education (60%). Impaired work functioning was present among 79% of OSA patients (Table 1).

**Table 1. Baseline characteristics of the 105 OSA patients (AHI ≥5)**

| **Characteristics** | |
|---|---|
| Age in years; mean, SD | 47.53±9.81 |
| Gender; N, % male | 73 (70%) |
| Education; N, % | |
| Elementary | 4 (4%) |
| Secondary | 63 (60%) |
| University | 38 (36%) |
| Occupation type; N, % white-collar | 51 (49%) |
| Apnea-hypopnea index; mean, SD | 37.03±22.75 |
| OSA severity; N, % | |
| Mild (AHI≥5≤15) | 16 (15%) |
| Moderate (AHI>15≤30) | 40 (38%) |
| Severe (AHI>30) | 49 (47%) |
| Nighttime sleep quality (PSQI); mean, SD (0-21) | 11.09±4.31 |
| Excessive daytime sleepiness (ESS); mean, SD (0-24) | 10.31±5.29 |
| Mastery (PMS) ); mean, SD (7-28) | 20.13±4.35 |
| Work functioning (WRFQ) total scale; mean, SD (0-100%) | 52.59±28.76 |
| Impaired Work functioning; N, % (cut-off score <90) | 83 (79%) |

AHI – Apnea-Hypopnoea Index; OSA – Obstructive Sleep Apnea; PSQI – Pittsburgh Sleep Quality Index; ESS – Epworth Sleepiness Scale;
PMS – Pearlin Mastery Scale; WRFQ – Work Role Functioning Questionnaire.

*Associations between OSA severity, sleep-related problems, mastery and work functioning*

In the subsequent multivariate regression models, the effects of gender, OSA severity, nighttime sleep quality and mastery on work functioning were found to be significant. The association between OSA severity and work functioning (Model 1 - Model 3) was weak, and no longer significant when nighttime sleep quality was added to the model (Model 4). The association between sleep quality and work functioning was strong, but attenuated when mastery was added to the model. We found strong association between mastery and work functioning. The final model (Model 5) explained 27.5% of the work functioning total variance (Table 2).

**Table 2. Multiple linear regression analysis: associations of OSA severity, nighttime sleep quality, daytime sleepiness and mastery with work functioning**

| | **Crude** | **Model 1** | **Model 2** | **Model 3** | **Model 4** | **Model 5** |
|---|---|---|---|---|---|---|
| | **Beta** | **Beta** | **Beta** | **Beta** | **Beta** | **Beta** |
| Age | -0.07 | -0.04 | -0.03 | -0.01 | -0.01 | -0.04 |
| Gender | **0.24***** | **0.24*** | **0.24*** | **0.21*** | 0.16 | 0.13 |
| Occupation | -0.07 | - | -0.03 | -0.01 | -0.03 | 0.02 |
| OSA severity | **-0.20*** | **-** | **-** | -0.14 | -0.09 | -0.07 |
| Nighttime sleep quality | **-0.45***** | **-** | **-** | **-** | **-0.39***** | **-0.31**** |
| Daytime sleepiness | 0.11 | **-** | **-** | **-** | 0.06 | -0.11 |
| Mastery | **0.46***** | **-** | **-** | **-** | **-** | **0.34***** |
| F Change | **-** | **3.38*** | 0.09 | 2.51 | **8.27***** | **13.22**** |
| Adjusted $R^2$ | **-** | 0.046 | 0.037 | 0.052 | 0.179 | 0.275 |

Notes: Crude effects: effect of each variable separately on work functioning; Model 1: effect of age and gender on work functioning; Model 2: effect of age, gender and type of occupation on work functioning, Model 3: effect of age, gender, type of occupation and OSA severity on work functioning; Model 4: effect of age, gender, type of occupation, OSA severity, nighttime sleep quality and daytime sleepiness on work functioning; Model 5: effect of age, gender, type of occupation, OSA severity, nighttime sleep quality, daytime sleepiness and mastery on work functioning; Beta: unstandardized regression coefficient; Gender – male gender was set as the reference; Blue-white collar – white collar was set as the reference; OSA – Obstructive Sleep Apnea; F Change – significance of prediction improvement in the model fit; Adjusted $R^2$ – explained variance adjusted for the number of predictors in the model; $^*p<0.05$; $^{**}p<0.01$; $^{***}p<0.001$.

Impaired work functioning was present among 79% of OSA patients. OSA severity, poor sleep quality and mastery were univariately associated with work functioning. Our results provided suggestive evidence that poor nighttime sleep quality and poor level of mastery were associated with impaired work functioning. Mastery was more strongly associated with impaired work functioning than poor sleep quality. After adding mastery, the explained work functioning variance rose from 17.9% to 27.5%.

The association between OSA severity and work functioning in our study was weak. In line with our findings, previous studies have shown that AHI does not correlate well with the presence or degree of daytime sleepiness [e.g. 21, 22], poor sleep quality [22, 23] or functional status [24]. Our study revealed an association between poor nighttime sleep quality and impaired work functioning, whereas daytime sleepiness was not related to work functioning. Contrary to this finding, previous studies in patients referred for OSA described an association between excessive sleepiness and work limitation [e.g. 6, 25]. A potential explanation for these discrepancies could be that daytime sleepiness, measured by ESS, is assessed predominantly in a setting of decreased activity level (e.g. watching TV, sitting, reading etc.) compared with the higher mental or physical activity level usually expected in the working environment.

Although, it may be assumed that some OSA-related symptoms, such as sleep problems, may be more difficult to overcome due to the sedentary nature of work in the group of white-collar OSA patients, we found no significant difference regarding work functioning impairment in blue- and white-collar workers. However, the fact that white-collar workers in particular may have modified and more flexible work options or benefits enabling those with more severe OSA symptoms to continue to work without significant impairment should be considered [6].

Our results suggest that mastery may have the potential to improve work functioning when confirmed in longitudinal studies. The findings may *help to* optimize *management, standard treatment and work functioning OSA patients.* Mastery may also be improved by chronic disease management programmes [26], or by relaxation techniques [27].

## 5 Conclusion

Screening for sleep quality in clinical and workplace environment may help to identify a reversible cause of impaired work functioning. Due to high prevalence of impaired work functioning among OSA patients, governments, transportation agencies, industry, and insurance companies need to be better informed concerning the economic impact of untreated OSA [28]. Education of OSA patients, provided by psychologists or trained nurses focusing on personal empowerment for maintaining an adequate level of mastery, may be efficient when confirmed in longitudinal studies.

## Acknowledgements

This work was supported by the Slovak Research and Development Agency under contract APVV-15- 0719.

## Contact

Vladimira Timkova; e-mail: vladimira.timkova@upjs.sk

## References

[1] YOUNG, T., PALTA, M., DEMPSEY J., ET AL. 1993*. The occurrence of sleep-disordered breathing among middle-aged adults. The New England Journal of Medicine;* 32:1230–1235.

[2] YOUNG, T., PALTA, M., DEMPSEY, J., ET AL. 2009. Burden of sleep apnea: Rationale, design, and major findings of the Wisconsin Sleep Cohort study. *Wisconsin Medical Journal*; 108:246–249.

[3] KALES, S. N., CZEISLER, C. A. 2016. Obstructive sleep apnea and work accidents: time for action. *Sleep*; 39(6):1171-1173.

[4] WITTMANN, V., RODENSTEIN, D. O., 2004. Health care costs and the sleep apnea syndrome. *Sleep Medicine Reviews*; 8(4):269-279.

[5] REUVENI, H., GREENBERG-DOTAN, S., SIMON-TUVAL, T., ET AL. 2008. Elevated healthcare utilisation in young adult males with obstructive sleep apnoea. *European Respiratory Journal*; 31(2):273-279.

[6] MULGREW, A. T., RYAN, C. F., FLEETHAM, J. A., ET AL. 2007. The impact of obstructive sleep apnea and daytime sleepiness on work limitation. *Sleep Medicine*; 9(1):42-53.

[7] SIVERTSEN, B., ØVERLAND, S., GLOZIER, N., ET AL. 2008. The effect of OSAS on sick leave and work disability. *European Respiratory Journal*; 32(6):1497-1503.

[8] LEGER, D., BAYON, V., LAABAN, J., ET AL. 2012. Impact of sleep apnea on economics. *Sleep Medicine Reviews*; 16(5):455-462.

[9] NODA, A., YAGI, T., YOKOTA, M., ET AL. 1998. Daytime sleepiness and automobile accidents in patients with obstructive sleep apnea syndrome. *Psychiatry and Clinical Neurosciences*; 52(2):221-222.

[10] PIZZA, F., CONTARDI, S., MONDINI, S., ET AL. 2009. Daytime sleepiness and driving performance in patients with obstructive sleep apnea: comparison of the MSLT, the MWT, and a simulated driving task. *Sleep*; 32(3):382-391.

[11] PEARLIN, L. I., SCHOOLER, C. 1978. The structure of coping. *Journal of Health and Social Behavior*; 19(1): 2-21.

[12] KEMPEN, G. I., RANCHOR,, A. V., VAN SONDEREN E., ET AL. 2006. Risk and protective factors of different functional trajectories in older persons: are these the same? *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences*; 61(2):95–101.

[13] LANG, C. J., APPLETON, S., VAKULIN, A., ET AL. 2016. Psychological and quality of life factors in men with comorbid Obstructive Sleep Apnea (OSA) and insomnia (Ins): a population study. In: *Sleep DownUnder 2016: 28th ASM of Australasian Sleep Association and Australasian Sleep Technologists Association* (20-22 October 2016, Adelaide, Australia). *Journal of Sleep Research*; 25(2):14.

[14] BUYSSE, D. J., REYNOLDS, C. F., MONK, T. H., ET AL. 1989. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Research*; 28(2):193-213.

[15] MILETIN, M. S., HANLY, P. J. 2003. Measurement properties of the Epworth sleepiness scale. *Sleep Medicine*; 4(3):195-199.

[16] ABMA, F. I., VAN DER KLINK, J. J., BÜLTMANN, U. 2013. The work role functioning questionnaire 2.0 (Dutch version): examination of its reliability, validity and responsiveness in the general working population. *Journal of Occupational Rehabilitation*; 23(1):135-147.

[17] AMICK III, B. C., HABECK, R. V., OSSMANN, J., ET AL. 2004. Predictors of successful work role functioning after carpal tunnel release surgery. *Occupational and Environmental Medicine;* 46(5):490-500.

[18] INTERNATIONAL STANDARD CLASSIFICATION OF OCCUPATIONS: ISCO-88. INTERNATIONAL LABOUR OFFICE. 1990. Geneva: International Labour Office.

[19] AMERICAN ACADEMY OF SLEEP MEDICINE. 2005. *International Classification of Sleep Disorders: Diagnostic and Coding Manual*. 2nd edition. Sleep Disorders Association, Rochester, MN (ICSD-2).

[20] FAUL, F., ERDFELDER, E., BUCHNER, A., ET AL. 2009. Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behav Res Methods*; 41(4):1149-1160.

[21] BIXLER, E. O., VGONTZAS, A. N., LIN, H. M., ET AL. 2005. Excessive daytime sleepiness in a general population sample: the role of sleep apnea, age, obesity, diabetes, and depression. *The Journal of Clinical Endocrinology & Metabolism*; 90(8):4510–4515.

[22] MACEY, P. M., WOO, M. A., KUMAR, R., ET AL. 2010. Relationship between obstructive sleep apnea severity and sleep, depression and anxiety symptoms in newly-diagnosed patients. *PloS One*; https://doi.org/10.1371/journal.pone.0010211.

[23] KEZIRIAN E. J., HARRISON S. L., ANCOLI-ISRAEL S., ET AL. 2009. Behavioral correlates of sleep-disordered breathing in older men. *Sleep*; 32(2): 253–261.

[24] SHARKEY, K. M., ORFF, H. J., TOSI, C., ET AL. 2013. Subjective sleepiness and daytime functioning in bariatric patients with obstructive sleep apnea, *Sleep and Breathing*; 17(1):267-274.

[25] ULFBERG, J., CARTER, N., TALBÄCK, M., ET AL. 1996. Excessive daytime sleepiness at work and subjective work performance in the general population and among heavy snorers and patients with obstructive sleep apnea. *Chest*; 110(3):659-663.

[26] REA, H., MCAULEY, S., STEWART, A., ET AL. 2004. A chronic disease management programme can reduce days in hospital for patients with chronic obstructive pulmonary disease. *Internal Medicine Journal*; 34(11):608-614.

[27] O'BRIEN, G., O'BRIEN, P. G., KENNEDY, W. Z., ET AL. 2012. *Psychiatric Mental Health Nursing: an introduction to theory and practice*. 2nd edition, Jones & Bartlett Publishers. ISBN: 978-1-4496-5174-9.

[28] ALGHANIM, N., COMONDORE, V. R., FLEETHAM, J., ET AL. 2008. The economic impact of obstructive sleep apnea. *Lung*; 186(1):7-12.

# Conference Partners and Sponsors

Society of Social Medicine and Health Care Management of the Czech Medical Association of Jan Evangelista Purkyně, Czech Republic

The Institute for Postgraduate Medical Education (IPVZ), Prague, Czech Republic

The Slovak Public Health Association (SAVEZ)

Faculty of Medicine, Pavol Jozef Šafárik University in Košice, Slovakia

Polish Society of Public Health

The Hungarian Association of Public Health Training and Research Institutions (HAPHI)

The conference is sponsored by the City of Prague. The conference is held under the auspices of Radek Lacko, the City of Prague councillor for health and housing.

9 788088 260080