Zadnik V, Guillaume E, Lokar K, Žagar T, Primic Žakelj M, Launoy G, Launay L. Slovenian version of the European deprivation index at municipality level. Zdr Varst. 2018;57(2):47-54. doi: 10.2478/sjph-2018-0007.

SLOVENIAN VERSION OF THE EUROPEAN DEPRIVATION INDEX AT MUNICIPAL LEVEL

SLOVENSKA RAZLIČICA EVROPSKEGA KAZALNIKA PRIMANJKLJAJA NA RAVNI OBČIN

Vesna ZADNIK[1*], Elodie GUILLAUME[2], Katarina LOKAR[1], Tina ŽAGAR[1], Maja PRIMIC ŽAKELJ[1], Guy LAUNOY[2,3], Ludivine LAUNAY[2,4]

[1]Institute of Oncology, Epidemiology and Cancer Registry, Zaloška 2, 1000 Ljubljana, Slovenia
[2]U1086 "Anticipe" INSERM-Normandy Caen University, Caen, France
[3]Pôle Recherche, University Hospital of Caen, Caen, France
[4]Centre François Baclesse, Caen, France

Received: Jun 19, 2017
Accepted: Dec 21, 2017

Original scientific article

ABSTRACT

Introduction: Ecological deprivation indices belong to essential instruments for monitoring and understanding health inequalities. Our aim was to develop the SI-EDI, a newly derived European Deprivation Index for Slovenia. We intend to provide researchers and policy-makers in our country with a relevant tool for measuring and reducing the socioeconomic inequalities in health, and even at a broader level.

Methods: Data from the European survey on Income and Living Conditions and Slovenian national census for the year 2011 were used in the SI-EDI construction. The concept of relative deprivation was used where deprivation refers to unmet need(s), which is caused by lack of all kinds of resources, not only material. The SI-EDI was constructed for 210 Slovenian municipalities. Its geographical distribution was compared to the distribution of two existing deprivation scores previously applied in health inequality research in Slovenia.

Results: There were 36% of adults recognized as deprived in Slovenia in 2011. SI-EDI was calculated using 10 census variables that were associated with individual deprivation. A clear east-to-west gradient was detected with the most deprived municipalities in the eastern part of the country. The two existing deprivation scores correlate significantly with the SI-EDI.

Conclusions: A new deprivation index, the SI-EDI, is grounded on the internationally established scientific concept, can be replicated over time and, crucially, provides an account of the socioeconomic and cultural particularities of the Slovenian population. The SI-EDI could be used by the stakeholders and the governmental and nongovernmental sectors in Slovenia, with the goal of better understanding health inequalities in Slovenia.

Keywords:
European Deprivation Index – Slovenian version, deprivation index, health inequalities, socioeconomic determinants

IZVLEČEK

Uvod: *Kazalniki, ki na ravni izbranih geografskih enot prikazujejo socialno-ekonomsko blagostanje oziroma primanjkljaj prebivalstva, so danes temeljno orodje za preučevanje in razumevanje neenakosti v zdravju. V prispevku predstavljamo SI-EDI, novo razvit kazalnik primanjkljaja na ravni slovenskih občin. SI-EDI je slovenska različica evropskega kazalnika primanjkljaja (European Deprivation Index – EDI), ki ga v javnozdravstvenih raziskavah že uspešno uporabljajo v Franciji, Španiji, Italiji, Angliji in na Portugalskem. Namen raziskave je tudi preveriti veljavnost SI-EDI in ga tako kot ustrezno orodje ponuditi raziskovalcem in odločevalcem.*

Metode: *Za izdelavo SI-EDI smo uporabili podatke za leto 2011 iz dveh virov: (1) podatke slovenske različice Ankete o življenjskih pogojih, ki jo na zahtevo Eurostata na reprezentativnem vzorcu posameznikov letno izvaja nacionalni statistični urad, in (2) podatke iz popisa prebivalstva. Izračun temelji na konceptu relativnega primanjkljaja, ki ga je prvi opisal Townsend, danes pa se v nekoliko prilagojeni obliki uporablja tudi v izračunu kazalnikov primanjkljaja na ravni Evropske unije. V konceptu relativnega primanjkljaja so pomanjkanju podvrženi posamezniki, ki jim ni omogočeno zadovoljevanje različnih vrst potreb, ne samo materialnih. SI-EDI za 210 slovenskih občin smo izračunali po enaki metodi, kot se uporablja za EDI. Njegovo veljavnost smo preizkušali s primerjavo z dvema obstoječima kazalnikoma, ki sta se v slovenskem prostoru v zadnjem obdobju uporabljala v raziskavah in prikazih socialno-ekonomske neenakosti v zdravju po občinah: koeficientom razvitosti občin, ki ga uporablja NIJZ, ter kazalnikom primanjkljaja, ki ga je v dosedanjih analizah bremena raka uporabljala naša raziskovalna skupina.*

Rezultati: *Med štirimi temeljnimi življenjskimi potrebami (dostopnost počitnic, zmožnost ogrevati bivališče, osebnega računalnika in avtomobila), ki so se v raziskavi izkazale za povezane z objektivno ali subjektivno revščino, vsaj ene izmed njih ni zadovoljilo 36 % odraslih. Ti so bili opredeljeni kot prikrajšani na individualni ravni. Njihove lastnosti so bile prenesene na populacijsko raven v agregirani obliki, tako da smo za izračun SI-EDI uporabili 10 ustreznih popisnih spremenljivk. Na zemljevidu SI-EDI po občinah je jasno viden trend večanja socialno-ekonomskega primanjkljaja od zahoda proti vzhodu države. Največje vrednosti SI-EDI imajo področja na skrajnem severovzhodu in jugovzhodu države. Povezava SI-EDI z dvema obstoječima kazalnikoma primanjkljaja je bila statistično značilna.*

Zaključki: *Nov kazalnik primanjkljaja SI-EDI je zasnovan na mednarodno priznanem znanstvenem konceptu, lahko se replicira v času in prostoru, ter kar je najpomembnejše, odraža socialno-ekonomske in kulturne posebnosti populacije. Prepričani smo, da lahko služi kot ustrezno orodje pri razumevanju socialno-ekonomskih razlik v zdravju, zagotovo pa je lahko uporaben tudi drugod, ne samo na javnozdravstvenem področju.*

Ključne besede:
slovenska verzija evropskega kazalnika primanjkljaja, kazalnik primanjkljaja, neenakosti v zdravju, socialno-ekonomske determinante

***Corresponding author:** Tel. + 386 1 587 894 51; E-mail: vzadnik@onko-i.si

1 INTRODUCTION

People's health is intimately linked with the social and economic conditions in which they live. For the World Health Organisation, the concept of health pertains not only to the absence of disease or infirmity, but also to the state of complete physical, mental and social well-being (1). Since health starts long before illness in our families, homes, schools and workplaces, health inequalities arise from the conditions in which people are born, grow, live, work and age. These conditions are shaped by political, social and economic forces. The social determinants of health include our early life experiences which start before birth, the formal support received by our parents, our network of social support at home and within the community, social exclusion, poverty and discrimination, unemployment and the lack of job security, the amount of control we have at work, the type and quality of food to which we have access and the type of transport available to us (2–4). Socioeconomic problems are now seen as health problems that must be addressed to ensure that everyone has an equal chance for a healthy life (5, 6).

Tackling social inequalities in health is an ongoing priority for international health authorities and for many national governments in Europe (6). In Slovenia, the Ministry of Health coordinates all intersectoral action aiming to reduce health inequalities by improving the accessibility and use of health care services, including preventive and other public health-care programmes. It specifically focuses on vulnerable target groups (7). Evidence-based health policies require reliable and accurate measures of the socioeconomic environment of populations. Several approaches exist for measuring the socioeconomic status. Since individual socioeconomic data are often absent or poorly collected in large routine health databases, ecological measures based on aggregated census data are typically applied in such studies. They are commonly known as deprivation indices and are now available in many European countries (8–12) and worldwide (13–15). In Slovenia, however, there is still no standard deprivation measure for revealing socioeconomic inequalities at the local level (16).

Townsend pioneered the definition of poverty in terms of relative deprivation. Accordingly, the deprived are those who lack the necessities and activities that are widely encouraged or approved in the society to which they belong. Such unmet needs are due to a lack of resources of all kinds, not just financial. Needs differ between societies and periods (17, 18). By following the Townsend philosophy of relative deprivation and its extension to population level on an ecological scale, a European Deprivation Index (EDI) was proposed by two French teams in 2012 (19). They suggested a method for constructing a country-specific ecological deprivation index that best reflects individual experience of deprivation by using the European Union Statistics on Income and Living Conditions survey (EU-SILC) and selects ecological variables from national censuses that are most closely related to the individual deprivation indicator specific for each country. The procedure can be used to construct an ecological deprivation index using the smallest available geographical levels in a replicable way for all European Union members. So far, the EDI has been developed for France, Italy, Portugal, Spain and England (20, 21), and has since then been used in several studies on social inequalities in cancer burden (22–24), screening uptake (25) and health care access (26), orthopaedic care (27) and even environmental exposure (28).

The aim of our study was to develop the SI-EDI, a newly derived EDI for Slovenia. It was designed at the municipal level, the smallest administrative units where local policy is conducted, with the intention to provide researchers and policymakers in our country with a relevant tool for measuring and reducing socioeconomic inequalities in health, and even at a broader level.

2 METHODS

2.1 Data Sets

Information from two databases was combined in our analysis: EU-SILC and national census. In Slovenia, both databases are managed by the Statistical Office of the Republic of Slovenia and were supplied for our research in an anonymised version for the year 2011. The EU-SILC survey is organised by Eurostat and is based on a standardised questionnaire for interviewing a representative panel of households and individuals. It is specially designed to study deprivation and provides data on income, poverty, social exclusions and living conditions in the EU (29). To ensure the population is appropriately represented, all the EU-SILC responses were weighted on the survey sample design, response rate and population size for this report. The Slovenian national census 2011 was registry-based; the existing statistical and administrative data sources were linked (30). The census provides data on individual characteristics, features of households/families and dwellings traits for all 2 million inhabitants in Slovenia.

2.2 The Construction of the Ecological Deprivation Index

The development of the EDI was based on the thinking of Townsend, for whom deprivation refers to unmet need, which is due to the lack of all kinds of resources (17, 18). The full methodological and theoretical concepts have been reported previously (19). The construction of EDI can be summarised in three steps:

1. Construction of an individual deprivation indicator (EU-SILC data);
2. Identification and dichotomization of variables available at both aggregate (census data) and individual levels (EU-SILC data);
3. Construction of an ecological deprivation index, the EDI (EU-SILC and census data).

First, the objective and subjective poverty for a specific population are defined. Next, the fundamental needs associated with both types of poverty are identified. Individuals lacking those fundamental need(s) are defined as deprived. The information from the sample (individual) level is then transferred to the population (aggregated) level and, finally, the EDI is calculated for each geographical unit denoted as a simple weighted sum of z-scored percentages (=normalized to the national mean) of a deprived category of each EDI component (equation 1):

$$EDI_i = \sum_{j=1}^{J} w_j \cdot V_j \qquad [1]$$

where V1, … VJ are the variables that compose the EDI and w represents their weights. Statistical analysis was performed with IBM SPSS Statistics Version 24, using the Complex Samples module. Results with a p-value of less than 0.05 were considered statistically significant.

2.3 Results Presentation and Validation

The SI-EDI was constructed for 210 Slovenian municipalities as defined in 2011. First, the anonymised individual census data were aggregated at municipal level. In the aggregated dataset, exact individual values were replaced by categorized variables. The resulting SI-EDI was mapped in ArcGIS 10.4.1, using the quintile scale. The geographical distribution of SI-EDI was compared to two deprivation scores that were recently used for explaining inequalities in health in Slovenia: [1] the deprivation index developed by Zadnik et al. in 2006 for explaining the spatial trend of the cancer burden in Slovenia (31, 32) and [2] the Development Deficiency Index, which is routinely provided by the Slovenian Ministry of Finance to facilitate the attribution of governmental financial aid to the municipalities (33, 34). Visual inspections of the three maps provided insight into the similarities and differences between the three deprivation indices. Visual impressions were tested numerically by calculating Spearman correlation coefficients.

3 RESULTS

3.1 Individual Deprivation Indicator

There were 9,247 households and 24,600 individuals aged 16 and over included in the EU-SILC survey in Slovenia in 2011. According to their household income, 18.7% of individuals aged over 16 could be considered poor in Slovenia in 2011. The objective poverty threshold of 600€ equalised income per month per household member was applied in accordance with the EUROSTAT at-risk-of-poverty threshold definition. It corresponds to 60% of the national median equalised disposable income (29). Together with objective poverty, perceived (subjective) poverty was estimated by comparing responses to the item 'ability to make ends meet' (Table 1) with objective poverty. In Slovenia in 2011, almost one third (32%) of individuals who made ends meet 'with great difficulty' or 'with difficulty' perceived themselves as poor.

Table 1. Ability to make ends meet – weighted response to question HS120, EU-SILC 2011, Slovenia.

Ability to make ends meet	Weighted response (%)
With great difficulty	11.0
With difficulty	21.0
With some difficulty	38.7
Fairly easily	19.3
Easily	8.7
Very easily	1.2

Of the nine items where people were asked whether certain goods/services were within their means, eight were recognised as reflecting the goods/services considered necessary in a specific context of Slovenian society, while 'capacity to face unexpected financial expenses' was not considered essential by Slovenian residents. Table 2 presents the eight fundamental needs for Slovenians and indicates the proportion of households that did not possess/utilise them in 2011, because they could not afford them. Four of them: 'capacity to afford paying for one-week annual holiday away from home,' 'ability to keep home adequately warm,' 'possessing a computer' and 'possessing a car' were associated with objective and subjective poverty.

Table 2. Fundamental needs with the proportion of households who indicated that certain goods/services were not within their means, EU-SILC 2011, Slovenia.

Fundamental needs for people in Slovenia in 2011	goods/services were not within their means
***Capacity to afford paying for one week annual holiday away from home**	35.4
Capacity to afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day	12.4
***Ability to keep home adequately warm**	6.4
***Possessing a computer**	5.6
***Possessing a car**	5.5
Possessing a TV	0.7
Possessing a washing machine	0.5
Possessing a phone	0.3

* Fundamental needs that were associated with objective and subjective poverty

Only 0.6% of households lacked all four fundamental needs that were associated with both types of poverty, 2.8% lacked at least three needs, 11.0% at least two needs and 38.0% at least one need. Individuals who lived in a household that lacked at least one of the fundamental needs associated with both types of poverty were recognized as deprived in our analysis. There were 36.0% of individuals aged 16 and over recognised as deprived in Slovenia in 2011.

3.2 The Ecological Deprivation Index at Municipal Level

First, information from the EU-SILC was transferred to the national census. Sixteen socioeconomic variables were phrased and coded in the same way in both the EU-SILC 2011 and the Slovenian census 2011. However, age and sex are not appropriate for the construction of a deprivation index on the ecological level as they are essentially connected with individual deprivation and have a direct influence on health. Two other variables were omitted as the same information was already captured in other variables included. The dichotomisation of plurimodal variables was performed by applying the threshold where the best fit between the individual deprivation indicator and one of the categories of the corresponding variable was obtained. From the 12 dichotomous variables included, 10 were associated with the individual deprivation indicator calculated for the EU-SILC data by the multivariate logistic model in the previous step. Table 3 presents these 10 variables applied as the basic components in the SI-EDI calculation. In the adjusted Equation [1], they were included as a weighted sum of z-scored (=normalized to the national mean) percentages of a deprived category of each EDI component, for each geographical unit. The regression coefficients of the multivariate logistic model represent the weights for each component (also shown in Table 3).

Table 3. Components and its weights included in the calculation of the Slovenian European Deprivation Index (SI-EDI) for the year 2011.

SI-EDI component	Privileged category	Deprived category	Deprived in Slovenia 2011 (%)	Regression coefficient (weight)
Country of birth	Slovenia	Other	11.1	0.321
Citizenship	Slovenian	Other	4.0	0.368
Tenure status	Owner	Not owner	27.7	0.215
Household size (Members in household)	3+ members	<3 members	4.0	0.322
Access to bathroom or shower	Yes	No	3.1	2.423
Marital status	Married	Not married	60.0	0.362
Education	Achieved (upper) secondary education or more	Achieved lower secondary education or less	30.8	0.870
Current economic status (Activity)	Employed and self-employed	Other	56.6	0.554
Months unemployed	<3 months	3+ months	3.9	0.806
Occupation (ISCO-08 (COM))	Other	Elementary occupations	4.0	0.698

Figure 1 presents the map of the SI-EDI for the 210 municipalities in 2011, classified into quintiles. The SI-EDI score has the following distribution: minimum: -7.55, maximum: 17.17, median: -0.86, quintiles: 20%: -3.10, 40%: -1.44, 60%: 0.21, 80%: 2.44. A clear east-to-west gradient can be observed on the map with the most deprived municipalities in the north-eastern and south-eastern part of the country.

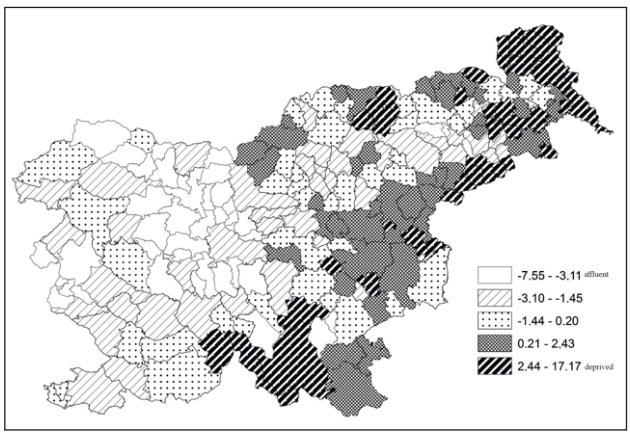

Figure 1. The European Deprivation Index for Slovenia (SI-EDI) for the year 2011, with municipalities classified into quintiles.

3.3 Comparison with Other Deprivation Scores

Municipalities are the smallest geographical units for which the association between socioeconomic inequalities and health has been explored in Slovenia in the last 20 years. Only two deprivation indices have been applied in these studies. Zadnik et al. developed a socioeconomic deprivation index by applying factorial analysis to the data of the national census 2001 (31, 32). This index classified into quintiles is presented in the upper part of Figure 2 and shows a clear east-to-west gradient. From the year 2016, the National Institute of Public Health has provided a variety of health indicators at municipal level (34). To describe socioeconomic inequalities, they have chosen to use the Development Deficiency Index, which is calculated by the Slovenian Ministry of Finance (33). This index classified into quintiles for 2011 and 2012 is presented in the lower part of Figure 2. The east-to-west gradient is only indicated here. Both maps correlate significantly with the newly developed SI-EDI, although the correlation is stronger for the deprivation index developed by Zadnik et al. (Spearman rho: 0.822 vs 0.622).

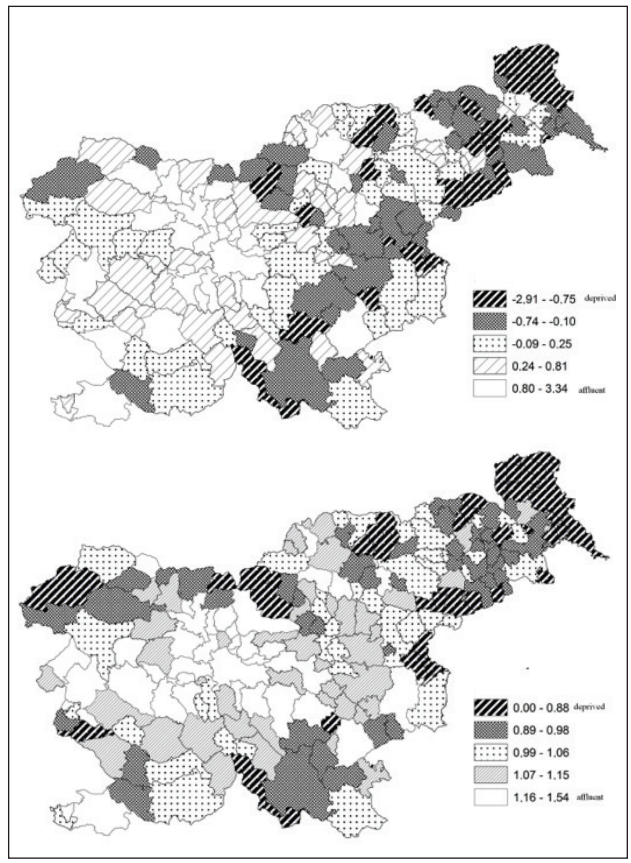

Figure 2. Up: Deprivation index suggested by (6). Down: National Development Deficiency Index (33).

4 DISCUSSION

This paper reports the development and validation of the SI-EDI, a newly derived ecological deprivation index for Slovenia. The SI-EDI classifies 210 Slovenian municipalities according to their level of socioeconomic deprivation. The method for its construction is based on a solid theoretical framework – the concept of relative deprivation - which was initially proposed by Townsend in the 1980s (17, 18) and has since heavily influenced both scientific and social thinking across the developed world (35). It was adopted as the official concept of poverty by the European Council in 1975 and has been retained with some modifications ever since (35–37).

The concept of relative poverty defines poverty on the individual level, individuals who lack necessities and activities that are widely encouraged or approved in the society to which they belong being described as deprived (17, 18). The EDI is an ecological deprivation

index, which summarises the socioeconomic status of individuals according to the level of deprivation assigned to the geographical area they live in. The ecological bias induced by this type of assessment is inevitable, its extent depending on the size of the population in the areas concerned (19). To address the issue of ecological fallacy, the methodology proposed for constructing the EDI includes two steps: [1] only the variables that are associated with subjective and objective poverty on the individual level are included in the EDI calculation; and [2] the EDI could be calculated for very fine geographical resolution concerning areas with extremely small populations, the only scale restriction being the area level for which the census data are available (19). To date, the EDI on the smallest available level has been developed for France, Italy, Portugal, Spain and England. The average population per unit applied in these analyses ranged from 170 inhabitants in Italy to 2,000 inhabitants in France (20, 21).

There were almost 10,000 inhabitants living on average in Slovenian municipalities in 2011. The SI-EDI reflects the average deprivation at municipality level where the socioeconomic heterogeneity of the population is wide. To study the influence of social inequalities and health in more detail, the SI-EDI should be prepared for smaller geographical areas. Our team believes that the 3,104 national polling station areas with the average population size of 600 inhabitants would be the most appropriate geographical division for investigating social inequalities and health in Slovenia.

Nevertheless, even though municipalities in Slovenia vary greatly in size, population density, infrastructure and other characteristics, they are the smallest administrative units where local policy is conducted in Slovenia. The disparities in well-being in Slovenian municipalities has been investigated by Malešič – this research shows a prevailing higher level of well-being in the west, while lower well-being was observed in the east of Slovenia (38). The municipalities are also the smallest geographical areas for which the Slovenian National Institute of Public Health presents and compares a selection of the most important health indicators within the project Health in the Municipalities, a yearly programme that began in 2016 (34). The National Development Deficiency Index is currently included as a deprivation index in the project Health in the Municipalities. The SI-EDI geographical distribution patterns show a satisfactory correlation with it as well as with the deprivation index suggested by Zadnik (6). The EDI is based on an established concept that is also recognised on the level of the European Union. Furthermore, it incorporates the social and cultural specifics of our population as it is based on the population specific survey. It also presents the socioeconomic inequalities existing in Slovenia; the same southwest-northeast pattern has been observed for mortality in Slovenia (39). Therefore, we believe it could possibly be used to improve future issues of the publication Health in the Municipalities and could serve as a relevant tool for policymakers for measuring and reducing socioeconomic inequalities in health.

One of the major advantages of the EDI is that it is both population-specific and fully replicable in all EU member states, thereby allowing direct cross-country comparisons. Comparison of EDIs developed for France, Italy, Portugal, Spain and England demonstrated that the impact of cultural differences may be lesser than expected: the fundamental needs for all five countries were practically identical, although there were other differences on the census variables that were included in the final EDI calculation (20). By using our results, we can extend this comparison to the SI-EDI. In Slovenia, we share the same fundamental needs as in the other five countries. The exception was the variable 'capacity to face unexpected financial expenses,' which was not recognised as a fundamental need only in Slovenia. In Slovenia, individuals who lived in households that lacked at least one of the fundamental needs associated with objective and subjective poverty were recognized as deprived, whereas in the other five countries at least two needs had to be lacking. Further studies are required to elucidate this difference. Ten census variables were included in the final SI-EDI calculation, nine in the French, Italian, Spanish and English EDI versions and eight in the Portuguese one (20). Three of them were shared by all countries, namely: occupation, education and tenure status. Considering the census variables included in the EDI, the SI-EDI is most like the French version with seven identical variables, whereas there were only four identical variables between the Slovenian and Portuguese EDI. A limited number of variables appearing at the same time in the EU-SILC and census data is one of the major limitations of the existing EDI.

The SI-EDI presented reflects the socioeconomic inequalities in Slovenia in the year 2011. Owing to the dynamic cohort of the EU-SILC system, the index can be replicated over time, since the 2014 EU-SILC survey data on deprivation are updated annually. Thus, the frequency of EDI upgrading could be annual even if the census data are collected only every ten years. In addition, the number of variables that reflect deprivation has been increased in EU-SILC surveys recently: new variables related to individual deprivation have been added to the existing variables that were related to deprivation at household level (37). The methodology for constructing the EDI can easily be adopted to include additional variables. The EDI with newly adopted variables reflecting individual perception would improve its power, particularly for measuring social inequalities.

5 CONCLUSIONS

Despite a universal healthcare system, inequalities in health in Slovenia are considerable. People further down the social ladder are at higher risk of serious illness and premature death than those closer to the top. A 30-year-old man with a university degree can expect to live 7.3 years longer than a man who has completed primary education or less (5). On the other hand, the risk of malignant melanoma and breast cancer is higher for women living in the economically privileged areas of central and western Slovenia (31).

Tackling social inequalities in health is a priority for Slovenian national policy, but so far, no standardised tool for their measurement has been developed. The new deprivation index described here has been constructed at municipal level. It is based on an established scientific concept, it can be replicated over time in other European countries and, most importantly, it provides an account of the socioeconomic and cultural particularities of the Slovenian population. We believe that the SI-EDI could be used by stakeholders and governmental and non-governmental sectors in Slovenia with the goal of better understanding health inequalities in Slovenia.

ACKNOWLEDGEMENTS

The authors thank Danilo Dolenc, Rihard Inglič and Martina Stare from the Statistical Office of the Republic of Slovenia and Metka Zaletel from the Slovenian National Institute of Public Health for their valuable comments on the selection of the variables and their interpretation.

FUNDING

This work was founded in part by the Institute of Oncology Ljubljana, GRELL – Group of Registry and Epidemiology of Cancer in Latin Speaking Countries and the French Ligue Contre le Cancer.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

ETHICAL APROVAL

The data for this study was derived from the EU-SILC 2011 for Slovenia and from the Slovenian national census 2011. All the analyses were performed on anonymised and aggregated data. The results do not include personal information.

REFERENCES

1. WHO. Preamble to the Constitution of WHO as adopted by the International Health Conference, New York, 19 June - 22 July 1946; signed on 22 July 1946 by the representatives of 61 States (Official Records of WHO;2:100) and entered into force on 7 April 1948. The definition has not been amended since 1948.
2. Dahlgren G, Whitehead M. European strategies for tackling social inequalities in health: leveling up, part 2. Copenhagen: World Health Organization, 2006.
3. Macknbach JP. Health inequalities: Europe in profile. Rotterdam: Erasmus MC, 2006.
4. Wilkinson R, Marmot M. Social determinants in health: the solid facts. 2nd ed. Copenhagen: World Health Organization, 2003.
5. Buzeti T, Djomba JK, Gabrijelčič Blenkuš M, Ivanuša M, Jeriček Klanšček H, Kelšin N, et al. Health inequalities in Slovenia. Ljubljana: National Institute of Public Health, 2011.
6. Marmot M, Allen J, Bell R, Bloomer E, Goldblatt P, Consortium for the European Review of Social Determinants of H, et al. WHO European review of social determinants of health and the health divide. Lancet. 2012;380:1011-29. doi: 10.1016/S0140-6736(12)61228-8.
7. Buzeti T, Gobec M. Health inequalities in Slovenia. Zdr Varst. 2012;51:75-9. doi: 10.2478/v10152-010-0028-3.
8. Caranci N, Biggeri A, Grisotto L, Pacelli B, Spadea T, Costa G. The Italian deprivation index at census block level: definition, description and association with general mortality. Epidemiol Prev. 2010;34:167-76.
9. Meijer M, Engholm G, Grittner U, Bloomfield K. A socioeconomic deprivation index for small areas in Denmark. Scand J Public Health. 2013;41:560-9. doi: 10.1177/1403494813483937.
10. Noble M, mcLennan D, Wilkinson K, Whitworth A, H. B. The english indices of deprivation 2007. London: Communities and Local Government, 2008.
11. Slachtova H, Tomaskova H, Splichalova A, Polaufova P, Fejtkova P. Czech socio-economic deprivation index and its correlation with mortality data. Int J Public Health. 2009;54:267-73. doi: 10.1007/s00038-008-7092-3.
12. Sundquist K, Malmstrom M, Johansson SE. Neighbourhood deprivation and incidence of coronary heart disease: a multilevel study of 2.6 million women and men in Sweden. J Epidemiol Community Health. 2004; 58:71-7.
13. Eibner C, Sturm R. US-based indices of area-level deprivation: results from HealthCare for Communities. Soc Sci Med. 2006;62:348-59. doi: 10.1016/j.socscimed.2005.06.017.
14. Frohlich N, Mustard C. A regional comparison of socioeconomic and health indices in a Canadian province. Soc Sci Med. 1996;42:1273-81.
15. Salmond C, Crampton P, Sutton F. NZDep91: a New Zealand index of deprivation. Aust N Z J Public Health. 1998;22:835-7.
16. Pecar J. Problematika merjenja blaginje oz razvitost na regionalni in lokalni ravni v Sloveniji. Ljubljana: Filozofska fakulteta, Oddelek za geografijo, 2014.
17. Townsend P. Poverty in the United Kingdom: a survey of household resources and standards of living. Hardmonsworth: Penguin Books, 1979.
18. Townsend P. Deprivation. J Soc Pol. 1987;16:125-46.
19. Pornet C, Delpierre C, Dejardin O, Grosclaude P, Launay L, Guittet L, et al. Construction of an adaptable European transnational ecological deprivation index: the French version. J Epidemiol Community Health. 2012;66:982-9. doi: 10.1136/jech-2011-200311.
20. Guillaume E, Pornet C, Dejardin O, Launay L, Lillini R, Vercelli M, et al. Development of a cross-cultural deprivation index in five European countries. J Epidemiol Community Health. 2016;70:493-9. doi: 10.1136/jech-2015-205729.
21. Ribeiro AI, Mayer A, Miranda A, Pina MF. The Portuguese version of the European Deprivation Index: an instrument to study health inequalities. Acta Med Port. 2017;30:17-25. doi: 10.20344/amp.7387.

22. Antunes L, Mendonca D, Bento MJ, Rachet B. No inequalities in survival from colorectal cancer by education and socioeconomic deprivation - a population-based study in the North Region of Portugal, 2000-2002. BMC Cancer. 2016;16:608. doi: 10.1186/s12885-016-2639-9.
23. Bryere J, Dejardin O, Launay L, Colonna M, Grosclaude P, Launoy G, et al. Socioeconomic status and site-specific cancer incidence, a Bayesian approach in a French Cancer Registries Network study. Eur J Cancer Prev. 2016. doi: 10.1097/CEJ.0000000000000326.
24. Marquant F, Goujon S, Faure L, Guissou S, Orsi L, Hemon D, et al. Risk of childhood cancer and socio-economic disparities: results of the French nationwide study Geocap 2002-2010. Paediatr Perinat Epidemiol. 2016;30:612-22. doi: 10.1111/ppe.12313.
25. Guillaume E, Launay L, Dejardin O, Bouvier V, Guittet L, Dean P, et al. Could mobile mammography reduce social and geographic inequalities in breast cancer screening participation? Prev Med. 2017;100:84-8. doi: 10.1016/j.ypmed.2017.04.006.
26. Moriceau G, Bourmaud A, Tinquaut F, Oriol M, Jacquin JP, Fournel P, et al. Social inequalities and cancer: can the European deprivation index predict patients' difficulties in health care access?: a pilot study. Oncotarget. 2016;7:1055-65. doi: 10.18632/oncotarget.6274.
27. Petit M, Bryere J, Maravic M, Pallaro F, Marcelli C. Hip fracture incidence and social deprivation: results from a French ecological study. Osteoporos Int. 2017;28: 2045-51. doi: 10.1007/s00198-017-3998-z.
28. Morelli X, Rieux C, Cyrys J, Forsberg B, Slama R. Air pollution, health and social deprivation: a fine-scale risk assessment. Environ Res. 2016;147:59-70. doi: 10.1016/j.envres.2016.01.030.
29. Eurostat. EU-SILC: description of target variables: cross-sectional and longitudinal, 2011 operation . Brussels: European Commission, 2011.
30. Dolenc D. Registrski popis prebivalstva v letu 2011 – nov izziv slovenske državne statistike. In: Noč Razinger M, Panič B, Zobec I, editors. Merjenje blaginje in napredka družbe: izzivi pri uporabi in razumevanju družbe. Ljubljana: Statistični urad Republike Slovenije, Statistično društvo Slovenije, 2010:140-1.
31. Zadnik V. Geografska analiza vpliva socialno-ekonomskih dejavnikov na incidenco raka v Sloveniji v obdobju 1995-2002: doktorsko delo. Ljubljana: Univerza v Ljubljani, Medicinska fakulteta, 2006.
32. Zadnik V, Reich BJ. Analysis of the relationship between socioeconomic factors and stomach cancer incidence in Slovenia. Neoplasma. 2006;53:103-10.
33. Določitev koeficientov razvitosti občin za leti 2011 in 2012. Ministrstvo za finance RS. Accessed Juny 1st, 2017 at: http://www.mf.gov.si/si/delovna_podrocja/lokalne_skupnosti/izracuni/dolocitev_koeficientov_razvitosti_obcin/za_leti_2011_in_2012/.
34. Tomšič S, Hočevar Grom A. Zdravje v občini: razvoj in definicije. Ljubljana: Nacionalni inštitut za javno zdravje, 2016.
35. Fahey T. Poverty and the two concepts of relative deprivation. Dublin: University College Dublin, 2010.
36. Guio AC. What can be learned from deprivation indicators in Europe? Luxembourg: European Union, 2009.
37. Guio AC, Gordon D, Najera H, Pomati M. Revising the EU material deprivation variables. Luxembourg: European Union, 2017. doi: 10.2785/33408
38. Malešič K. Metodologija merjanja blaginje občin v Sloveniji na osnovi sestavljenih kazalnikov: magistrsko delo. Ljubljana: Univerza v Ljubljani, Ekonomska fakulteta, 2016.
39. Artnik B, Vidmar G, Javornik J, Laaser U. Premature mortality in Slovenia in relation to selected biological, socioeconomic, and geographical determinants. Croat Med J. 2006;47:103-13.

Klok L, Engels Y, Veldhoven C, Rotar Pavlič D. Early identification of patients in need of palliative care in Slovenian general practice.
Zdr Varst. 2018;57(2):55-64. doi: 10.2478/sjph-2018-0008.

EARLY IDENTIFICATION OF PATIENTS IN NEED OF PALLIATIVE CARE IN SLOVENIAN GENERAL PRACTICE

ZGODNJE PREPOZNAVANJE PACIENTOV S POTREBO PO PALIATIVNI OSKRBI V SPLOŠNI ZDRAVSTVENI OSKRBI V SLOVENIJI

Lisette KLOK[1*], Yvonne ENGELS[2], Carel VELDHOVEN[2], Danica ROTAR PAVLIČ[3]

[1]Radboud University Medical Center, Faculty of Medicine, Regenwulp 19 Breda, 4822 RJ, the Netherlands
[2]Radboud University Medical Center, Department of Anaesthesiology, Pain and Palliative Medicine, Nijmegen, the Netherlands
[3]University of Ljubljana, Faculty of Medicine, Department of Family Medicine, Poljanski nasip 58, 1000 Ljubljana, Slovenia

Received: Apr 19, 2017
Accepted: Jan 15, 2018

Original scientific article

ABSTRACT

Background: To help general practitioners (GPs) in early identification of patients with palliative care (PC) needs, this pilot study aimed to determine the potential of the combined original surprise question (SQ1) ('Would I be surprised if this patient died within the next 12 months?') and the second surprise question (SQ2) ('Would I be surprised if this patient was still alive after 12 months?'). We hypothesized that answering these SQs would trigger them to make a multidimensional care plan.

Methods: 26 Slovenian GPs, randomized into 4 groups, were invited to write a care plan for each of the four patients described in case vignettes (2 oncologic, 1 organ failure and 1 frailty case). GPs in group 1 were only asked to write a care plan for each patient. GPs in group 2 answered SQ1 and GPs in groups 3 and 4 answered SQ1 and SQ2 before writing the care plan. The type and number of PC aspects mentioned in the respective care plans were quantified into a numeric RADboud ANTicipatory (RADIANT) score.

Results: Mean RADIANT scores in groups 1-4 were 2.2, 3.6, 2.5 and 3.1, respectively. When comparing the different vignettes, vignette B (terminal oncologic patient) scored best (3.6). Mean RADIANT scores in groups 3 and 4 were slightly higher for GPs who would be surprised compared to GPs who would not be surprised if the patient was still alive in 12 months.

Conclusion: The combined SQs were considered helpful in the early identification of patients in need of PC in Slovenian general practice.

Keywords:
palliative care, surprise question, general practitioners, Slovenia, cancer, organ failure, frail elderly, dementia

IZVLEČEK

Uvod: *Namen te študije kot pomoč splošnim zdravnikom (SZ) pri zgodnjem prepoznavanju pacientov s potrebo po paliativni oskrbi (PO) je določanje potenciala kombiniranega izvirnega vprašanja presenečenja (VP1): »Ali bi me presenetilo, če bi pacient umrl v naslednjih 12 mesecih?« ter drugega vprašanja presenečenja (VP2): »Ali bi me presenetilo, če bi bil ta pacient živ čez 12 mesecev?« Naša hipoteza temelji na domnevi, da bi odgovarjanje na ti dve VP sprožilo pripravo večdimenzionalnega načrta oskrbe.*

Metode: *Šestindvajset slovenskih SZ, ki so bili naključno razvrščeni v štiri skupine, smo prosili, naj pripravijo načrt oskrbe za vsakega od štirih pacientov, ki so bili opisani v vinjetah s primeri (2 onkološka primera, 1 odpoved organov in 1 primer krhkosti). SZ v 1. skupni so morali napisati poročilo o oskrbi za vsakega pacienta. SZ v 2. skupini so odgovorili na VP1, SZ v 3. in 4. skupini pa so odgovorili na VP1 in VP2, preden so pričeli pripravljati načrt oskrbe. Vrsta in število stališč PO, ki so bili omenjeni v načrtih oskrbe, so bili izmerjeni v numerični rezultat RADboud ANTicipatory (RADIANT).*

Rezultati: *Povprečni rezultati RADIANT od 1. do 4. skupine so bili 2,2, 3,6, 2,5 in 3,1. Pri primerjanju različnih vinjet je vinjeta B (umirajoči onkološki pacient) pridobila najboljši rezultat (3,6). Povprečni rezultati RADIANT v 3. in 4. skupini so bili rahlo višji pri SZ, ki bi bili presenečeni, v primerjavi s SZ, ki ne bili presenečeni, če bi bil pacient še vedno živ čez 12 mesecev.*

Zaključek: *Kombinirana VP pripomorejo k zgodnjemu prepoznavanju pacientov s potrebo po PO v splošni zdravstveni oskrbi v Sloveniji.*

Ključne besede:
paliativna oskrba, vprašanje presenečenja, splošni zdravniki, Slovenija, rak, odpoved organov, krhkost pri starostnikih, demenca

***Corresponding author:** Tel. + 316 241 89 472; E-mail: lisette_klok@live.nl

1 INTRODUCTION

During advanced stages of chronic life-limiting diseases, patients might benefit from palliative care (PC). Many patients in the Western world wish to remain at home during this palliative phase and to die there. Therefore, general practitioners (GPs) should play an important role in PC provision (1-4). In Slovenia, this is challenging since the average consultation time per patient is 7 minutes, and GPs do not receive extra payment for home visits (5). Other barriers in PC provision are the lack of knowledge, PC skills and experience, suboptimal communication with patients and with other healthcare professionals, and the uncertainty and unpredictability of illness trajectories, especially in non-cancer illnesses. (6-10). Therefore, PC is often restricted to physical symptom relief in the terminal phase, including emergency visits by the GP, transfers and unplanned hospital admissions (11). Moreover, 4% of the elderly Slovenian population have severe limitations, for which they do not receive any care (12). Without a universally accepted definition of 'early' palliative care, the dilemma arises of marking the right moment to start anticipatory PC alongside or instead of disease-oriented care in the advanced stages of chronic diseases (13-14). Physicians can approach this dilemma by (silently) asking themselves the surprise question (SQ1): 'Would I be surprised if this patient died within the next 12 months?' PC, including anticipating future problems, needs and wishes, would be indicated if the answer to this question was 'no.' The usefulness of this SQ has been validated in different populations (15-17). However, two recent reviews conclude that there is a wide range in accuracy and that further research is needed to develop more accurate tools (18, 19). Therefore, the second SQ (SQ2) was formulated: 'Would I be surprised if this patient was still alive in 12 months?' The aim of this pilot study was to determine the potential of using both SQ1 and SQ2 as tools to help GPs in the early identification of patients with a high chance to deteriorate or die.

2 METHODS

2.1 Population

In June 2016, invitations to participate in this study were sent to 240 recipients of the Slovenian Family Medicine Journal in the Ljubljana area, all being registered GPs. Because of the lack of responses, another 39 GPs from all over Slovenia, of whom the email addresses were know by one of the authors (DRP), were invited one month later. All responses were gathered in July and August 2016.

2.2 Design

Participating GPs were randomized into four groups and were sent the matching questionnaire through the valid online software application CastorEDC. Each questionnaire contained the same four case vignettes based on real patients' cases that were adapted to guarantee anonymity. The vignettes were written in English and described one organ failure patient (Vignette A), one terminal oncology patient (Vignette B), one frail elderly patient with dementia (Vignette C), and one incurable, but not yet terminal oncology patient (Vignette D) (Appendix 1). GPs in the first group were only asked whether they would plan any care for each of these patients. Those who decided to initiate care were asked to describe their care plan in detail. The GPs in group 2 were asked to answer SQ1. GPs in groups 3 and 4 were asked to answer SQ1 and SQ2 before answering the questions as described for the first group. GPs in group 4 were also shown the problem square (PS), a document designed to help structuring multidimensional care planning (Figure 1), before describing their care plan (20). Lastly, GPs were asked which aspects generally trigger them to start PC, and they were asked to give their opinion on the helpfulness and usefulness of the SQs and PS. The care plans and opinion section could be written in English or in Slovenian. Slovenian answers were translated to English by an independent, native Slovenian speaker.

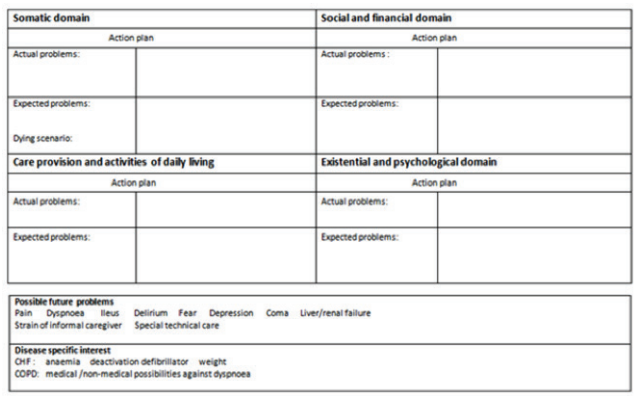

Figure 1. Problems square (Thoonsen et al. 2011 (18)).

2.3 Data Management

The open text content of each PC plan was quantified into a numeric score, the RADboud ANTicipatory (RADIANT) score, by one author (C.K.), using a score form (Figure 2). The form was developed by researchers from the Radboud university medical centre based in the Netherlands, on the WHO definition of PC and Dutch palliative care guidelines (21-24). The maximum score was 20 points.

Item	Score
Discussing patients personal aspects of quality of life	Yes; 1 point
Discuss how to achieve patients personal goals	Yes; 1 point
Adherence to the patient's preferences	Yes; 1 point
Multidimensionality: - Somatic dimension - Social context and financial dimension - Dimension of care giving and daily living activities - Existential and psychological dimension	1 point per dimension
Involvement of other disciplines, including palliative care consultation team	Yes; 1 point
Palliative care parallel to disease-targeted care	Yes; 1 point
Reactive or anticipatory care	Reactive; 1 point Anticipatory; 2 points
Discuss whether or not hospital admission is desired	Yes; 1 point
Discuss if treatment with antibiotics in the future is desired	Yes; 1 point
Discussing CPR policy	Yes; 1 point
Discussing policy on mechanical ventilation	Yes; 1 point
Discussing treatment limitations – not specified	Yes; 1 point
Discussing dying scenarios	Yes; 1 point
Discuss the use of treatments that will prolong life (for example: artificial feeding and administering intravenous fluids)	Yes; 1 point
Discussing preferences for end-of-life care (palliative sedation, euthanasia, instruction directive)	Yes; 1 point
Discuss preferred place of death	Yes; 1 point
Write assignment for out-of-hours GP-care	Yes; 1 point
Involving family and loved-ones in care planning	Yes; 1 point
Providing care for family and loved-ones	Yes; 1 point

Figure 2. Score form.

The primary outcome measure was the answer combination given to SQ1 and SQ2 in relation to the RADIANT scores for each care plan. The secondary outcome measures were:

- Differences in RADIANT scores between the four study groups and between the four vignettes.
- Proportion of multidimensional care plans in each study group and each vignette.
- Proportion of reactive and anticipatory care plans per vignette within each group.
- Differences in mean RADIANT scores between care plans written in Slovenian and in English.
- A qualitative review regarding the aspects that trigger GPs to start PC as well as their opinions on the usefulness of the SQs and PS.

All calculations were made using IBM SPSS software version 22. Significance testing was not performed because of the explorative nature of this study with a limited number of subjects.

3 RESULTS

3.1 Population

297 GPs were invited to participate in this study. 35 (11.8%) agreed to participate, and 26 (8.8% of total, 74% of those who agreed) actually completed the survey (Figure 3). The participants' characteristics are shown in Table 1.

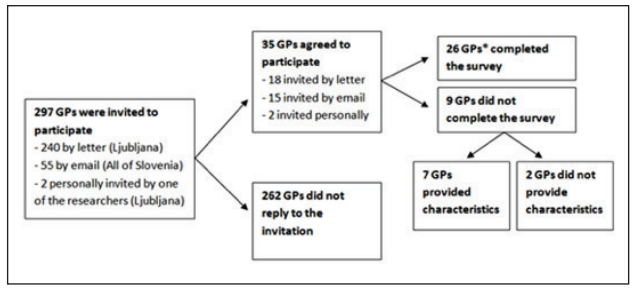

Figure 3. The process of inclusion of general practitioners.

Table 1. Characteristics of participants.

Age (years±SD)	48±10.4
Gender: male	36%
Vocational training	96%
Function	
• Employee in Healthcare Center	56%
• Independent contract holder	20%
• Employee in practice of independent contract holder	20%
• Other	4%
Type of practice	
• Practice in healthcare center	56%
• Solo practice	32%
• Nursing home	8%
• Other	4%
Teaching practice	64%
Workload (hours per week ±SD)	37±11.0
After hours work (hours per month ±SD)	20±13.7
Consultation time (minutes per patient ±SD)	9.5±4.9
Home visits (no. per week ±SD)	0.9±1.0
Interest in palliative care (scale 1-10 ±SD)	8.4±1.1
Palliative care skills (scale 1-10 ±SD)	6.3±1.6
Plans to improve PC skills	93%

3.2 Primary Outcome

In group 2, all participants (n=8) answered SQ1 with 'no' for each vignette (Table 2). In groups 3 (SQ1 and SQ2) and 4, (SQ1, SQ2 and PS) the patient B (terminal oncology patient) was the only patient for whom all GPs gave the answer combination no + yes (they would not be surprised if the patient died and would be surprised if the patient was still alive in 12 months). For the patient C (frail elderly patient with dementia), none of the GPs in group 3, and only 1 GP in group 4, gave this answer combination. In groups 3 and 4, the mean RADIANT scores were slightly higher for GPs who would be surprised if the patient was still alive in 12 months, compared to the GPs who would not be surprised if the patient was still alive in 12 months.

Table 2. Answer combinations to SQ1+SQ2 and mean RADIANT scores per case vignette.

	Group 2 (n=8)		Group 3 (n=5)		Group 4 (n=5)	
	Answer SQ1	RADIANT score	Q1+SQ2	RADIANT score	Answers SQ1+SQ2	RADIANT score
Vignette A	No (n=8)	3.63	No+Yes (n=2)	3.5	No+Yes (n=1)	4.0
			No+No (n=2)	1.0	No+No (n=3)	3.7
			Yes+No (n=1)	0	Yes+No (n=1)	2.0
Vignette B	No (n=8)	4.0	No+Yes (n=5)	3.0	No+Yes (n=5)	4.0
			No+No (n=0)	-	No+No (n=0)	-
			Yes+No (n=0)	-	Yes+No (n=0)	-
Vignette C	No (n=8)	3.3	No+Yes (n=0)	-	No+Yes (n=1)	3.0
			No+No (n=4)	2.0	No+No (n=3)	2.7
			Yes+No (n=1)	3.0	Yes+No (n=1)	2.0
Vignette D	No (n=8)	3.4	No+Yes (n=2)	3.0	No+Yes (n=1)	5.0
			No+No (n=1)	2.0	No+No (n=4)	1.8
			Yes+No (n=2)	3.0	Yes+No (n=0)	-

Abbreviations: GP: general practitioner, SQ1: first surprise question, SQ2: second surprise question, RADIANT score: RADboud ANTicipatory score, a scoring method to quantify the open text content of palliative care plans made by GPs.

3.3 Secondary Outcome Measures

RADIANT scores were highest in group 2 (SQ1) and lowest in group 1 (no SQs). When comparing the RADIANT scores for the different vignettes, vignette B (terminal oncology case) scored higher than the other vignettes. Overall, the highest RADIANT score was found for vignette B in groups 2 (SQ1) and 4 (SQ1, SQ2 and PS). In all groups, RADIANT scores were higher for plans written in Slovenian compared to those written in English (Table 3).

Table 3. Mean RADIANT scores* per case vignette in groups 1-4.

					Total		
	Vignette A	Vignette B	Vignette C	Vignette D	A	E	S
Group 1 (n=8)	1.9	3.3	2.0	1.5	2.2	1.7 (n=3)	2.5 (n=5)
Group 2 (n=8)	3.6	4.0	3.3	3.4	3.6	3.5 (n=4)	3.6 (n=4)
Group 3 (n=5)	1.8	3.0	2.2	2.8	2.5	2.0 (n=4)	4.3 (n=1)
Group 4 (n=5)	3.4	4.0	2.6	2.4	3.1	2.8 (n=4)	4.3 (n=1)
Total (n=26)	2.7	3.6	2.5	2.5	-	-	-

*RADIANT score: RADboudANTicipatory score, a scoring method to quantify the open text content of palliative care plans made by GPs.
Abbreviations: A: All participants in this study group; E: Participants in this study group that completed the survey in English (n=15); S: Participants in this study group that completed the survey in Slovenian (n=11).

The highest proportion of anticipatory care plans (40–80%) was made by GPs in group 4 (SQ1, SQ2 and PS), and the lowest (25–50%) in group 2 (SQ1) (Table 4). When comparing the proportions of anticipatory care in the different vignettes, the patient B (terminal oncology patient) scored highest (40–80%), and the patient C (frail elderly patient with dementia) scored lowest (20–40%).

Table 4. Proportions of reactive and anticipatory palliative care plans.

	Vignette A		Vignette B		Vignette C		Vignette D		Total	
	R	A	R	A	R	A	R	A	R	A
Group 1 (n=8)	88%	38%	100%	50%	88%	25%	63%	63%	84%	44%
Group 2 (n=8)	100%	50%	100%	50%	100%	25%	100%	38%	100%	41%
Group 3 (n=5)	80%	80%	100%	40%	100%	20%	80%	40%	90%	45%
Group 4 (n=5)	100%	40%	100%	80%	100%	40%	80%	40%	95%	50%
Total (n=26)	92%	50%	100%	54%	96%	27%	81%	46%	-	-

Shows the proportions of care plans that contain reactive and anticipatory aspects for each vignette per study group;
Abbreviations: R: reactive care; A: anticipatory care

The somatic dimension was most often included in the PC plans in all study groups (75%-95%) and all vignettes (65-100%), while the social/financial dimension was least mentioned within the different study groups (5-25%) and in vignettes B (terminal oncology patient) (19%) and D (advanced stage, but not yet terminal oncology patient) (12%). The existential/psychological dimension was least explored in vignettes A (organ failure patient) (4%) and C (frailty elderly with dementia) (8%). Group 1 (no SQs) shows the highest proportions of PC plans including all four aspects of multidimensional PC (9%), while none of the PC plans in group 4 (SQ1, SQ2 and PS) included all four aspects (Table 5).

Table 5. Multidimensional care.

	Somatic	Social / financial	Care giving /ADL*	Existential / psychological	All domains
Group 1	84%	9%	38%	16%	9%
Group 2	94%	25%	59%	31%	6%
Group 3	75%	5%	25%	20%	5%
Group 4	95%	10%	55%	15%	0%
Vignette A	89%	8%	54%	4%	
Vignette B	100%	19%	54%	35%	
Vignette C	96%	15%	65%	8%	
Vignette D	65%	12%	8%	35%	

Showing the proportion of care plans that include each of the four dimensions of palliative care for each study group and for each vignette separately and the proportion of care plans in each of the four study groups that include aspects of all four domains. * ADL: activities of daily living

3.4 Opinions

GPs were triggered to start PC in case of a terminal or incurable disease, like cancer or dementia, and symptoms, like pain, dyspnoea, weight loss and immobility. The second trigger were social aspects like 'loss of independence,' 'absence of the next of kin,' 'powerlessness of relatives' or 'lack of home care and support.'

Seventeen of the eighteen GPs who were asked SQ1 and all ten GPs who were asked the combined SQ found the tools helpful. However, four GPs had some concerns about the usefulness of either SQ1 or the combined SQs in daily practice (Figure 4). All five GPs in group 4 (SQ1, SQ2, PS) considered the PS to be a helpful tool for planning multidimensional PC.

Positive opinions (n=14)

- It would promote decision making and establishing an immediate plan of treatment for the patient (group 2)
- This question is very helpful. I use it and sometimes also ask relatives or care givers this question. It is simple and it could be an easy introduction to in-depth thinking about palliative care and then you can use other tools to estimate the patient's life expectancy (group 2).
- These questions would personally activate me to make a plan of treatment, planning and action (group 3).
- These surprise questions influence a doctor's decision making and estimation of how much time one has to prepare palliative care (group 4).

Concerns (n=4)

- My experience shows that the prediction of prognosis is sometimes very questionable and is often linked to the desire for life and life stance (...) You sometimes wonder if you really do enough in the beginning; although many times we want to do too much (group 2).
- I'm worried about how appropriate and professional it is to ask this question and how to share this information with the patient in a correct way (group 2).
- In my opinion it depends on the patient's willpower, if decided to fights the disease to quit, so the timetable of death varies often (group 3).
- I do not know how to interpret the answers to those questions. For instance I do not know what it means if my answer to both questions is "no" (group 3).

Figure 4. Statements about the usefulness of the first and second surprise questions.

4 DISCUSSION

In this pilot study, GPs were invited to plan care based on patient cases. GPs who were asked SQ1 and SQ2 before making the care plans, planned the most elaborate care for patients for whom they would not be surprised if they died within 12 months (the answer to SQ1 is 'no') and would be surprised if they were still alive after 12 months (the answer to SQ2 is 'yes'). This is in concordance with our hypothesis that answering SQ1 with 'no' and SQ2 with 'yes' would lead to more elaborate PC than other answer combinations.

4.1 Disease Trajectories

In this study, the terminal oncology patient was most often identified as being likely to die within a year and, therefore, received the most elaborate care. The frail elderly patient suffering from dementia was least expected to die within 12 months and was allocated less anticipatory and multidimensional care. This is in concordance with a systematic review by Gardiner et al. that mentions the delayed recognition of the palliative transition in non-cancer patients (11). Evans et al. found that organ failure and old-age/dementia patients received PC less frequently than cancer patients. They also found that old-age/dementia patients, the group of patients most likely to lose decision-making capacity, had the least end-of-life discussions and anticipatory care planning (10).

4.2 PC in Slovenia

A study with the same methodology was recently performed among Dutch GPs. The mean RADIANT scores in this Dutch study ranged from 4.9 to 8.9 and are noticeably higher than the Slovenian mean scores ranging from 2.2 to 3.6 (21).

The mean RADIANT scores were higher for the care plans written in Slovenian than for the plans written in English. It is likely that some of the subtler treatment descriptions and nuances in the care plans were lost in translation or misinterpreted due to different meanings of words in different languages.

The differences in RADIANT scores between the Dutch and Slovenian studies lie within the anticipatory and psychosocial aspects of the care plans. Dutch GPs discussed patients' aspects of quality of life, goals, and preferences more frequently than Slovenian GPs. In addition, Slovenian GPs scored fewer points on the social/financial and existential/psychological dimensions of multidisciplinary care. In this Slovenian study, treatment limitations, preferences for end-of-life care, dying scenarios and preferred places of death were never mentioned. This might be because Slovenian GPs did not consider discussing these topics as treatment and, therefore, did not include them in the care plan. Another possibility is that Slovenian GPs are less prone to discuss these topics due to differences between Dutch and Slovenian laws regarding matters as palliative sedation, euthanasia and advance directives. There are also cultural differences regarding health care, in general, and PC, in particular. In 2002, Lunder and Cerv wrote the following about PC in Slovenia: There has been long subjugation of the country to another's rule. In the period of socialism, death was pushed into the sphere of the private, and the Church. There was no interest in the development of public institutions, like palliative care wards in hospitals or hospices (25). Ten years later, a study regarding psychosocial care in cancer patients concluded that the need for further development of psychosocial care in Slovenia is still underestimated, but first attempts are being made to fill this gap (26).

There is much to gain in terms of PC education since this subject takes up only 8 hours in the general curriculum of the University of Ljubljana, and 15 hours for the University of Maribor (27). Another point of attention is the content of PC education programs. Findings from an international review show that concepts of pain management are being well addressed, but current undergraduate curricula may not adequately explore issues of broader symptom control, and psychosocial and spiritual aspects of care (28). The need and wish for these educational initiatives is also mentioned by Chang et al. (29). Furthermore, they are reflected in the self-assessed scores for PC skills (6.5 out of 10), interest in PC (8.3 out of 10), and the proportion of GPs who indicated to have plans to improve their PC skills (90%). Unfortunately, the number of PC experts willing to work as PC providers or teachers is insufficient according to the EAPC (27). Nonetheless, in Slovenia, PC education initiatives have been developed in both undergraduate and postgraduate programs. Several courses are organized to provide doctors and other healthcare professionals with special knowledge and skills in PC (30).

4.3 Opinions

The participants mentioned multiple physical and social aspects that trigger them to initiate PC. Similar aspects were mentioned by Dutch and British GPs in two separate studies (1, 17). The SQs were considered to be helpful tools for the identification of patients in need of PC. Concerns about the usefulness of the SQs included the difficulty of the prediction of prognosis, especially in non-cancer patients, and uncertainty about how to interpret the answers to the SQs. This uncertainty regarding interpretation is apparent in other studies as well. The SQ is often used as a prognostication tool to predict 1-year mortality while it was developed as a tool to identify patients with PC needs (15-17). The last concern was

regarding the communication with the patient once the GP has considered the SQs. Communication has been mentioned before as a barrier for the early initiation of PC (8, 9, 31). The positive opinions regarding the PS are mirrored by recent research by Thoonsen et al., in which GPs stated that this PS helped them consider actual and possible future problems, needs and scenarios regarding all dimensions of PC (32). Surprisingly, this current study shows no effect of the use of the PS on the multidimensionality of the care plans. In fact, group 4 was the only group in which none of the care plans mentioned all four dimensions of PC.

4.4 Strengths and Limitations

The strength of this study lies in the fact that it combines the original SQ with a second SQ and a PS. This approach does not only help GPs to identify patients who are at high risk to deteriorate and die, but also triggers them to start multidisciplinary and anticipatory PC.

Unfortunately, due to the small number of participants, the results of this pilot study could not be subjected to significance testing, so any of the differences found might be due to chance. Another limitation is that the vignettes and score form were developed for use among Dutch GPs. This might explain the low RADIANT scores, low response rate and low number of GPs who actually completed the survey. The length of the survey also seemed to have a negative influence on participation, since less surveys were completed in groups 3 and 4, in which the survey contained more questions than in groups 1 and 2. The timing of the study was not ideal either, since the invitations and surveys were sent in July and August, when many GPs were on holidays.

5 CONCLUSION

This was one of the first studies to investigate the use of the combined SQs. The results of this pilot study seem promising, but further research is needed regarding the usefulness in daily practice. Furthermore, it seems worthwhile to continue exploring how GPs can be triggered to identify patients in need of PC, and to start multidisciplinary and anticipatory care. More attention could be given to the psychosocial aspects of care and to the discussion of patients' goals and preferences for end-of-life care. In the future, PC should become more generally available for non-cancer patients. Further development of PC education programs and national guidelines could be the first step towards reaching these goals in Slovenia.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

FUNDING

No funding was required.

ETHICAL APPROVAL

Received from the Slovene Medical Ethics Committee on 14-06-2016, consent number KME 126/06/16.

REFERENCES

1. Claessen SJ, Francke AL, Engels Y, Deliens L. How do GPs identify a need for palliative care in their patients? An interview study. BMC Fam Pract. 2013;14:42. doi: 10.1186/1471-2296-14-42.
2. Makivić I, Kersnik J, Klemenc-Ketiš Z. The role of the psychosocial dimension in the improvement of quality of care: a systematic review. Zdr Varst. 2015;55:86-95. doi: 10.1515/sjph-2016-0004.
3. Abarshi E, Onwuteaka-Philipsen B, Donker G, Echteld M, Van den Block L, Deliens L. General practitioner awareness of preferred place of death and correlates of dying in a preferred place: a nationwide mortality follow-back study in the Netherlands. J Pain Symptom Manage. 2009;38:568-77. doi: 10.1016/j.jpainsymman.2008.12.007.
4. Gomes B, Calanzani N, Curiale V, McCrone P, Higginson IJ. Effectiveness and costeffectiveness of home palliative care services for adults with advanced illness and their caregivers. Cochrane Database Syst Rev. 2013;6:CD007760. doi: 10.1002/14651858.CD007760.
5. Švab I, Kravos A, Vidmar G. Factors influencing home visits in Slovenian general practice. Fam Pract. 2003;20:58-60.
6. European Association for Palliative Care. Promoting palliative care in the community: producing a toolkit to improve and develop primary palliative care in different countries internationally. doi: 10.1177/0269216314522318. Accessed Juny 6th, 2016 at: http://www.eapcnet.eu/LinkClick.aspx?fileticket=PXlXlRoSrXU%3D.
7. Beernaert K, Deliens L, De Vleminck A, Devroey D, Pardon K, Van Den Block L, et al. Early identification of palliative care needs by family physicians: a qualitative study of barriers and facilitators from the perspective of family physicians, community nurses, and patients. Palliat Med. 2014;28:480-90. doi: 10.1191/0269216305pm937oa.
8. Groot MM, Vernooij-Dassen MJFJ, Crul BJP, Grol RP. General practitioners (GPs) and palliative care: perceived tasks and barriers in daily practice. Palliat Med. 2005;19:111-8. doi: 10.1177/0269216314526271.
9. Evans N, Pasman HR, Donker GA, Deliens L, Van den Block L, Onwuteaka- Philipsen B. End-of-life care in general practice: a cross-sectional, retrospective survey of 'cancer', 'organ failure' and 'old-age/dementia' patients. Palliat Med. 2014;28:965-75. doi: 10.1136/bmjspcare-2010-000001.
10. Gardiner C, Ingleton C, Gott M, Ryan T. Exploring the transition from curative care to palliative care: a systematic review of the literature. BMJ Support Palliat Care. 2011;1:56-63. doi: 10.1200/JCO.2008.17.7568.
11. Thoonsen B, Engels Y, van Rijswijk E, Verhagen S, van Weel C, Groot M, et al. Early identification of palliative care patients in general practice: development of RADboud indicators for PAlliative Care Needs (RADPAC). Br J Gen Pract. 2012;62:625-31. doi: 10.1001/jama.2009.1198.

12. Hlebec V, Srakar A, Majcen B. Determinants of unmet needs among Slovenian old population. Zdr Varst. 2016;55(1):78-85. doi: 10.1177/0269216314545006.
13. Follwell M, Burman D, Le LW, Wakimoto K, Seccareccia D, Bryson J, et al. Phase II study of an outpatient palliative care intervention in patients with metastatic cancer. J ClinOncol. 2009;27:206-13. doi: 10.3399/bjgp12X654597.
14. Bakitas M, Lyons KD, Hegel MT, Balan S, Brokaw FC, Seville J, et al. Effects of a palliative care intervention on clinical outcomes in patients with advanced cancer: the Project ENABLE II randomized controlled trial. JAMA. 2009;302:741-9. doi: 10.1089/jpm.2010.0018.
15. Moss AH, Lunney JR, Culp S, Auber M, Kurian S, Rogers J, et al. Prognostic significance of the "surprise" question in cancer patients. J Palliat Med. 2010;13:837-40. doi: 10.3747/pdi.2011.00204.
16. Moroni M, Zocchi D, Bolognesi D, Abernethy A, Rondelli R, Savorani G, et al. The 'surprise' question in advanced cancer patients: a prospective study among general practitioners. Palliat Med. 2014;28:959-64. doi: 10.1177/0269216314526273.
17. Elliott M, Nicholson C. A qualitative study exploring use of the surprise question in the care of older people: perceptions of general practitioners and challenges for practice. BMJ Support Palliat Care. 2017;7:32-8. doi: 10.1136/bmjspcare-2014-000679.
18. Downar J, Goldman R, Pinto R, Englesakis M, Adhikari NK. The "surprise question" for predicting death in seriously ill patients: a systematic review and meta-analysis. CMAJ. 2017;189(13):E484-93. doi: 10.1186/1471-2296-12-123.
19. White N, Kupeli N, Vickerstaff V, Stone P. How accurate is the 'Surprise Question' at identifying patients at the end of life? A systematic review and meta-analysis. BMC Med. 2017;15(1):139.
20. Thoonsen B, Groot M, Engels Y, Prins J, Verhagen S, Galesloot C, et al. Early identification of and proactive palliative care for patients in general practice, incentive and methods of a randomized controlled trial. BMC Fam Pract. 2011;12:123.
21. Weijers F. Does adding the Surprise Questions to case vignettes help GPs to increase the thoroughness of palliative care planning? Results of a pilot RCT. Unpublished manuscript, Radboud University, Nijmegen, The Netherlands, 2016.
22. World Health Organization Definition of Palliative Care. Accessed Juny 10th, 2016 at: http://www.who.int/cancer/palliative/definition/en/.
23. Pallialine: general principles of palliative care. Accessed July 14th, 2016 at: http://pallialine.nl/algemene-principes-van-palliatieve-zorg.
24. Information for patients about end-of-life decisions and treatment limitations. Accessed July 14th, 2016 at: http://www.thuisarts.nl/levenseinde.
25. Lunder U, Cerv B. Slovenia: status of palliative care and pain relief. J Pain Symptom Manage. 2002;24:233-5. doi: 10.1002/pon.3154.
26. Grassi L, Watson M. Psychosocial care in cancer: an overview of psychosocial programmes and national cancer plans of countries within the International Federation of Psycho-Oncology Societies. Psychooncology. 2012;21:1027-33.
27. Centeno C, Lynch T, Donea O, Rocafort J, Clark D. EAPC atlas of palliative care in Europe 2013. Milan: EAPC Press, 2013.
28. Fitzpatrick D, Heah R, Patten S, Ward H. Palliative care in undergraduate medical education - how far have we come? Am J Hosp Palliat Care. 2017;34:762-73. doi: 10.1111/j.1440-172X.2008.01723.x.
29. Chang E, Daly J, Johnson A, Harrison K, Easterbrook S, Bidewell J, et al. Challenges for professional care of advanced dementia. Int J Nurs Pract. 2009;15:41-7. doi: 10.1186/s12875-015-0342-6.
30. Albreht T, Pribaković Brinovec R, Josar D, Poldrugovac M, Kostnapfel T, Zaletel M, et al. Slovenia: health system review. Health Syst Transit. 2016;18:1-207. doi: 10.1136/bmjspcare-2015-001031.
31. Thoonsen B, Vissers K, Verhagen S, Prins J, Bor H, van Weel C, et al. Training general practitioners in early identification and anticipatory palliative care planning: a randomized controlled trial. BMC Fam Pract. 2015;16:126. doi: 10.1186/s12875-015-0342-6.
32. Thoonsen B, Gerritzen SH, Vissers KC, Verhagen S, van Weel C, Groot M, et al. Training general practitioners contributes to the identification of palliative patients and to multidimensional care provision: secondary outcomes of an RCT. BMJ Support Palliat Care. 2016; Epub ahead of print. doi: 10.1136/bmjspcare-2015-001031.

Appendix 1: vignettes

Vignette A

Mrs. A., 83 years old, is widowed and lives independently in a detached house on the outskirts of the village. She and her husband used to run several shops in the centre of the nearest city. She has six children, who are all closely involved. She enjoys life, and particularly the company of her children and grandchildren. Her cognitive functions are still excellent, but she has several relevant somatic problems, the most important of which are:

- COPD Gold III-IV. She still enjoys several cigarettes per day.
- Presbycusis, for which she wears bilateral hearing aids.
- Diabetes type 2.
- Kidney failure (MDRD <30).
- Anaemia.
- In 2011, she suffered a severe myocardial infarction, for which she underwent an emergency PTCA and coronary stent placement. Unfortunately, she developed severe heart failure (NYHA classification 3-4).

Her main complaints are fatigue and some exertional dyspnoea. Her exercise capacity is clearly decreasing and walking longer distances within her house is sometimes challenging. In the past year, she has experienced several acute exacerbations of both heart failure and COPD, often combined. She regularly asks you about treatment options regarding her fatigue since she still very much enjoys life and does not want to say farewell to her children yet.

Vignette B

56-year-old Mr. W. is married and lives with his wife in an apartment on the edge of the forest. His wife is 52 years of age and very healthy. They have two daughters and five grandchildren. Both daughters are involved and live in the same area.

Mr W. is a manager at the university. He is rarely ill, but in the last few months, he has been having fluctuating, but sometimes severe pain of his upper abdomen. He also suffers from general malaise and an overall decline in his physical abilities. His condition was difficult to diagnose at first, but eventually a metastatic pancreatic tumour was found. Currently, he is suffering severe pain and he has lost several kilograms of weight. A coeliac plexus blockade has been planned. He is only moderately fit, but calm and resigned.

Vignette C

Mrs. C. is a 91-year old childless widow. She lives alone in a luxurious apartment, where additional care is provided. She has an 85-year-old sister in law, who cares for her.

Mrs. C. has been experiencing increasing problems in her daily life. She hardly leaves her house and tends to fail performing certain complex tasks. Her (short-term) memory seems to be intact. She is, however, increasingly disoriented in time and place (orientation in person is intact). A year and a half ago she was diagnosed with dementia by a geriatrician.

Several years ago, she had a heart attack, for which she was hospitalized and treated conservatively with medication. Next, she developed heart failure, which is currently stable. She also has atrial fibrillation, for which she takes oral anticoagulants.

She developed squamous cell carcinoma in her face several times. Recently, one of those carcinomas, situated at the right side of her mount, was surgically removed. Because of postoperative complications, she had to undergo a repeat surgery. This resulted in permanent dysfunction of the right side of her mouth causing eating difficulties and several kilograms of weight loss in the past months.

Finally, she suffers from bilateral coxarthrosis, which causes pain every now and then.

Lately, Mrs. C. has fallen regularly. Since her last fall, she has been immobilized due to severe lower back pain. She spends most of the day either dozing in her chair or lying in bed. Two years ago, she went through an episode during which she experienced the same problems, caused, at that time, by osteoporotic vertebral infraction. She recovered spontaneously from this previous episode in six months.

Vignette D

69-year-old Mr. T. is married and lives with his wife in a single-family home. He is quite healthy and hardly ever ill.

After a period of vague abdominal complaints, he was referred to an internist, who diagnosed him with colon cancer with hepatogenous and pulmonary metastasis. At first, Mr. T. was very emotional about this news, but after a while, he regained his calm.

Mr. T. would like to receive life-prolonging treatment. He is very fit and hardly experiences any complaints now. He has an appointment with a medical oncologist to discuss the possible options. He is very motivated to continue treatment.

Kanisek S, Gmajnić R, Barać I. Risk of potential exposure incident in non-healthcare workers in contact with infectious and municipal waste.
Zdr Varst. 2018;57(2):65-71. doi: 10.2478/sjph-2018-0009.

RISK OF POTENTIAL EXPOSURE INCIDENT IN NON-HEALTHCARE WORKERS IN CONTACT WITH INFECTIOUS AND MUNICIPAL WASTE

TVEGANJE ZA IZPOSTAVLJENOST NEZDRAVSTVENIH DELAVCEV, KI SO V STIKU Z INFEKTIVNIMI IN KOMUNALNIMI ODPADKI V AMBULANTAH DRUŽINSKE IN ZOBNE MEDICINE

Sanja KANISEK[1,2*], Rudika GMAJNIĆ[1], Ivana BARAĆ[1]

[1]Health Centre Osijek, Park kralja P. Krešimira IV/6, 31000 Osijek, Croatia
[2]J.J. Strossmayer University of Osijek, Faculty of Medicine, Cara Hadrijana 10e, 31000 Osijek, Croatia

Received: Apr 8, 2017
Accepted: Jan 17, 2018

Original scientific article

ABSTRACT

Introduction: The proper classification of sharp and infectious waste in situ by the healthcare workers is an important measure of prevention of sharps and other exposure incidents in non-healthcare workers, who handle such waste. The aim was to examine the practice of classifying sharp and infectious waste in family and dental practices.

Methods: An analysis of 50 bags of infectious and 50 bags of municipal waste from five family and five dental practices for five days in October 2016 at the Health centre Osijek.

Results: Healthcare workers in 70% of the practices deposited sharps in infectious waste. In 56% of infectious waste bags, sharp object were found. More risky bags of infectious waste were produced by family practices (64%), but with no significant differences in relation to dental practices (48%), (P=0.143). Disposing of infectious into municipal waste was the case in 90% of the practitioners, where in 60% of municipal waste bags, infectious waste was disposed. Dental practices produced more risky bags of municipal waste (76%) in relation to family practices (44%), but with no significant difference (P=0.714).

Conclusions: The results of this research point to importance of performing audits of proper disposal of sharps and infectious waste to reduce the risks of injury to non-healthcare workers who come into contact with the said waste. Given results could be used for framing written protocols of proper disposal of sharps and infectious waste that should be visibly available in family and dental practices and for education of healthcare workers.

Keywords:
medical waste, injuries, primary healthcare

IZVLEČEK

Uvod: *Pravilno sortiranje ostrih predmetov in infektivnih odpadkov, ki ga izvajajo zdravstveni delavci, je pomembno za preprečevanje opozorilnih nevarnih dogodkov, posebej vbodov z ostrimi predmeti pri nezdravstvenih delavcih, ki z odpadki prihajajo v stik. Cilj je bil raziskati ločevanje ostrih in infektivnih odpadkov v ambulantah družinske medicine in ambulantah zobne medicine.*

Metode: *Analiziranih je bilo 50 vreč infektivnih in 50 vreč komunalnih odpadkov iz petih ambulant družinske medicine in petih ambulant zobne medicine v petih dneh v oktobru 2016 v Domu zdravlja Osijek.*

Rezultati: *Zdravstveni delavci so v 70 % ambulant odlagali ostre predmete v infektivne odpadke. V 56 % vreč z infektivnimi odpadki so bili najdeni ostri predmeti. Ordinacije družinske medicine so ustvarile več rizičnih vreč infektivnih odpadkov (64 %), vendar brez pomembne razlike glede na ambulante zobne medicine (48 %) (P=0,143). Odlaganje infektivnih odpadkov v komunalne je bilo v praksi dokazano v 90 % ordinacij, infektivni odpadki pa so bili dokazano prisotni v 60 % vrečah komunalnih odpadkov. Ordinacije zobne medicine so imele več rizičnih vreč komunalnih odpadkov (76 %) kot ordinacije družinske medicine (44 %), vendar brez pomembne razlike (P=0,714).*

Zaključki: *Rezultati tega raziskovanja nam kažejo pomembnost izvajanja testiranj o pravilnem odlaganju ostrih in infektivnih odpadkov, da bi se zmanjšalo tveganje za poškodbe nezdravstvenih delavcev, ki prihajajo v stik z navedenimi odpadki. Dobljeni rezultati bi lahko bili uporabljeni za oblikovanje pisanih protokolov za pravilno odlaganje ostrih in infektivnih odpadkov, ki naj bi bili vidno dostopni v družinski in zobni medicini, in za edukacijo zdravstvenih delavcev.*

Ključne besede:
medicinski odpadki, poškodbe, primarna zdravstvena zaščita

***Corresponding author:** Tel. + 385 9 590 830 72; E-mail: sanja.kanisek@gmail.com

1 INTRODUCTION

In Croatia, waste management and its individual segments are regulated by numerous legal documents, which are fully compliant with European regulations (1), where medical waste management was regulated as a separate category of waste (2). The largest producer of medical waste is the health system, i.e., it is the by-product of the health service delivery (3). Most medical waste in Croatia consists of non-hazardous waste, which in its composition, corresponds to municipal waste, and only a small portion (14%) consists of hazardous medical waste (4), which requires special methods of disposal and treatment (2). In Croatia, hazardous medical waste, in respect with the hazardous properties and the methods of management, is divided into infectious waste, sharps, pharmaceutical waste, chemical waste, cytotoxic and cytostatic waste, amalgam waste from dental care and other hazardous waste – any waste that has some of the hazardous properties listed in Appendix III of the Act on sustainable waste management (1). Despite significant progress in the medical waste management in recent decades, errors are still present, and their consequences can be disastrous (5). Among the many potential health hazards from contact with hazardous medical waste are HIV infection, hepatitis B and C, gastroenterological, respiratory, skin, and numerous other infections (3). All persons who come into close contact with hazardous medical waste are exposed to a potential risk of injury, including those that produce such waste and those who handle it (3). The main groups of people at risk of injury in health institutions are nurses and support staff, where the highest rate of injury through medical waste is present in the staff responsible for cleaning and workers involved in the transport and disposal of waste (3). Although hospitals are the largest producers of medical waste, we should not neglect its production at the level of primary health care, which deals with 80–85% of health problems in the community (6) and is the input filter into higher levels of health system (7). In Croatia, there is no data on behaviour patterns of healthcare workers in family practice (FP) and dental practice (DP) when disposing of components of sharps and infectious waste. The aim was to examine the practice of classifying sharps and infectious waste of healthcare workers in FP and DP, and to examine the existence of risks for potential sharps injury and other exposure incidents in non-healthcare workers (cleaning staff, municipal workers) in contact with the said waste. These results would contribute to clarifying the pattern of behaviour of healthcare workers in FP and DP, when disposing of sharps and infectious waste, and point to the possible need for interventions that would enhance the said practice to reduce the risks of injuries in non-healthcare workers.

2 METHODS

In the area of Osijek – Baranja County in the year 2015, there were a total of 169 contracted FP teams and 123 DP teams. Of the total number of contracted teams, in six health centres in Osijek-Baranja County, there were 64 contracted FP teams and 47 contracted DP teams, where the Health centre Osijek had the largest number of contracted teams in these sectors (31 FP teams and 22 DP teams) (8). FP and DP teams in Health Centre Osijek were chosen for medical waste analysis, as they are the most numerous among all services provided by all health centres and are the largest producers of sharps and infectious waste. In order to select practitioners that constitute a representative sample, categories of family and dental practitioners in Health Centre Osijek were determined based on their levels of activity and the annual patient visits in 2015 (8). Three categories of FP have been determined, namely: up to 12000 visits, from 12001 to 15000 visits and more than 15000 visits, as well as three categories of DP: up to 2000 visits, from 2001 to 2500 visits and more than 2500 visits. Based on these categories, five FP teams (16.1%) and five DP teams (22.7%) from Health Centre Osijek were selected with the purpose of analysing infectious and municipal waste (Table 1). Given the relatively small daily amount of waste production in practice (in relation to the hospital), the overall, i.e., 100% daily production of infectious and municipal waste during 8 working hours per day, in selected 10 practices, over five average working days (weekends and holidays are excluded) in October 2016, was included for analysis of the types and quantities of waste components. Healthcare workers in the selected practices were unaware of the waste analysis.

Table 1. The method of selection of FP and DP for waste analysis in Health Centre Osijek.

Health centre Osijek	Categories of practices according to the annual number of patient visits in 2015	Number of practices within a category	Number of selected practices from a particular category (%)
FP	≤12000	12	2 (16.6)
	12001-15000	12	2 (16.6)
	>15000	7	1 (14,2)
DP	≤2000	8	2 (25)
	2001-2500	8	2 (25)
	>2500	6	1 (16.6)

FP - family practice; DP - dental practice

2.1 Waste Analysis

The waste was collected by the staff in charge of cleaning and analysed the same or the following day in order to avoid inaccurate results due to shrinkage of waste (9). When handling the waste during the analysis, personal protective equipment, a gripper for sorting and a protective pad on which the waste was sorted, were used. The sorted waste was weighed according to the groups and was later returned to the previously prepared new bags (9). Weighing was conducted on a moderate scale, with test spacing of 1 g, with the maximum value of 3000 g. In order to save the data anonymity, all practices were numbered during monitoring according to the order of waste analysis on the first day of monitoring, i.e., the name of the practice was replaced by a number (i.e. FP-1, FP-5, FP-9 etc.). Waste analysis of other practices (i.e., paediatric, pulmological, occupational medicine, etc.) has been conducted as well, but due to the small number of these practices and a small waste production, was not included in this analysis. Waste analysis was photo-documented.

2.2 Statistical Analysis

Categorical data are presented in absolute and relative frequencies. Numerical data are presented in the median and limits of interquartile range. The differences of categorical variables were tested by Fisher's exact test. The normality of the distribution of numerical variables was tested by the Shapiro-Wilk test. The differences of normally distributed numerical variables between the two independent groups were tested by the Mann-Whitney U test. All P values are double-sided. The level of significance was set at alpha=0.05. The statistical program MedCalc Statistical Software version 14.12.0 (MedCalc Software bvba, Ostend, Belgium; http://www.medcalc.org; 2014) was used for the statistical analysis.

3 RESULTS

Two healthcare workers in each practice, where one worker had a high school education (nurse/technician) and the other a university degree (medical doctor/dentist), or a total of 20 healthcare workers, were involved in the production of medical waste. Given the fact that every practice produced one bag of infectious and one bag of municipal waste daily, an analysis of the quantity and composition of 50 bags of municipal and 50 bags of infectious waste was conducted. A few years ago, containers for sharps (1.5 l) and infectious waste (25 l), marked by the type of waste, were set beside the municipal waste container in every practice (25 l). Although the Ordinance of waste management in Health Centre Osijek was adopted a few years ago, no written protocols were available to the healthcare workers until after the implementation of this waste analysis. Improper disposal of sharps waste (needles, ampoules) into infectious waste was found in 70% of the practices, i.e., in four FPs and three DPs. The proportion of sharps waste into infectious waste in FP ranged from 4 to 20% of the total of infectious waste over five days and in DP from 1 to 2% (Table 2).

Table 2. Five-day production of components of sharps in infectious waste in family and dental practices in Health Centre Osijek.

	The proportion of sharps in infectious waste/5 days (%)	TOTAL infectious waste/ 5 days (%)
FP-1	30 (4)	815 (100)
FP-5	94 (20)	478 (100)
FP-9	29 (5)	548 (100)
FP-12	55 (10)	531 (100)
FP-13	0	626 (100)
DP-3	11 (1)	1864 (100)
DP-4	29 (2)	1387 (100)
DP-8	0	2252 (100)
DP-10	19 (1)	2141 (100)
DP-11	0	3111 (100)

FP - family practice; DP - dental practice

The production of infectious waste in DP was significantly higher in relation to FP (P=0.009). Although the proportion of sharps in infectious waste was higher in FP, there were no significant differences in relation to DP (P=0.090) (Table 3).

Table 3. The average five-day production of sharps in infectious waste in family and dental practices in Health Centre Osijek.

	The median (interquartile range)		
	Family practice	Dental practice	P*
The proportion of sharps in infectious waste/ 5 days (g)	30 (14.5-74.5)	11 (1-18)	0.090
Total infectious waste/ 5 days (g)	548 (505-721)	2141 (1626-2682)	0.009

*Mann Whitney U test

Given the number of bags of infectious waste produced over five days in all practices in which incorrectly disposed of sharps (needles, ampoules) were found, 28 (56%) of a total of 50 bags of infectious waste represented the potential risk for sharps injuries for other persons who come into contact with infectious waste. Although FP produced a larger number of high-risk infectious waste bags, 16 (64%) of the total 25 bags, no significant differences in relation to DP were found (12 (48%)) (P=0.143) (Table 4).

Table 4. The type and frequency of sharps in infectious waste over five days in family and dental practices in Health Centre Osijek.

	Number of needles/ ampoules in infectious waste					Number of risky bags IW	Total number of risky bags IW	P*
	Day 1	Day 2	Day 3	Day 4	Day 5			
FP-1	0/5	1/3	0/1	0/6	0/3	5		
FP-5	0/1	0/2	0/8	0/5	0/1	5		
FP-9	0/1	0/1	0/2	0/5	0/2	5	**16**	
FP-12	0	0	0	0/1	0	1		
FP-13	0	0	0	0	0	0		
								0.143
DP-3	2/0	3/0	1/0	1/0	0	4		
DP-4	1/0	1/1	0	2/1	4/2	4		
DP-8	0	0	0	0	0	0	**12**	
DP-10	1/2	1/0	0/1	0/1	0	4		
DP-11	0	0	0	0	0	0		

FP - family practice; DP - dental practice; IW - infectious waste; * Fisher's exact test

Improper disposal of infectious waste in municipal waste was established in 90% of the practices, that is, only one FP has not deposited infectious waste into municipal waste. The proportion of infectious waste in FP ranged from 2 to 4% of the total of municipal waste over five days, and in DP, from 5 to 25%. No sharps in municipal waste bags have been established (Table 5).

Table 5. Five-day production of components of infectious waste in municipal waste in family and dental practices in Health Centre Osijek.

	The proportion of infectious in municipal waste/ 5 days (%)	TOTAL municipal waste/ 5 days (%)
FP-1	40 (2)	1652 (100)
FP-5	34 (4)	767 (100)
FP-9	3 (0)	1030 (100)
FP-12	61 (4)	1637 (100)
FP-13	0	898 (100)
DP-3	149 (18)	841 (100)
DP-4	297 (10)	2951 (100)
DP-8	308 (25)	1252 (100)
DP-10	89 (6)	1374 (100)
DP-11	75 (5)	1607 (100)

FP - family practice; DP - dental practice

Although DPs produced a larger amount of municipal waste, there were no significant differences of production of municipal waste in relation to FPs (P=0.602). Significantly more of infectious waste in municipal waste in relation to FP was deposited by DP (P=0.009) (Table 6).

Due to disposing of infectious waste into municipal waste, 30 (60%) of the bags of the total of 50, presented a risk for potential exposure incident for other persons who came into contact with them (cleaning staff, municipal workers). Although DP produced a larger number of high-risk municipal waste bags, 19 (76%) of the total of 25, compared to FP (11 (44%)), no significant differences have been determined (P=0.714) (Table 7).

Table 6. The average five-day production of infectious waste in municipal waste in family and dental practices in Health Centre Osijek.

	The median (interquartile range)		
	Family practice	Dental practice	P*
The proportion of infectious in municipal waste/ 5 days (g)	34 (2-51)	149 (82-303)	0.009
Total municipal waste/ 5 days (g)	1030 (833-1645)	1374 (1047-2279)	0.602

*Mann Whitney U test

Table 7. The amount and frequency of infectious waste in municipal waste over five days in family and dental practices in Health Centre Osijek.

	Infectious waste in municipal waste (g)					Number of risky bags MW	Total number of risky bags MW	P*
	Day 1	Day 2	Day 3	Day 4	Day 5			
FP-1	10	0	7	6	17	4		
FP-5	0	21	13	0	0	2		
FP-9	0	0	0	0	3	1	**11**	
FP-12	17	15	13	0	16	4		
FP-13	0	0	0	0	0	0		
								0.714
DP-3	100	7	15	18	9	5		
DP-4	58	44	63	53	79	5		
DP-8	25	6	62	79	0	4	**19**	
DP-10	0	25	30	34	0	3		
DP-11	20	55	0	0	0	2		

FP-family practice; DP-dental practice; MW- municipal waste; * Fisher's exact test

4 DISCUSSION

Sharp objects, such as used ampoules, should be disposed in situ into the sharps container (3, 10). Sharp objects which primarily are not contaminated, if stored in the infectious waste, get contaminated as a result of contact with other content of infectious waste (11). Sharps injury analysis in Croatia in the year 2015 (12) shows an increase in the number of reported accidental sharps injuries compared to the year 2014 (13). The largest number of incidents (63%) is related to the injuries with different kinds of needles. The most commonly injured were nurses (50%), followed by medical doctors (25%) and in high third place were the cleaning staff (10%) (12). From this analysis, the circumstances in which the cleaning staff members were injured, the frequency of which is quite high, considering that they are not in direct contact with patients, are not clearly visible (12). Sharps injury analysis in Croatia in 2015, states that a high number of sharps injuries of cleaning staff possibly results from improper sorting of waste in situ (12). The given assumption is supported by results of this research, which shows that healthcare workers in 70% of the practices, deposited primarily non-contaminated sharps waste (mostly empty ampoules) into infectious waste by mistake. Research on the analysis of the sharps injuries in non-healthcare workers in health facilities have shown that 60–80% of such injuries are due to improper disposal of sharp objects in infectious waste (11, 14–16), and that more than 30% of such injuries were caused by sharp objects, such as glass (15). The fact that more than a half of the infectious waste bags were risky, where FP produced a larger number of high-risk bags of infectious waste, shows the frequency of such improper conduct of healthcare professionals and the consequent exposure to accidental sharps injuries of other people who come into contact with infectious waste, such as the cleaning staff. These results can indicate a lack of knowledge of the majority of healthcare workers from this research on the methods of disposal of sharps waste in situ and the lack of awareness of the potential dangers of such practice on the health of other workers who come in contact with infectious waste. In addition, it is possible that the said defect is more present with FP healthcare workers. Despite a number of preventive measures, such as education and design of protective mechanisms, proper sorting and disposal of waste in situ represents the most effective measure to prevent injuries (14). Infectious waste, disposed of in municipal waste, contaminates its entire content (17, 18), which, primarily, was not like that. Results of this research have shown that healthcare workers in almost all practices (90%) mistakenly deposited infectious waste (gloves, material for dental impression...) in the municipal waste, and almost two thirds of municipal waste bags represented risks for potential exposure incidents for other persons who come into contact with that kind of waste, where the DP prevailed in the number of produced contaminated municipal waste bags. Through such improper conduct of healthcare workers, the risk of endangering the health of others extends to an even greater number of people (e.g. municipal workers). Although the risk of infection in people exposed to exposure incidents through mucous membranes or injured skin is smaller than with injuries by contaminated sharp object, it is necessary to prevent these types of incidents, because the repetition of such exposure incidents increases the risk of transmission of infection (15). Based on the assessment method of disposal of medical waste, it is possible to identify activities where the improper sorting of waste in situ is conducted (19), and to determine the existence of risk of injury for non-healthcare workers (cleaning staff, municipal workers) who come into contact with the waste. While in literature, most attention is given to prevention of sharps injuries and other exposure incidents in healthcare workers, little attention is given to well-being and safety of non-healthcare workers who come in contact with hazardous medical waste (15). The results of waste analysis from this research emphasize the uncomfortable truth that the fundamental problem of exposure to harm of non-healthcare workers is a consequence of the improper conduct of healthcare workers when disposing of hazardous medical waste in situ (5). The results of this research confirm the recommendation on the need to conduct periodic surveys on sharps waste disposal with purpose of identifying incorrect procedures in practice (19), as well as the necessity for municipal waste surveillance, for a fuller insight into the practice of disposal of hazardous medical waste (5), all with the goal of preventing the sharps injuries and other exposure incidents of non-healthcare workers as well as all persons who come into contact with waste from health facilities. Characterization of medical waste is an essential tool not only to assess the production of waste within the institution, but also to accurately identify other types of problems (20). The results of this study reflect the paradox of the health care system in which healthcare workers on one hand ‘cure,’ but on the other hand ‘endanger’ the health. Although the results of this research cannot be generalized because of the small sample of monitored practices, they point to one aspect of risks for potential sharps injuries and other types of exposure incidents caused by the improper conduct of healthcare workers when disposing of sharps and infectious waste in situ.

5 CONCLUSION

The results of this research point to the importance of performing audits of proper disposal of sharps and infectious waste in outpatient settings, in order to reduce

the risks of injury to non-healthcare workers who come into contact with the said waste. Given results could be used for framing written protocols of proper disposal of sharps and infectious waste that should be visibly available in family and dental practices, as well as for education of healthcare workers, with an emphasis on the consequent dangers of improper conduct on the health of other people who come into contact with the said waste.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

FUNDING

For the purpose of implementing this medical waste analysis, Health Centre Osijek has provided the nurse for control and prevention of infections with personal protection equipment as well as time needed within her working hours.

ETHICAL APPROVAL

Received from the Commission for Ethical and Status Issues of Health Centre Osijek before the implementation of the research.

REFERENCES

1. Zakon o održivom gospodarenju otpadom. Narodne novine. 2013;94.
2. Pravilnik o gospodarenju medicinskim otpadom. Narodne novine. 2015;50.
3. Chartier Y, Emmanuel J, Pieper U, Prüss A, Rushbrook P, Stringer R, et al. Safe management of wastes from health-care activities. 2nd ed. World Health Organization, 2014. Accessed November 15th, 2016 at: http://www.searo.who.int/srilanka/documents/safe_management_of_wastes_from_healthcare_activities.pdf.
4. Marinković N, Vitale K, Afrić I, Janev Holcer N. Javno zdravstveni aspekti gospodarenja opasnim medicinskim otpadom. Arh Hig Rada Toksikol. 2005;56(1):21-32.
5. Blenkharn JI. Sharps management and the disposal of clinical waste. Br J Nurs. 2009;18(14):860-4. doi: 10.12968/bjon.2009.18.14.43353.
6. Bakar Ž. Korijeni nezadovoljstva liječnika primarne zdravstvene zaštite. Med Fam Croat. 2009;17:85-92.
7. Katić M, Juresa V, Oresković S. Family medicine in Croatia: past, present, and forthcoming challenges. Croat Med J. 2004;45(5):543-9.
8. Republika Hrvatska, Osječko- baranjska županija. Izvješće o stanju i problematici zdravstvenih ustanova čiji je osnivač Osječko-baranjska županija u 2015. godini. Osijek: Osječko-baranjska županija, 2016. Accessed November 15th, 2016 at: http://www.obz.hr/hr/pdf/2016/21_sjednica/24_izvjesce_o_stanju_i_problematici_zdravstvenih_ustanova_ciji_je_osnivac_obz_u_2015.pdf.
9. Tudor TL, Marsh CL, Butler S, Van Horn JA, Jenkin LE. Realising resource efficiency in the management of healthcare waste from the Cornwall National Health Service (NHS) in the UK. Waste Manag. 2008;28(7):1209-18. doi: 10.1016/j.wasman.2007.04.004.
10. Damani N. Priručnik o prevenciji i kontroli infekcija. 3rd ed. Zagreb: Medicinska naklada, 2015.
11. Rymer W, Gladysz A, Filipowski H, Zubkiewich-Zarebska A, Tuminska A, Knysz B. Risk of occupational exposure to the HBV infection in non-clinical healthcare personnel. Med Pr. 2016;67(3):301-10. doi: 10.13075/mp.5893.00272.
12. Hrvatski zavod za zaštitu zdravlja i sigurnost na radu. Analiza ubodnih incidenata u 2015. Accessed November 15th, 2016 at: http://test.hzzzsr.hr/wp-content/uploads/2016/11/Izvje%C5%A1%C4%87e_Ubodni_incidenti_2015.P.pdf.
13. Hrvatski zavod za zaštitu zdravlja i sigurnost na radu. Analiza ubodnih incidenata u 2014. Accessed Nov 15, 2016 at: http://test.hzzzsr.hr/wp-content/uploads/2016/11/Ubodni_incident__2014.pdf.
14. Blenkharn JI, Odd C. Sharps injuries in healthcare waste handlers. Ann Occup Hyg. 2008;52(4):281-6. doi: 10.1093/annhyg/men010.
15. Shiferaw Y, Abebe T, Mihret A. Sharps injuries and exposure to blood and bloodstained body fluids involving medical waste handlers. Waste Manag Res. 2012;30(12):1299-305. doi: 10.1177/0734242X12459550.
16. Ream PS, Tipple AF, Salgado TA, Souza AC, Souza SM, Galdino-Junior H, et al. Hospital housekeepers: victims of ineffective hospital waste management. Arch Environ Occup Health. 2016;71(5):273-80. doi: 10.1080/19338244.2015.1089827.
17. Chaerul M, Tanaka M, Shekdar AV. A system dynamics approach for hospital waste management. Waste Manag. 2008;28(2):442-9. doi: 10.1016/j.wasman.2007.01.007.
18. Pereira MS, Alves SB, Silva e Souza AC, Tipple AF, de Rezende FR, Rodrigues EG. Waste management in non-hospital emergency units. Rev Lat Am Enfermagem. 2013;21:259-66.
19. Aziz AM, Ashton H, Pagett A, Mathieson K, Jones S, Mullin B. Sharps management in hospital: an audit of equipment, practice and awareness. Br J Nurs. 2009;18(2):92-8. doi: 10.12968/bjon.2009.18.2.37861.
20. Paiz JC, Bigolin M, Schneider VE, Stedile NL. Applying Nightingale charts to evaluate the heterogeneity of biomedical waste in a hospital. Rev Lat Am Enfermagem. 2014;22(6):942-9. doi:10.1590/0104-1169.3309.2499.

Hertiš T, Petek T, Marčun Varda N. Prevalence of elevated blood pressure in a sample of Slovene children and adolescents: a pilot study.
Zdr Varst. 2018;57(2):72-80. doi: 10.2478/sjph-2018-0010.

THE PREVALENCE OF ELEVATED BLOOD PRESSURE IN A SAMPLE OF SLOVENE CHILDREN AND ADOLESCENTS: A PILOT STUDY

PREVALENCA VISOKEGA KRVNEGA TLAKA NA VZORCU SLOVENSKIH OTROK IN MLADOSTNIKOV: PILOTNA ŠTUDIJA

Tjaša HERTIŠ[1], Tadej PETEK[1], Nataša MARČUN VARDA[2*]

[1]University of Maribor, Faculty of Medicine, Taborska ul. 8, 2000 Maribor, Slovenia
[2]University Medical Centre Maribor, Department of Pediatrics, Ljubljanska ul. 5, 2000 Maribor, Slovenia

Received: Nov 19, 2016
Accepted: Jan 18, 2018

Original scientific article

ABSTRACT

Introduction: The aim of our study was to determine the prevalence of prehypertensive and elevated blood pressure in the hypertensive range (elevated BP) and obtain some anthropometric measures in Slovene children and adolescents.

Methods: In the cross-sectional study lasting one year, we measured BP using mercury sphygmomanometers, as well as height, weight, waist, and hip circumferences in schools. Data from regular check-ups (oscillometric measurements) were also added to increase the sample size. Participants were 2-19 years old. For statistical analysis, we used two-sided multivariate analysis of variance, Pearson's r, and chi-squared test.

Results: From altogether 1594 participants, 723 (45.4%) were boys and 871 (54.6%) girls. The prevalence of elevated BP on a single oscillometric blood-pressure measurement was 12.0% (95% CI: 10.3 to 13.9), and an additional 13.9% (95% CI: 12.0 to 15.9) had prehypertensive BP. In Riva-Rocci measurements, elevated BP was present in only 7.1% (95% CI: 4.9 to 10.1) and prehypertensive BP additionally in 3.9% (95% CI: 2.4 to 6.4) in comparison to oscillometric measurements, which showed higher prevalence. Importantly, overweight participants had a 1.75 times greater relative risk for prehypertensive BP (95% CI: 1.22 to 2.53; p<0.01). Obesity carried a 1.79 times greater relative risk (95% CI: 1.22 to 2.63; p<0.01) for BP outside of the normotensive BP range.

Conclusion: Arterial hypertension is becoming an important public health problem, especially due to the childhood obesity. It seems to concern also Slovene young population with prevalence of elevated BP at around 7.1% after a single auscultatory BP measurement.

Keywords:
hypertension, prevalence, children, adolescents, Slovenia, antropometrics

IZVLEČEK

Namen: *Namen naše raziskave je bil ugotoviti razširjenost povišanega krvnega tlaka ter pridobiti nekatere antropometrične meritve slovenskih otrok in mladostnikov.*

Metode: *V tej presečni študiji, ki je trajala eno leto, smo merili krvni tlak (KT) z živosrebrnimi sfingomanometri in pridobili nekatere antropometrične meritve, kot so starost, spol, višina, teža, obseg pasu in bokov. Vzorec smo povečali s podatki, pridobljenimi z oscilometrično metodo s sistematskih pregledov in sprotnih pregledov pri pediatrih. Preiskovanci so bili stari od 2 do 19 let. Rezultate smo nato še statistično obdelali z dvosmerno multivariatno analizo variance. Izračunali smo tudi Pearsonov korelacijski koeficient r in naredili preizkus hi-kvadrat.*

Rezultati: *Skupno je sodelovalo 1594 otrok in mladostnikov, od tega 723 (45,4 %) fantov in 871 (54,6 %) deklet. Pri enkratni oscilometrični meritvi KT je razširjenost visokega KT znašala 12,0 % (95 % IZ: 10,3 do 13,9) in prehipertenzivnega KT kar 13,9 % (95 % IZ: 12,0 do 15,9). Meritve krvnega tlaka z avskultatorno metodo so pokazale nižje vrednosti; povišan KT je imelo 7,1 % (95 % IZ: 4,9 do 10,1) in prehipertenzivni KT dodatno 3,9 % (95 % IZ: 2,4 do 6,4) osnovnošolskih otrok in mladostnikov. Prekomerna telesna teža je v primerjavi z normalno pomenila 1,75-krat večje relativno tveganje za prisotnost prehipertenzivnega KT (95 % IZ: 1,22 do 2,53; p<0,01). Debelost je v primerjavi z normalno telesno težo pomenila 1,79-krat večje tveganje za KT izven normotenzivnega območja (95 % IZ: 1,22 do 2,63; p<0,01).*

Zaključek: *Arterijska hipertenzija postaja pomemben javnozdravstveni problem, zlasti zaradi debelosti otrok in mladostnikov. Zdi se, da to zadeva tudi slovensko pediatrično populacijo, saj znaša razširjenost visokega KT med otroki in mladostniki 7,1 % ob enkratni meritvi z avskultatorno metodo.*

Ključne besede:
hipertenzija, prevalenca, otroci, mladostniki, Slovenija, antropometrija

***Corresponding author:** Tel. + 386 2 321 24 65; E-mail: natasa.marcunvarda@amis.net

1 INTRODUCTION

Elevated blood pressure (BP) in children and adolescents is becoming a public health concern. The increasing prevalence of arterial hypertension (HTN) is observed worldwide (1, 2) and relates to the epidemic of obesity (3, 4), among other factors.

According to the 2016 European Society of Hypertension guidelines (5), unlike the previously used guidelines (6), high BP is defined differently in children and adolescents aged ≥16 years. Normal BP in children is defined as a systolic and diastolic BP, which is less than the 90th percentile, adjusted for gender, age, and height. Children with an average systolic blood pressure (SBP) or diastolic blood pressure (DBP) in the 90th or higher percentile, but less than the 95th percentile, are prehypertensive. HTN in children is defined as an average SBP and/or DBP, which is in the 95th or higher percentile, measured on at least three different occasions and confirmed by auscultatory measurement. The first stage of HTN is defined as the 95th to 99th percentile BP plus 5 mmHg and the second stage of hypertension as BP greater than 99th percentile plus 5 mmHg. Isolated systolic hypertension (ISH) is defined by SBP ≥95th percentile and DBP <90th percentile (5).

In adolescents aged ≥16 years, normotension is defined as a BP <130/85 mmHg. With repeated measures, a BP of 130-139/85-89 mmHg defines prehypertension, and a BP value ≥140/90 mmHg defines HTN. The first stage of HTN in older adolescents is defined as BP 140-159/90-99 mmHg, and second stage as BP 160-179/100-109 mmHg. ISH is defined as BP ≥140/<90 mmHg (5).

Most studies report the prevalence of prehypertension around 9–12% (4). On single BP measurement, an American study (7) estimated the prevalence of HTN (here described as 'elevated BP' if <3 measurements were carried out with readings in the hypertensive range) in adolescents at approximately 10%, the same applies to single-measurement prevalence of prehypertensive BP. After three BP measurements, the prevalence of HTN decreased to 3.2%, while the prevalence of prehypertension increased to 15.7%, as some of the previous hypertensive individuals dropped to the prehypertensive group. In a Swiss study (8), the prevalence of prehypertension was 13.3% and elevated BP 11.4% at the first measurement, and after the second, 9.5% and 9.4%, respectively. At the third measurement, the prevalence of prehypertension was 2.2% and HTN 1.7%. Those results are similar to a Slovene paediatric study (1978–1990), which estimated the prevalence of HTN at 1.2% (9, 10).

Since then, there has been a lack of research on this topic in Slovenia. With this pilot study, we want to contribute new data on the estimated prevalence of prehypertensive BP and elevated BP. Additionally, we also search for some anthropometric features that correlate with elevated BP, such as increased body mass index (BMI).

2 METHODS

2.1 Design and Background

This pilot study was conducted under the supervision of the Unit for Paediatric nephrology and hypertension, University Medical Centre Maribor, Slovenia. In December 2014, this cross-sectional study received the approval of the Ethics Committee of the University Medical Centre Maribor. Before starting data collection, we obtained all necessary consents. The data collection was completed in March 2016.

2.2 Sampling

Participants were aged 2–19. From December 2014, we began our cooperation with the Health Centre Adolf Drolc in Maribor and with the Paediatric Clinic in Lenart. There we collected BP data and certain anthropometric measurements from regular check-ups, measured with an automatic (oscillometric) device during February 2015 and March 2016. Children with a previously known diagnosis of secondary (but not essential) hypertension were excluded, as they had aetiology-based treatment and their small count would not influence the overall results.

Meanwhile, we began to cooperate with two nearby schools. There, we measured BP once a month with a mercury sphygmomanometer (auscultatory method) and gathered additional data on weight, height, hip and waist circumferences. The sampling procedure for the auscultatory and oscillometric measurements is described in Figure 1.

2.3 Procedure

Measurements in primary schools were carried out by two 6th year medical students, previously trained recording paediatric BP using a mercury sphygmomanometer. Height, weight, waist, and hip circumferences were also measured. Before each measurement, we explained the procedure, took a brief history on possible elevated BP and asked about children's experience with BP measuring. We waited for anxious children to relax. Participants were also not allowed to be physically active before the examination, if so, we waited for at least five minutes.

Children entered the quit room in pairs. As one of two examiners was measuring the BP of one of the two children, the other examiner obtained anthropometric measurements. BP was first measured on the right upper arm in the seated position. In the case of increased BP (≥90. p.), we obtained a second right upper arm BP measurement, followed by a third measurement by the other examiner for cross-checking, and a fourth measurement on the left upper arm for evaluation of possible aortic coarctation, with three-minute intervals in between. Three right upper arm measurements were used for later analysis.

The sample was increased using patient records from systematic check-ups. There, repeated BP measurements on the upper right arm were taken by Health Centre staff, using an Omron M6 oscillometric upper arm blood pressure monitor. In addition, data on gender, height, weight, and BMI were collected.

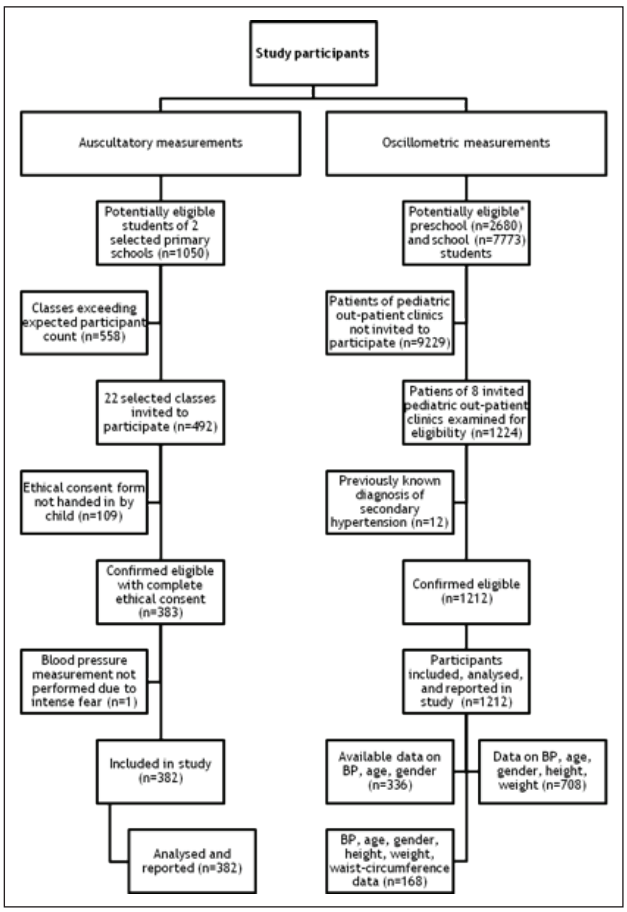

Figure 1. Sampling procedure of study participants.

After collecting the data, we calculated average values of SBP and DBP, and calculated mean arterial pressures (MAP). Using height and weight data, we calculated the BMI and BMI standard deviation scores (SDS).

Anthropometric measurements served us to calculate the waist-to-hip and waist-to-height ratios. In accordance with recommendations (5), we calculated percentiles of arterial BP based on sex, age and height. More about this calculation is found in the 4th Report (Supplement) of the NHBPEP Working Group on Children and Adolescents (6). Since this was a study on the Slovenian children, we decided to use the WHO and CDC growth curves (11–13) to calculate SDS scores of anthropometric parameters (weight-for-age, height-for-age, BMI-for-age). We used the European (ages 2–11) and Japanese (ages 12–19) data to calculate waist circumference SDS scores (14, 15). Children and adolescents were classified into four groups based on their BMI percentile: underweight, normal weight status, overweight and obese. The participants were also allocated to different groups dependent on their height, waist, and hip circumferences. When the waist-to-hip circumference ratio exceeded 0.85 for girls or 0.9 for boys, it was regarded as increased (16). Waist-to-height ratio was defined as increased when it exceeded 0.5 (17).

2.4 Statistical Methods and Sample Size

We used IBM SPSS statistical program (version 20), running on a PC with Windows 10 operating system. To calculate the independence of the distributions of categorical variables, we used the chi-square test. Pearson's correlation coefficient r was used in the calculation of correlations between the SDS score of systolic and diastolic BP and certain anthropometric parameter SDS scores.

The sample size was assessed via an online statistical program (18), using an expected hypertension prevalence (10%) and the desired confidence interval width of 95%±2%. Based on this, the recommended sample size was 912 participants.

3 RESULTS

3.1 Sample Characteristics and Epidemiology

A total of 1,594 children and adolescents have been included, 723 (45.4%) boys and 871 (54.6%) girls. The participants from two schools (N=382) were aged 6–15, with an average age of 9.78 years (SD=2.7). The age of children and adolescents from regular check-ups (N=1212) was 2–19 years, with an average age of 11.2 years (SD=4.9).

Table 1. Mean values of sample characteristics.

	Auscultatory measurements - Mean (SD; N)			Oscillometric measurements - Mean (SD; N)			All measurements - Mean (SD; N)		
Characteristic	**2-6 years**	**7-12 years**	**13-19 years**	**2-6 years**	**7-12 years**	**13-19 years**	**2-6 years**	**7-12 years**	**13-19 years**
Age	6.0 (0.0; 46)	9.2 (1.6; 253)	13.7 (0.7; 83)	4.8 (1.2; 303)	8.8 (1.9; 319)	15.7 (1.8; 590)	5.0 (1.2; 349)	9.0 (1.8; 572)	15.5 (1.8; 673)
Gender - N (Male: Female)	46 (25: 21)	253 (119 : 134)	83 (35: 48)	303 (144: 159)	319 (163: 156)	540 (237: 353)	349 (169: 180)	572 (282: 290)	673 (272: 401)
SBP [mmHg]	100.4 (7.5; 46)	100.9 (12.0; 253)	114.4 (11.5; 83)	98.9 (10.2; 427)	109.6 (10.7; 319)	119.4 (11.7;590)	99.1 (9.9; 349)	105.8 (12.1; 572)	118.8 (11.8; 673)
DBP [mmHg]	57.0 (8.1; 46)	55.1 (9.2; 253)	64.2 (11.7; 83)	62.3 (8.8; 427)	66.7 (9.5; 319)	72.1 (8.8; 590)	61.6 (8.9; 349)	61.6 (11.0; 572)	71.1 (9.5; 673)
MAP [mmHg]	71.5 (7.2; 46)	70.4 (9.0; 253)	81.0 (10.1; 83)	74.5 (8.0; 427)	81.0 (9.5; 319)	87.8 (8.4; 590)	74.13 (8.0; 349)	76.3 (10.2; 572)	87.0 (8.9; 673)
Height [SDS]	1.45 (0.84; 46)	0.79 (1.00; 253)	0.32 (1.20; 83)	-0.57 (1.23; 233)	0.43 (1.44; 196)	0.61 (0.98; 469)	-0.21 (1.40; 257)	0.63 (1.22; 449)	0.56 (1.02; 552)
Weight [SDS]	0.53 (0.81; 46)	0.51 (1.01; 253)	0.56 (1.27; 83)	0.10 (1.64; 233)	0.79 (1.36; 196)	0.94 (1.40; 469)	0.18 (1.53; 257)	0.63 (1.18; 449)	0.88 (1.39; 552)
BMI [SDS]	-0.05 (0.82;46)	0.16 (0.74; 253)	0.09 (0.52; 83)	0.34 (0.86; 233)	0.40 (0.81; 196)	0.27 (0.58; 469)	0.27 (0.86; 257)	0.27 (0.78; 449)	0.21 (0.57; 552)
WC [SDS]	1.41 (1.89; 46)	0.48 (1.63; 253)	0.04 (1.61; 83)	0.54 (1.58; 77)	0.56 (1.90; 81)	1.00 (1.97; 33)	0.93 (1.77;104)	0.50 (1.70; 334)	0.31 (1.77; 116)
HC [cm]	69.1 (6.3; 46)	78-4 (9.4; 253)	92.3 (8.67; 83)	NA	NA	NA	69.1 (6.3; 46)	78.4 (9.4; 253)	92.3 (8.7; 83)
Waist-to-hip ratio	0.87 (0.06; 46)	0.83 (0.07; 253)	0.80 (0.08; 83)	NA	NA	NA	0.87 (0.06; 46)	0.83 (0.07; 253)	0.80 (0.08; 83)
Waist-to-height ratio	0.48 (0.06; 46)	0.46 (0.06; 253)	0.45 (0.06; 83)	0.51 (0.05; 76)	0.49 (0.07; 79)	0.49 (0.07; 32)	0.48 (0.06 ;46)	0.47 (0.06; 332)	0.46 (0.07; 115)

N - number of participants; SD - standard distribution; SDS - standard distribution (Z) score; SBP - systolic blood pressure; DBP - diastolic blood pressure; MAP - mean arterial pressure; BMI - body mass index; WC - waist circumference; HC - hip circumference; NA - data not available

3.2 The Prevalence of Prehypertensive and Elevated Blood Pressure in Hypertensive Range

The prevalence of elevated BP after a single Riva-Rocci auscultatory measurement in schools was 7.1% (95% CI: 4.9 to 10.1), and the prevalence of elevated BP at regular check-ups, measured with automatic oscillometric device, was approximately 12.0% (95% CI: 10.3 to 13.9). Furthermore, the prevalence of children and adolescents with BP in stage 1 hypertensive range, using auscultatory measurement, was 1.6% (95% CI: 0.7 to 3.4), and in stage 2 hypertensive range, 1.0% (95% CI: 0.4 to 2.7). In oscillometric measurements, stage 1 hypertensive range BP was observed in 6.5% (95% CI: 5.3 to 8.0), and stage 2 hypertensive range BP in 1.1% (95% CI: 0.6 to 1.8).

The prevalence of prehypertensive BP in children and adolescents after auscultatory measurement was at 3.9% (95% CI: 2.4 to 6.4), and majorly different in oscillometric measurements, that is, 13.9% (95% CI: 12.0 to 15.9). Regarding ISH, it was prevalent in 4.5% (95% CI: 2.8 to 7.0) of cases with auscultatory measurements and 4.5% (95% CI: 3.4 to 5.8) of cases with oscillometric measurements. For more details on normotension, prehypertensive BP, elevated BP, stage 1 and stage 2 hypertensive range BP, and isolated systolic hypertension prevalence at different ages, see Table 2.

Table 2. Blood pressure categories by the participants' age.

Characteristic	Participant count - N (%)								
	2-3 years	4-5 years	6-7 years	8-9 years	10-11 years	12-13 years	14-15 years	16-17 years	18-19 years
Auscultatory measurements - N (%)									
Normal	NA	NA	91 (96.8%)	92 (91.1%)	69 (93.2%)	51 (77.3%)	37 (78.7%)	NA	NA
Prehypertensive BP	NA	NA	2 (2.1%)	4 (4.0%)	1 (1.4%)	4 (6.1%)	4 (8.5%)	NA	NA
Hypertension‡	NA	NA	1 (1.1%)	5 (5.0%)	4 (5.4%)	11 (16.7%)	6 (12.8%)	NA	NA
Stage 1 Hypertension‡	NA	NA	1 (1.1%)	0 (0.0%)	1 (1.4%)	2 (3.0%)	2 (4.3%)	NA	NA
Stage 2 Hypertension‡	NA	NA	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (6.1%)	0 (0.0%)	NA	NA
ISH‡	NA	NA	0 (0.0%)	5 (5.0%)	3 (4.1%)	5 (7.6%)	4 (8.5%)	NA	NA
Oscillometric measurements - N (%)									
Normal	38 (48.7%)	70 (70.7%)	30 (53.6%)	25 (45.5%)	60 (71.4%)	125 (77.2%)	88 (73.9%)	187 (74.2%)	60 (65.9%)
Prehypertensive BP	13 (16.7%)	18 (18.2%)	13 (23.2%)	10 (18.2%)	9 (10.7%)	20 (12.3%)	13 (10.9%)	52 (20.6%)	20 (22.0%)
Hypertension‡	27 (34.6%)	11 (11.1%)	13 (23.2%)	20 (36.4%)	15 (17.9%)	17 (10.5%)	18 (15.1%)	13 (5.2%)	11 (12.1%)
Stage 1 Hypertension‡	25 (32.1%)	6 (6.1%)	8 (14.3%)	11 (20.0%)	4 (4.8%)	3 (1.9%)	8 (6.7%)	7 (2.7%)	7 (7.7%)
Stage 2 Hypertension‡	2 (2.6%)	1 (1.0%)	1 (1.8%)	2 (3.6%)	1 (1.2%)	1 (0.6%)	4 (3.4%)	1 (0.4%)	0 (0.0%)
ISH‡	0 (0.0%)	4 (4.0%)	4 (7.1%)	7 (12.7%)	10 (11.9%)	13 (8.0%)	6 (5.0%)	5 (2.0%)	4 (4.4%)
All measurements - N (%)									
Normal	38 (48.7%)	70 (70.7%)	121 (80.7%)	117 (75.0%)	129 (81.6%)	176 (77.2%)	125 (75.3%)	187 (74.2%)	60 (65.9%)
Prehypertensive BP	13 (16.7%)	18 (18.2%)	15 (10.0%)	14 (9.0%)	10 (6.3%)	24 (10.5%)	17 (10.2%)	52 (20.6%)	20 (22.0%)
Hypertension‡	27 (34.6%)	11 (11.1%)	14 (9.3%)	25 (16.0%)	19 (12.0%)	28 (12.3%)	24 (14.5%)	13 (5.2%)	11 (12.1%)
Stage 1 Hypertension‡	25 (32.1%)	6 (6.1%)	9 (6.0%)	11 (7.1%)	5 (3.2%)	5 (2.2%)	10 (6.0%)	7 (2.7%)	7 (7.7%)
Stage 2 Hypertension‡	2 (2.6%)	1 (1.0%)	1 (0.6%)	2 (1.3%)	1 (0.6%)	5 (2.2%)	4 (2.4%)	1 (0.4%)	0 (0.0%)
ISH‡	0 (0.0%)	4 (4.0%)	4 (2.7%)	12 (7.7%)	13 (8.2%)	18 (7.9%)	10 (6.0%)	5 (2.0%)	4 (4.4%)

N - number of cases; ISH - isolated systolic hypertension; NA - data not available; N - number of cases; ‡ Due to BP measurement on a single occasion, the term hypertension is used as a synonym with "elevated BP in the hypertensive range"

3.3 The Influence of Anthropometric Characteristics on Blood Pressure Values

Relative Risks

For each pair of variables (anthropometric characteristic, blood pressure category), the relative risk with confidence intervals and chi-square test were calculated (Table 3).

Focusing on auscultatory measurements, which show a more complete set of data, it is seen that children aged 7–12 years and adolescents aged 13–19 years have 1.10 times (95% CI: 1.01 to 1.19; $p<0.05$) greater and 0.82 times (95% CI: 0.72 to 0.93, $p<0.01$) smaller relative risk for being normotensive in comparison to the rest of participants, respectively. Interestingly, not any of the three age groups has an increased relative risk for having prehypertensive or elevated BP.

The relative risk for being prehypertensive (1.23; 95%CI: 0.48 to 3.50) or having elevated BP (1.13 95% CI: 0.63 to 2.04) for boys was not significantly different in comparison to girls in the auscultatory measurement group.

As expected, the frequency of hypertensive range BP was higher among participants with elevated BMI (overweight and obesity). After calculation of the chi-square value, we found that the relative risk for having prehypertensive BP was 6.67 times (95% CI: 2.53 to 17.60; p<0.001) greater in the overweight group, with an insufficient number of cases to calculate the relative risk for prehypertensive BP in the obese group. Interestingly, neither overweight nor obesity carried a significantly greater relative risk of elevated BP in the hypertensive range (relative risk of elevated BP for overweight = 1.37; 95% CI: 0.22 to 8.62 and relative risk of elevated BP for obese = 1.12; 95% CI: 0.18 to 7.17), but this was again most likely due to not enough obese (pre)hypertensive patient cases.

There was a positive correlation between increased waist-to-hip ratio as well as waist-to-height ratio and elevated BP in the hypertensive range, but both were statistically insignificant (Table 3).

Table 3. Blood pressure categories by the relative risks for having normotensive, prehypertensive or hypertensive BP in correlation with some participants' characteristics, e.g. participants' age.

Characteristic	Auscultatory measurements - RR (95% CI)			Oscillometric measurements - RR (95% CI)			All measurements - RR (95% CI)		
	Normotensive	Prehypertensive	Hypertensive	Normotensive	Prehypertensive	Hypertensive	Normotensive	Prehypertensive	Hypertensive
Age									
• 2-6 years: rest	1.11	NA	0.81	0.66	0.98	0.96	0.89	1.04	0.98
	(1.05;1.18)*		(0.30; 2.18)	(0.48; 0.90)**	(0.70; 1.38)	(0.66; 1.38)	(0.82; 0.98)**	(0.70; 1.54)	(0.70; 1.38)
• 7-12 years: rest	1.10	1.02	1.06	0.88	0.93	1.50	1.09	0.60	1.15
	(1.01; 1.19)*	(0.36; 2.92)	(0.57; 1.98)	(0.78; 0.99)*	(0.65; 1.32)	(1.06; 2.12)*	(1.03; 1.16)**	(0.43; 0.83)**	(0.86; 1.54)
• 13-19 years: rest	0.82	1.80	1.05	1.20	1.06	0.77	0.99	1.48	0.89
	(0.72; 0.93)**	(0.63; 5.13)	(0.52; 2.11)	(1.09; 1.31)**	(0.80; 1.41)	(0.56; 1.06)	(0.93; 1.05)	(1.12; 1.94)**	(0.67; 1.18)
Gender									
(male: female)	0.96	1.23	1.13	0.81	1.71	1.36	0.87	1.63	1.29
	(0.92; 1.06)	(0.48; 3.50)	(0.63; 2.04)	(0.74; 0.88)**	(1.30;2.26)**	(0.99; 1.87)	(0.82; 0.93)**	(1.24;214)**	(0.98; 1.71)
Waist-to-hip ratio									
(increased: normal)	1.03	0.80	2.03	NA	NA	NA	1.03	0.80	2.03
	(0.94; 1.12)	(0.26; 2.45)	(0.82; 5.03)				(0.94; 1.12)	(0.26; 2.45)	(0.82; 5.03)
Waist-to-height ratio									
(increased: normal)	1-23	0.51	1.77	1.23	1.28	1.43	1.37	0.68	1.20
	(1.08; 1.40)**	(0.18; 1.43)	(0.72; 4.36)	(0.90; 1.68)	(0.72; 2.29)	(0.73; 2.79)	(1.20; 1.57)**	(0.40; 1.14)	(0.70; 2.05)
Body mass index									
overweight: normal	0.67	6.67	1.37	0.79	1.37	1.16	0.74	1.75	0.97
	(0.52; 0.88)**	(2.53; 17.60)**	(0.22; 8.62)	(0.66; 0.95)**	(0.92; 2.05)	(0.71; 1.89)	(0.64; 0.86)**	(1.22; 2.53)**	(0.60; 1.57)
obese: normal	0.95	NA	1.12	0.43	1.36	0.78	0.56	1.42	0.87
	(0.73; 1.24)		(0.18; 7.17)	(0.24; 0.76)**	(0.66; 2.80)	(0.27; 2.29)	(0.38; 0.82)**	(0.67; 2.99)	(0.34; 2.21)

RR - relative risk; CI - confidence interval; NA - comparison not possible due to too few cases in the 2x2 contingency table;
* - p<0.05 using chi-square test; ** - p<0.01 using chi-square test

3.3.2 Pearsons' Correlations

Some anthropometric characteristics (with continuous range of values) correlated with SBP and DBP SDS scores differently than others (Table 4).

Table 4. Pearsons' r correlation coefficients between sample characteristics and blood pressure SDS scores.

Sample characteristic	Auscultatory BP m. - r (N)		Oscillometric BPm. - r (N)		All BP measurements - r (N)	
	Systolic blood pressure (SDS)	Diastolic blood pressure (SDS)	Systolic blood pressure (SDS)	Diastolic blood pressure (SDS)	Systolic blood pressure (SDS)	Diastolic blood pressure (SDS)
Age [yr]	0.20 (382)**	0.12 (382)*	0.04 (878)	-0.21 (878)**	0.11 (1260)**	-0.04 (1260)
Height [SDS]	0.10 (382)	0.07 (382)	0.06 (878)	-0.07 (878)*	0.17 (1260)	-0.12 (1260)**
Weight [SDS]	0.41 (382)**	0.31 (382)**	0.21 (878)*	0.08 (878)	0.26 (1260)**	0.14 (1260)**
WC (SDS)	0.31 (382)**	0.20 (382)**	0.35 (174)**	0.23 (174)**	0.31 (556)**	0.20 (556)**
HC (cm)	0.43 (382)**	0.30 (382)**	NA	NA	0.43 (382)**	0.30 (382)**
Waist-to-hip ratio	0.08 (382)	0.02 (382)	NA	NA	0.08 (382)	0.02 (382)
Waist-to-height ratio	0.32 (382)**	0.20 (382)**	0.23 (170)**	0.20 (170)**	0.35 (552)**	0.30 (552)**
Body mass index (SDS)	0.39 (382)**	0.26 (382)**	0.23 (878)**	0.20 (878)**	0.29 (1260)**	0.24 (1260)**

* p<0.05; ** p<0.01; N - number of cases; SDS - standard distribution (Z) score; NA - data not available; r - Pearson's r correlation coefficient; WC - waist circumference; HC - hip circumference; BP m. - blood pressure measurements

3.3.3 Comparisons of BP SDS Score Mean Values

The initial intent was to analyse possible interactions between anthropometric characteristics and mean scores of BP percentiles using the two-way Students' t-test, but no significant interactions were seen on MANOVA analysis, so that subsequent testing was not performed.

4 DISCUSSION

The only published study on the prevalence of HTN in children in Slovenia between 1978 and 1990 estimated the prevalence at 1.2% (9, 10). In foreign literature, the prevalence of elevated BP ranges from 9%–19% on a single measurement, and the prevalence of prehypertension 10%–30%, which is higher than our results, with 3.9% prevalence of prehypertensive BP and 7.1% of elevated BP in hypertensive range (7, 8, 19).

If we compare the results of the prevalence from regular check-ups (12.0%) and the results obtained with the auscultatory method (7.1%), we can see that they differ to a high extent. This could be explained with findings from research by Park et al. (20), where the values of BPs measured with automatic-oscillometric device were 10 mmHg higher in systolic BPs and 5 mmHg higher in diastolic BPs, compared to the auscultatory method. Differences between settings of out-patient clinics in oscillometric measurements and primary school cabinets in auscultatory measurements could have led to some differences in BP values, further potentiated by the white-coat effect in the clinical setting. We also observed relatively large proportions of elevated BP readings in the young child group, aged 2–6 years, which were seen by primary care paediatricians. The reason might be a positive selection of patients, in which a BP measurement was indicated and not measured only as part of a screening protocol.

We believe that our estimate of HTN prevalence of about 7% obtained with auscultatory measurement at one occasion is the most accurate. Based on these findings and the assumption that the prevalence of HTN is at least halved after the second and third measurement (7, 21), we presume the actual prevalence of HTN in Slovenian paediatric population is around 3–4%, concordant with results from recent foreign literature (20).

In the second part of our analysis, we have seen that BMI is positively correlated to BP height, which is consistent with findings from several other studies (3, 4, 21). Surprisingly, the relative risk for HTN was not statistically increased with an increase in waist-to-hip ratio, as it would be expected (16). Foreign studies (16, 17, 22) also report

that an increased waist-to-height ratio strongly correlates with a high BP, which was not observed in our study, due to unknown reasons, and should be further elucidated.

A major methodological issue was the difference between the auscultatory and oscillometric cohorts, which prevented us from analysing the two groups together. The most important limitation of our study were measurements of BP on a single occasion, often with a single measurement if below 90th percentile, and not at three, as it is expected (5). Single measurement studies (7, 8, 19) overestimate the prevalence of HTN. In at least two studies, the prevalence of arterial hypertension was more than halved after completion of the second and third measurements (7, 21). A limitation of our sample was also the absence of measurements of certain parameters which could correlate with HTN, such as family history of hypertension, race, birth weight, quality of diet, drug therapy and physical activity.

Our methodology risked a selection bias due to opportunistic sampling of children in primary schools. This was reduced by supplementing it with data from regular check-ups. Observer bias was reduced by double-checking the measured elevated BP by another examiner.

5 CONCLUSION

The estimated prevalence of elevated BP in hypertensive range in Slovenian paediatric population, measured at a single occasion, is around 7.1%, and prehypertensive BP approximately 3.9%, which is consistent with recent foreign studies. Moreover, a positive correlation between blood pressure and body mass index was shown. In other words, normal blood pressure appeared less often in overweight and obese children and adolescents. These findings of a pilot study give a reason to conduct a representative, larger-scale study on the prevalence of elevated BP and obesity in Slovene paediatric population, and, thereby, gather insight into the burden of a disease gaining epidemic proportions worldwide.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

FUNDING

The study was not financed.

ETHICAL APPROVAL

The study was granted ethical approval by the University

Medical Centre Maribor Ethics Committee on 19 December 2014.

REFERENCES

1. Din-Dzietham R, Liu Y, Bielo MV, Shamsa F. High blood pressure trends in children and adolescents in national surveys, 1963 to 2002. Circulation. 2007;116(13):1488-96. doi: 10.1161/CIRCULATIONAHA.106.683243.
2. Falkner B. Recent advances in pediatric hypertension. J Clin Hypertens (Greenwich). 2012;14(6):345. doi: 10.1111/j.1751-7176.2012.00664.x.
3. Chiolero A, Bovet P, Paradis G, Paccaud F. Has blood pressure increased in children in response to the obesity epidemic? Pediatrics. 2007;119(3):544-53. doi: 10.1542/peds.2006-2136.
4. Flynn J. The changing face of pediatric hypertension in the era of the childhood obesity epidemic. Pediatr Nephrol. 2013;28(7):1059-66. doi: 10.1007/s00467-012-2344-0.
5. Lurbe E, Agabiti-Rosei E, Cruickshank JK, Dominiczak A, Erdine S, Hirth A, et al. 2016 European Society of Hypertension guidelines for the management of high blood pressure in children and adolescents. J Hypertens. 2016;34:1887-920. doi: 10.1097/HJH.0000000000001039.
6. National High Blood Pressure Education Program Working Group on High Blood Pressure in Children and Adolescents. The fourth report on the diagnosis, evaluation, and treatment of high blood pressure in children and adolescents. Pediatrics. 2004;114(Suppl 2, Rep 4):555-76.
7. McNiece K, Poffenbarger T. Prevalence of hypertension and pre-hypertension among adolescents. J Pediatr. 2007;150(6);640-4. doi: 10.1016/j.jpeds.2007.01.052.
8. Chiolero A, Paccaud F, Bovet P. Pre-hypertension and hypertension among adolescents of Switzerland. J Hypertens. 2007;151(6):24-5. doi: 10.1016/j.jpeds.2007.08.043.
9. Gregorič A, Oberiter V, Schmidt I, Adamčič M, Gulič F, Nikolić T, et al. Hypertension in Slovene schoolchildren population. Clin ExperTheory Pract. 1986;8(4-5):571-6.
10. Gregorič A. Esencialna arterijska hipertenzija pri otrocih. Zdr Obz. 1990;24:157-61.
11. WHO Multicentre Growth Reference Study Group. WHO Child Growth Standards based on length/height, weight and age. Acta Paediatr Suppl. 2006;450:76-85.
12. De Onis M, Onyango AW, Borghi E, Siyam A, Nishida C, Siekmann J. Development of a WHO growth reference for school-aged children and adolescents. Bull World Health Organ. 2007;85(9):660-7.
13. CDC. About child & teen BMI. Accessed September 10th, 2016 at: http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html.
14. Nagy P, Kovacs E, Moreno LA, Veidebaum T, Tornaritis M, Kourides Y, et al. Percentile reference values for anthropometric body composition indices in European children from the IDEFICS study. Int J Obes (Lond). 2014;38(Suppl 2):S15-25. doi: 10.1038/ijo.2014.131.
15. Inokuchi M, Matsuo N, Anzo M, Takayama JI, Hasegawa T. Age-dependent percentile for waist circumference for Japanese children based on the 1992-1994 cross-sectional national survey data. Eur J Pediatr. 2007;166:655-61. doi: 10.1007/s00431-006-0296-8.
16. World Health Organisation. Waist circumference and waist-hip ratio report of a WHO expert consultation. Geneva: World Health Organization, 2008.

17. McCarthy HD, Ashwell M. A study of central fatness using waist-to-height ratios in UK children and adolescents over two decades supports the simple message - 'keep your waist circumference to less than half your height'. Int J Obes (Lond). 2006;30(6):988-92. doi: 10.1038/sj.ijo.0803226.
18. UCSF. Sample size calculators. Accessed September 11th, 2016 at: http://www.sample-size.net/sample-size-conf-interval-proportion/.
19. Paradis G, Lambert M, O'Loughlin J, Lavallee C, Aubin J, Delvin E, et al. Blood pressure and adiposity in children and adolescents. Circulation. 2004;110(13):1832-8. doi: 10.1161/01.CIR.0000143100.31752.B7.
20. Park MK, Menard SW, Yuan C. Comparison of ausculatory and oscillometric blood pressures. Arch Pediatr Adolesc Med. 2001;155:50-3.
21. Chiolero A, Madeleine G, Gabriel A, Burnier M, Paccaud F, Bovet P. Prevalence of elevated blood pressure and association with overweight in children of a rapidly developing country. J Hum Hypertens. 2007;21(2):120-7. doi: 10.1038/sj.jhh.1002125.
22. Falkner B. Hypertension in children and adolescents: epidemiology and natural history. Pediatr Nephrol. 2010;25(7):1219-24. doi: 10.1007/s00467-009-1200-3.

Lucovnik M, Starc G, Golja P, Verdenik I, Stucin Gantar I. Effects of perinatal factors on body mass index and physical fitness of school-age children. Zdr Varst. 2018;57(2):81-87. doi: 10.2478 /sjph-2018-0011.

EFFECTS OF PERINATAL FACTORS ON BODY MASS INDEX AND PHYSICAL FITNESS OF SCHOOL-AGE CHILDREN

VPLIV PERINATALNIH DEJAVNIKOV NA INDEKS TELESNE MASE IN GIBALNO UČINKOVITOST OSNOVNOŠOLCEV

Miha LUCOVNIK[1*], Gregor STARC[2], Petra GOLJA[3], Ivan VERDENIK[4], Irena STUCIN GANTAR[1]

[1]University Medical Centre Ljubljana, Department of Perinatology, Division of Obstetrics and Gynecology, Slajmerjeva 4, 1000 Ljubljana, Slovenia
[2]University of Ljubljana, Faculty of Sport, Gortanova 22, 1000 Ljubljana, Slovenia
[3]University of Ljubljana, Biotechnical Faculty, Jamnikarjeva 101, 1000 Ljubljana, Slovenia
[4]University Medical Centre Ljubljana, Clinic for Gynecology and Obstetrics, Division of Perinatology, Slajmerjeva 3, 1000 Ljubljana, Slovenia

Received: Jun 26, 2017
Accepted: Mar 7, 2018

Original scientific article

ABSTRACT

Objective: To examine the effects of various maternal and neonatal perinatal factors on the child's body mass index (BMI) and physical fitness at school-age.

Methods: Data from two registries, the SLOfit database (a national surveillance system of children's motor and physical development) and Slovenian National Perinatal Information System (NPIS) were analysed. Perinatal data for 2,929 children born in 2008 were linked to results of SLOfit testing of these children in 2016. Linear regression analysis was used to assess the potential relationship between several perinatal factors (very preterm birth, birth mass, maternal age, hypertensive disorders of pregnancy, gestational diabetes, parity, plurality, maternal pre-pregnancy BMI, mode of delivery, presentation, Apgar score at 5 minutes, and admission to a neonatal intensive care unit (NICU)) and child's BMI or child's physical fitness index (PFI) at the age of eight years. We also included child's school grade and maternal educational level in the analysis. A p value <0.05 was considered statistically significant.

Results: Children born to mothers with lower pre-pregnancy BMI and higher education had lower BMI and higher PFI ($p<0.001$) at school-age. Physical fitness was also inversely associated with nulliparity ($p<0.001$) and NICU admission ($p=0.020$).

Conclusions: Among all perinatal factors studied, higher maternal education and lower pre-pregnancy BMI seem to be the most significant determinants of child's BMI and physical fitness at school-age.

Keywords:
body mass index, pre-pregnancy obesity, physical fitness, preterm birth, maternal education

IZVLEČEK

Namen: *Ugotoviti morebitne dolgoročne učinke perinatalnih dejavnikov na indeks telesne mase (ITM) in gibalno učinkovitost otrok v starosti osem let.*

Metode: *Analizirali smo podatke baze SLOfit (Nacionalnega sistema spremljanja telesnega in gibalnega razvoja otrok in mladine) in Nacionalnega perinatalnega informacijskega sistema Slovenije (NPIS). Perinatalne podatke za 2929 otrok, rojenih leta 2008, smo povezali z rezultati njihovih meritev SLOfit v letu 2016. Z linearno regresijo smo ugotavljali morebitne povezave med otrokovim ITM in indeksom gibalne učinkovitosti (IGU) ter naslednjimi perinatalnimi dejavniki: zelo prezgodnji porod, porodna masa, pariteta, število plodov, ITM matere pred zanositvijo, način poroda, vstava, ocena po Apgarjevi in potreba po neonatalni intenzivni terapiji. V analizo smo vključili tudi razred osnovne šole, ki ga je otrok obiskoval, in materino stopnjo izobrazbe. Za statistično značilno smo upoštevali vrednost $p<0,05$.*

Rezultati: *Otroci, rojeni materam z višjo izobrazbo in nižjim ITM pred zanositvijo, so imeli v starosti osem let nižji ITM in višji IGU ($p<0,001$). Otroci, ki so potrebovali neonatalno intenzivno terapijo (ne glede na gestacijsko starost) ($p=0,020$), in prvorojenci ($p<0,001$) so imeli slabšo gibalno učinkovitost.*

Zaključki: *Med vsemi preučenimi perinatalnimi dejavniki sta stopnja izobrazbe matere in njen ITM pred zanositvijo v največji meri vplivala na ITM in gibalno učinkovitost otroka v starosti osem let.*

Ključne besede:
indeks telesne mase, debelost, nosečnost, porod, gibalna učinkovitost, izobrazba matere

***Corresponding author:** Tel. + 386 1 318 681; E-mail: mihalucovnik@yahoo.com

1 INTRODUCTION

Data on pregnancy complications, labour, delivery, and perinatal outcomes are being extensively collected in all developed countries. However, due to logistic difficulties of a long-term follow-up, only the short-term outcomes, such as Apgar scores, neonatal respiratory morbidity, admission to neonatal intensive care units (NICU), etc., are mostly analysed (1). Of all perinatal factors, prematurity has been the most studied in terms of its long-term consequences. Preterm birth has been shown in observational studies to be associated with decreased physical fitness and impaired cognitive functions in later life (2–9). Studies on impacts of other perinatal factors, such as hypertensive disorders of pregnancy, gestational diabetes, intrauterine growth restriction, plurality, parity, mode of delivery, etc., on long-term health are, however, lacking.

Studies on children born preterm suggest that childhood obesity and poor physical fitness could be among potential adverse long-term effects of complications in the perinatal period (2–14). Childhood obesity and poor physical fitness at school-age are associated with many preventable diseases and present a serious current and future public health problem, especially because they track well into adulthood and are associated with numerous adverse health outcomes (15–18). With global prevalence of childhood obesity continually growing, it is important to identify potential perinatal risk factors that could be effective targets of future public health initiatives tackling obesity (19, 20). Moreover, poor physical fitness in childhood has been associated with unfavourable psychological, social and cognitive development (21–32). It is, therefore, important to establish the impact of perinatal factors, such as preterm birth and others, on long-term physical development of children.

All births in Slovenia are being registered in the Slovenian National Perinatal Information System (NPIS) since 1987. The country also has a monitoring system of children's motor and physical development, the SLOfit system, implemented in all schools in 1987, which includes almost the entire school-going population from ages 6 to 18. The aim of the present study was to link the data from both registers in order to examine the potential relationship between several biological and environmental perinatal factors and child's body mass index (BMI) and physical fitness at school-age.

2 METHODS

We analysed the 2016 SLOfit data for children born at our institution in 2008, at their age of eight, and linked them to their NPIS perinatal data.

The SLOfit system is a national surveillance system of children's motor and physical development. Every April, qualified physical education teachers perform the measurements in all primary and secondary schools, following the official measurement protocol. The SLOfit test battery includes eight motor tests (arm-plate tapping, standing long jump, polygon course backwards, sit-ups, standing reach touch, bent arm hang, 60-meter run and 600-meter run), as well as measurements of child's height, weight and triceps skinfold thickness. Measurements are always organized in school gyms between 08:00 and 14:00. Subjects are weighed barefoot in their shorts and T-shirts to the nearest 0.1 kg with portable scales of various brands; height is measured with stadiometers of various brands to the nearest 0.1 cm. In order to include and evaluate the children's measurements in the SLOfit system, and to use the data for scientific purposes, children need the written consent of their parents; throughout the existence of this system, the response rates in primary schools have remained above 94%.

The Slovenian National Perinatal Information System (NPIS) registers all deliveries in Slovenia at ≥22 weeks of pregnancy or when the birth mass is ≥ 500 g. Registration is mandatory by law in the country's 14 maternity units and more than 140 variables are entered into a computerized database by the attending midwife and physician. To assure quality of data collection, controls are built in the computerized system, data is audited periodically, and comparisons are made with international databases, such as the Vermont Oxford network, in which Slovenia participates.

SLOfit data of the eight motor tests were used to calculate the physical fitness index (PFI). The z-score of each test was computed and the PFI was computed as the mean of all eight z-scores as: mean of eight z-scores x ten + 50. Child's height and weight measurements were used to calculate the body mass index (BMI). By definition BMI (both in children and in mothers) was calculated as an individual's weight in kilograms, divided by the height in metres squared. BMI was categorized according to the Institute of Medicine criteria as underweight (<18.5 kg/m2), normal (18.5–24.9 kg/m2), overweight (25–29.9 kg/m2) or obese (≥30 kg/m2) (33).

Student's T test was used to compare maternal and neonatal characteristics in the study group (the group for which SLOfit and NPIS data could be matched) and in the group in which SLOfit and NPIS data could not be matched. Linear regression analysis was used to assess the potential relationship between several perinatal factors (very preterm birth (<32 0/7 weeks), small for gestational age (SGA; birth mass of <10th percentile for gestation), large for gestational age (LGA; birth mass of >90th percentile for gestation), maternal age at birth, hypertensive disorders of pregnancy (diagnosed in 2008

in Slovenia as blood pressure of ≥140/90 mmHg after 20 weeks' gestation with or without proteinuria), gestational diabetes mellitus (diagnosed in Slovenia in 2008 using a two-step approach: screening with 50g oral glucose load and, when indicated, performing a 100g oral glucose tolerance test based on Carpenter and Coustan criteria), parity (nullipara vs. multipara), plurality (singleton vs. twin pregnancies), maternal pre-pregnancy BMI, mode of delivery (caesarean vs. vaginal delivery), presentation (cephalic vs. breech), Apgar score at 5 minutes <6, and admission to a neonatal intensive care unit (NICU)) and child's BMI and PFI at the age of eight years. We also included child's school grade and maternal educational level (defined as primary or vocational school; high school or college, and university degree or higher) in the regression analysis.

A p value of <0.05 was considered statistically significant. The software used for statistical analysis was IBM SPSS Statistics for Windows Version 21.0 (Armonk, NY: IBM Corp.).

3 RESULTS

A total of 6,894 neonates were born at our institution in 2008. Ninety stillbirths and early neonatal deaths were excluded leaving 6,804 children for analysis. We were able to match 2,929 (43%) of these children from SLOfit database to NPIS data due to unavailability of complete identifiers in the NPIS register. In other words, NPIS includes mothers' data for identification of children and the initial names of children are later often changed. The SLOfit database only includes children's data from official school records.

Table 1 presents the comparison between maternal and neonatal characteristics in the study group (the group for which SLOfit and NPIS data could be matched) and in the group in which we were unable to match the SLOfit and NPIS data.

Table 1. The comparison between maternal and neonatal characteristics in the study group and in the group in which SLOfit and NPIS data could not be matched.

	Matched study group	Non-matched group	P
Low maternal educational level (primary or vocational school degree)*	133 (4.6%)	135 (3.5%)	0.03
High maternal educational level (university degree or higher)	1,225 (42.0%)	1,665 (43.0%)	0.40
Very preterm birth (<32 0/7 weeks)*	39 (1.3%)	101 (2.6%)	<0.001
SGA	79 (2.7%)	134 (3.5%)	0.08
LGA	108 (3.7%)	133 (3.4%)	0.56
Maternal age (years)*	30.4±4.6	30.0±4.8	<0.001
Hypertensive disorders of pregnancy	93 (3.2%)	125 (3.2%)	0.93
Gestational diabetes	130 (4.5%)	175 (4.5%)	0.90
Nulliparity*	1,223 (41.9%)	2,298 (59.3%)	<0.001
Twin pregnancy*	122 (4.2%)	210 (5.4%)	0.02
Maternal pre-pregnancy BMI*	23.4±4.2	23.0±4.2	<0.001
Cesarean section	454 (15.5%)	666 (17.2%)	0.07
Breech presentation	147 (5%)	212 (5.5%)	0.43
Apgar score at 5 min <6	14 (0.5%)	21 (0.5%)	0.72
NICU admission*	205 (7.0%)	371 (9.6%)	<0.001

Data are shown as mean ± SD, or as N (%); BMI body mass index; NICU neonatal intensive care unit; * represents statistical significance (p<0.05) (Student's T test)

Tables 2 and 3 present the results of the regression analysis. Children born to mothers with lower pre-pregnancy BMI and higher education had lower BMI and higher PFI (p<0.001). Physical fitness was lso inversely associated with nulliparity (p<0.001) and NICU admission (p=0.020), but not with other factors, including very preterm birth (p=0.719).

Table 2. The relationship between perinatal factors and child's body mass index (BMI) at the age of eight.

	Unstandardized B	SE	Standardized B	p
High maternal educational level (university degree or higher)*	-0.484	0.102	-0.091	<0.001
Very preterm birth (<32 0/7 weeks)	-0.873	0.516	-0.036	0.091
SGA	0.089	0.310	0.006	0.773
LGA	0.430	0.266	0.031	0.106
Maternal age	-0.016	0.011	-0.029	0.150
Hypertensive disorders of pregnancy	0.337	0.278	0.022	0.226
Gestational diabetes	-0.098	0.234	-0.008	0.677
Nulliparity	0.147	0.105	0.028	0.159
Twin pregnancy	-0.119	0.270	-0.009	0.659
Maternal pre-pregnancy BMI*	0.153	0.012	0.241	<0.001
Cesarean section	-0.022	0.145	-0.003	0.878
Breech presentation	-0.208	0.236	-0.017	0.378
Apgar score at 5 min <6	0.653	0.737	0.017	0.376
NICU admission	-0.090	0.248	-0.009	0.718

B regression model coefficient; SE model's coefficient standard error; BMI body mass index; NICU neonatal intensive care unit; * represents statistical significance (p<0.05)

Table 3. The relationship between perinatal factors and child's physical fitness index (PFI) at the age of eight.

	Unstandardized B	SE	Standardized B	p
High maternal educational level (university degree or higher)*	1.598	0.255	0.120	<0.001
Very preterm birth (<32 0/7 weeks)	-0.455	1.266	-0.008	0.719
SGA	-0.735	0.773	-0.018	0.342
LGA	-0.550	0.666	-0.016	0.409
Maternal age	-0.044	0.029	-0.031	0.121
Hypertensive disorders of pregnancy	0.224	0.682	0.006	0.743
Gestational diabetes	-0.672	0.574	-0.021	0.241
Nulliparity	-1.528	0.261	-0.115	<0.001
Twin pregnancy	0.564	0.677	0.017	0.405
Maternal pre-pregnancy BMI*	-0.105	0.031	-0.066	<0.001
Cesarean section	0.223	0.365	0.012	0.541
Breech presentation	-0.110	0.586	-0.004	0.851
Apgar score at 5 min <6	-0.815	2.024	-0.008	0.687
NICU admission	-1.432	0.618	-0.056	0.020

B regression model coefficient; SE model's coefficient standard error; BMI body mass index; NICU neonatal intensive care unit; * represents statistical significance (p<0.05)

4 DISCUSSION

Our findings emphasize the importance of maternal education and lifestyle on children's motor and physical development. Higher maternal education and lower pre-pregnancy maternal BMI were associated with lower BMI and higher physical fitness of children at age 8. Children's physical fitness was also linked to parity (first-borns having lower physical fitness than their siblings) and NICU admission irrespective of gestational age.

These results are in accordance with several previously published studies. Finger et al. showed lower parental education level to be associated with higher BMI and lower fitness capacity among adolescents (34). Parental education and occupation were more strongly related to adolescents' physical activity and fitness outcomes than to family income (31). Two other studies reported similar results, but they were both based on surveys and not on objective fitness capacity measurements (35, 36). Children from families with lower socioeconomic status have also been shown to have higher rates of metabolic syndrome, impaired fasting glucose and type 2 diabetes in adulthood (37). Special preventive measures for these families with programs focused on healthy nutrition and fitness stimulation could effectively decrease the burden of metabolic syndrome in adulthood.

Very preterm birth (at <32 weeks' gestation) was not an independent risk factor for increased child's BMI at the age of eight years. This is not in accordance with the results from Vasylyeva et al., who showed preterm birth to be associated with the highest risk for excessive weight gain during childhood (10). However, late preterm birth, and not very preterm birth, was the main factor contributing to excessive weight gain in their study (10). A possible explanation for this could be that altered appetite regulation or altered insulin secretion are responsible for childhood obesity only in preterm infants with higher birth mass, i.e., those born in the late preterm period (11, 12). Physical fitness was also not associated with very preterm delivery. However, admission to the NICU was an independent risk factor for decreased physical fitness at school-age. This may be explained by increased pain sensitivity, increased avoidance behaviour, and social hypervigilance, which are all possible consequences of untreated NICU associated pain in early infancy and are unrelated to gestational age at NICU admission (13). Decreasing stress in the NICU and active encouraging of parents to stimulate their NICU children to participate in regular childhood physical activities and sports could, therefore, be very important to decrease the negative influence of NICU on physical fitness in childhood.

The association between birth order and physical fitness has not been well studied to date. We found first-born children to have lower exercise capacities, in contrast to Barclay and Myrskyla, who reported the opposite, i.e., better physical fitness in first-borns (38). It is important to notice that they analysed only males, who were born in a different time period (1965–1977). They interpreted their findings as being the consequence of social upbringing within the family rather than prenatal experience. Our results seem to suggest that older siblings positively influence the physical activity of their younger brother or sister. The important influence of peer stimulation is supported by the fact that children who attended higher school grades at the same age had better PFI in our study.

The main limitation of the study is its retrospective observational nature, which does not allow accounting for all potential confounders. It also does not allow deriving definitive conclusions on causal relations between factors studied and children's BMI and physical fitness. Moreover, we were not able to match the data of all children from the SLOfit database and NPIS. The group in which we were unable to link children's data from SLOfit to NPIS differed in many maternal and neonatal characteristics from the group for which data from these databases could be matched. Many of these differences were statistically important due to large numbers, but clinically irrelevant, e.g., the 94 g difference in birth mass between the two groups. Other differences, such as higher proportion of nulliparous women in the non-matched group, however, could indicate a systemic bias. Our results should, therefore, be interpreted with caution. To allow this, we decided to present also maternal and neonatal characteristics of pregnancies of the non-matched data. We have not stratified BMIs in subgroups, but only determined a correlation between maternal and child's BMI and other factors. Further studies will, therefore, be needed in order to more exactly determine which BMIs (in which subgroups) are correlated with which outcomes. We believe, however, that our results highlight the importance of maternal pre-pregnancy BMI and will lead to additional studies in this field.

In conclusion, our results seem to suggest that factors such as high maternal pre-pregnancy BMI and low maternal education level seem to be among the most important determinants of worse child's physical health at school-age. These public health domain factors seem to be of greater importance for child's long-term development than many perinatal outcomes, such as very preterm birth, SGA, LGA or low Apgar scores, on which perinatal medicine is currently mostly focused. Finally, our study shows that social factors seem to significantly determine the developmental outcome of children, which gives lots of opportunities for effective interventions in the pre-school and school age.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

FUNDING

The study was not financed.

ETHICAL APPROVAL

Received from the National Medical Ethics Committee (approval number 102/03/15).

REFERENCES

1. EURO-PERISTAT Project. The european perinatal health report 2010. Accessed June 18th, 2017 at: http://europeristat.com.
2. Hille ET, den Ouden AL, Saigal S, Wolke D, Lambert M, Whitaker A , et al. Behavioural problems in children who weigh 1000 g or less at birth in four countries. Lancet. 2001;357:1641-3. doi: 10.1016/S0140-6736(00)04818-2.
3. Bhutta AT, Cleves MA, Casey PH, Cradock MM, Anand KJ. Cognitive and behavioral outcomes of school-aged children who were born preterm: a meta-analysis. JAMA. 2002;288:728-37. doi: 10.1001/jama.288.6.728.
4. Saigal S, den Ouden L, Wolke D, Hoult L, Paneth N, Streiner DL , et al. School-age outcomes in children who were extremely low birth weight from four international population-based cohorts. Pediatrics. 2003;112:943-50. doi: 10.1542/peds.112.4.943.
5. Hack M, Taylor HG, Drotar D, Schluchter M, Cartar L, Andreias L, et al. Chronic conditions, functional limitations, and special health care needs of school-aged children born with extremely low-birth-weight in the 1990s. JAMA. 2005;294:318-25. doi: 10.1001/jama.294.3.318.
6. Marlow N, Wolke D, Bracewell MA, Samara M. Neurologic and developmental disability at six years of age after extremely preterm birth. N Engl J Med. 2005;352:9-19. doi: 10.1056/NEJMoa041367.
7. Litt J, Taylor HG, Klein N, Hack M. Learning disabilities in children with very low birthweight: prevalence, neuropsychological correlates, and educational interventions. J Learn Disabil. 2005;38:130-41. doi: 10.1177/00222194050380020301.
8. Moster D, Lie RT, Markestad T. Long-term medical and social consequences of preterm birth. N Engl J Med. 2008;359:262-73. doi: 10.1056/NEJMoa0706475.
9. Svedenkrans J, Kowalski J, Norman M, Bohlin K. Low exercise capacity increases the risk of low cognitive function in healthy young men born preterm: a population-based cohort study. PLoS One. 2016;11:e0161314. doi: 10.1371/journal.pone.0161314.
10. Vasylyeva TL, Barche A, Chennasamudram SP, Sheehan C, Singh R, Okogbo ME. Obesity in prematurely born children and adolescents: follow up in pediatric clinic. Nutr J. 2013;12:150. doi: 10.1186/1475-2891-12-150.
11. Gaskins RB, Liu J, Shankaran S, Lester BM, Bada HS. Small for gestational age and higher birth weight predict childhood obesity in preterm infants. Am J Perinatol. 2010;27:721-30. doi: 10.1055/s-0030-1253555.
12. Rother E, Kuschewski R, Alcazar MA, Oberthuer A, Bae-Gartz I, Vohlen C. Hypothalamic JNK1 and IKK beta activation and impaired early postnatal glucose metabolism after maternal perinatal high-fat feeding. Endocrinology. 2012;153:770-81. doi: 10.1210/en.2011-1589.
13. Page GG. Are there long-term consequences of pain in newborn or very young infants? J Perinat Educ. 2004;13:10-7. doi: 10.1624/105812404X1725.
14. Kovač M, Jurak G, Zaletel Kragelj L, Leskošek B. The secular trend in the prevalence of overweight and obesity in the population of primary school children from Ljubljana (Slovenia). Zdr Varst. 2014;53:188-98. doi: 10.2478/sjph-2014-0019.
15. Dietz WH. Health consequences of obesity in youth: childhood predictors of adult disease. Pediatrics. 1998;101:518-25. doi: 10.1542/peds.101.3.s1.518.
16. Yang X, Telama R, Leskinen E, Mansikkaniemi K, Viikari JSA, Raitakari OT. Testing a model of physical activity and obesity tracking from youth to adulthood: the cardiovascular risk in young Finns study. Int J Obes. 2007;31:521-7. doi: 10.1038/sj.ijo.0803459.
17. Steinberger J, Daniels SR, Eckel RH, Hayman L, Lustig RH, McCrindle B, et al. Progress and challenges in metabolic syndrome in children and adolescents: a scientific statement from the american heart association atherosclerosis, hypertension, and obesity in the young committee of the council on cardiovascular disease in the young; council on cardiovascular nursing; and council on nutrition, physical activity, and metabolism. Circulation. 2009;119:628-47. doi: 10.1161/CIRCULATIONAHA.108.191394.
18. Kotnik P, Fischer Posovszky P, Wabitsch M. Endocrine and metabolic effects of adipose tissue in children and adolescents. Zdr Varst. 2015;54:131-8. doi: 10.1515/sjph-2015-0020.
19. Wang Y, Lobstein T. Worldwide trends in childhood overweight and obesity. Int J Pediatr Obes. 2006;1:11-25. doi: 10.1080/17477160600586747.
20. Centers for Disease Control (CDC). Childhood obesity facts. Accessed June 18th 2017 at: http://www.cdc.gov/healthyschools/obesity/facts.htm.
21. Owen CG, Nightingale CM, Rudnicka AR, Sattar N, Cook DG, Ekelund U, et al. Physical activity, obesity and cardiometabolic risk factors in 9- to 10-year-old UK children of white European, South Asian and black African-Caribbean origin: the Child Heart And health Study in England (CHASE). Diabetologia. 2010;53:1620-30. doi: 10.1007/s00125-010-1781-1.
22. Fox KR. The self-esteem complex and youth fitness. Quest. 1988;40:230-46. doi: 10.1080/00336297.1988.10483903.
23. Backmand H, Kaprio J, Kujala UM, Sarna S, Fogelholm M. Physical and psychological functioning of daily living in relation to physical activity: a longitudinal study among former elite male athletes and controls. Aging Clin Exp Res. 2006;18:40-9. doi: 10.1007/BF03324639.
24. Hassmen P, Koivula N, Uutela A. Physical exercise and psychological well-being: a population study in Finland. Prev Med. 2000;30:17-25. doi: 10.1006/pmed.1999.0597.
25. Kjonniksen L, Anderssen N, Wold B. Organized youth sport as a predictor of physical activity in adulthood. Scand J Med Sci Sports. 2009;19:646-54. doi: 10.1111/j.1600-0838.2008.00850.x.
26. Trudeau F, Laurencelle L, Shephard RJ. Is fitness level in childhood associated with physical activity level as an adult? Pediatr Exerc Sci. 2009;21:329-38. doi: 10.1123/pes.21.3.329.
27. Telama R, Yang XL, Hirvensalo M, Raitakari O. Participation in organized youth sport as a predictor of adult physical activity: a 21-year longitudinal study. Pediatr Exerc Sci. 2006;18:76-88. doi: 10.1123/pes.18.1.76.
28. Strauss RS, Rodzilsky D, Burack G, Colin M: Psychosocial correlates of physical activity in healthy children. Arch Pediat Adol Med. 2001;155:897-902. doi: 10.1001/archpedi.155.8.897.
29. Gibbons SL, Ebbeck V, Weiss MR. Fair play for kids - effects on the moral development of children in physical-education. Res Q Exercise Sport. 1995;66:247-55. doi: 10.1080/02701367.1995.10608839.
30. Sallis JF, McKenzie TL, Kolody B, Lewis M, Marshall S, Rosengard P. Effects of health-related physical education on academic

achievement: project SPARK. Res Q Exerc Sport. 1999;70:127-34. doi: 10.1080/02701367.1999.10608030.
31. Carlson SA, Fulton JE, Lee SM, Maynard LM, Brown DR, Kohl HW, et al. Physical education and academic achievement in elementary school: data from the early childhood longitudinal study. Am J Public Health. 2008;98:721-7. doi: 10.2105/AJPH.2007.117176.
32. Trudeau F, Shephard R. Physical education, school physical activity, school sports and academic performance. Int J Behav Nutr Phys Act. 2008;5:10. doi: 10.1186/1479-5868-5-10.
33. Finger JD, Mensink GBM, Banzer W, Lampert T, Tylleskär T. Physical activity, aerobic fitness and parental socio-economic position among adolescents: the German Health Interview and Examination Survey for Children and Adolescents 2003–2006 (KiGGS). Int J Behav Nutr Phys Act. 2014;11:43. doi: 10.1186/1479-5868-11-43.
34. Institute of Medicine. Weight gain during pregnancy: reexamining the guidelines. Washington DC: National Academic Press, 2009.
35. McMurray RG, Harrell JS, Deng S, Bradley CB, Cox LM, Bangdiwala SI. The influence of physical activity, socioeconomic status, and ethnicity on the weight status of adolescents. Obesity. 2000;8:130-9. doi: 10.1038/oby.2000.14.
36. Sallis JF, Zakarian JM, Hovell MF, Hofstetter CR. Ethnic, socioeconomic, and sex differences in physical activity among adolescents. J Clin Epidemiol. 1996;49:125-34. doi: 10.1016/0895-4356(95)00514-5.
37. Puolakka E, Pahkala K, Laitinen TT, Magnussen CG, Hutri-Kähönen N, Tossavainen P, et al. Childhood socioeconomic status in predicting metabolic syndrome and glucose abnormalities in adulthood: the cardiovascular risk in young Finns study. Diabetes Care. 2016;39:2311-7. doi: 10.2337/dc16-1565.
38. Barclay K, Myrskylä M. Birth order and physical fitness in early adulthood: evidence from Swedish military conscription data. Soc Sci Med. 2014;123:141-8. doi: 10.1016/j.socscimed.2014.11.007.

Bakalár P, Zvonar M, Sedlacek J, Lenkova R, Sagat P, Vojtasko L, Liptakova E, Barcalova M. Movement activity determination with health related variables of university students in Kosice. Zdr Varst. 2018;57(2):88-95. doi: 10.2478/sjph-2018-0012.

MOVEMENT ACTIVITY DETERMINATION WITH HEALTH-RELATED VARIABLES OF UNIVERSITY STUDENTS IN KOSICE

DOLOČANJE GIBALNE DEJAVNOSTI S SPREMENLJIVKAMI NA PODROČJU ZDRAVJA PRI UNIVERZITETNIH ŠTUDENTIH V MESTU KOŠICE

Peter BAKALÁR[1], Martin ZVONAR[2*], Jaromir SEDLACEK[3], Rut LENKOVA[3], Peter SAGAT[4], Lubos VOJTASKO[5,3], Erika LIPTAKOVA[6], Miroslava BARCALOVA[5,7]

[1]Pavol Jozef Šafárik University, Institute of Physical Education and Sports, Ondavská 21, Kosice, Slovakia
[2]Masaryk University, Faculty od Sports Studies, Kamenice 5, Brno, Czech Republic
[3]University of Presov, Faculty of Sport, Department of Sports Kinanthropology, 17th November Str., Presov, Slovakia
[4]Prince Sultan University Riyadh, Department of Physical Education, Riyadh, Saudy Arabia
[5]Technical University of Kosice, Department of Physical Education, Vysokoškolská 4, Kosice, Slovakia
[6]Technical University of Kosice, Faculty of Economics,
Department of Applied Mathematics and Business Informatics, Němcovej 32, Kosice, Slovakia
[7]Technical University of Kosice, Faculty of Mechanical Engineering,
Department of Biomedical Engineering and Measurement, Letná 9, Kosice, Slovakia

Received: May 29, 2017
Accepted: Mar 12, 2018

Original scientific article

ABSTRACT

Introduction: There is currently a strong scientific evidence about the negative health consequences of physical inactivity. One of the potential tools for promoting physical activity at the institutional level of the Ecological model is to create conditions and settings that would enable pupils, students and employees engage in some form of physical activity. However, physical activities as a subject are being eliminated from the study programs at Slovak universities. The purpose of the study was to find current evidence about the level of structured physical activity and health-related variables in university students in Košice.

Material and methods: The sample consisted of 1,993 or, more precisely, 1,398 students who attended two universities in Košice. To collect data, students completed a questionnaire and were tested for body height, body weight, circumferential measures and percentage body fat.

Results: The university students did not sufficiently engage in a structured physical activity. A large number of students had either low or high values of percentage body fat and BMI and high WHR values.

Conclusions: Our findings have shown that the research into physical activity of university students should receive more attention.

Keywords:
Physical activity, percentage body fat, Body mass index, Waist-hip ratio, university students

IZVLEČEK

Uvod: *Trenutno imamo na voljo zelo trdne znanstvene dokaze o negativnih telesnih posledicah zaradi telesne nedejavnosti. Eno izmed morebitnih orodij za promocijo telesne dejavnosti na institucionalni ravni Ekološkega modela je ustvarjanje pogojev in okolja, ki omogoča učencem, študentom in zaposlenim vključevanje v določeno telesno dejavnost. Na univerzah na Slovaškem se telesne dejavnosti kot predmet izločajo iz študijskih programov. Namen študije je raziskovanje trenutnih dokazov o ravni strukturirane telesne dejavnosti in spremenljivk, ki so povezane z zdravjem pri študentih v mestu Košice.*

Gradivo in metode: *Vzorec je vključeval 1.993, ali natančneje 1.398 študentov, ki obiskujejo obe univerzi v mestu Košice. Zbiranje podatkov je potekalo v obliki vprašalnika, ki so ga študenti izpolnili, ter testiranja za pridobivanje podatkov o telesni višini, telesni teži, obodnih vrednosti in odstotka telesne maščobe.*

Rezultati: *Univerzitetni študenti se ne vključujejo v strukturirane telesne dejavnosti v zadostni meri. Visoko število študentov ima prenizke ali previsoke vrednosti za odstotek telesne maščobe in indeks telesne mase ter visoke vrednosti pri razmerju med pasom in boki.*

Zaključek: *Ugotovitve nakazujejo, da bi morali raziskovanju telesne dejavnosti univerzitetnih študentov posvečati več pozornosti.*

Ključne besede:
telesna dejavnost, odstotek telesne maščobe, indeks telesne mase, razmerje med pasom in boki, univerzitetni študenti

***Corresponding author:** Tel. + 420 602 733 111; E-mail: zvonar@fsps.muni.cz

1 INTRODUCTION

At present, we have strong scientific evidence on the negative health consequences of lack of movement activity, which we define as 'the behaviour of an individual with a low volume of normal physical activity and the deficit of structured movement activities with the prevalence of sedentary lifestyle' (1). In the Slovak Republic, according to the Eurobarometer 2014 (2), no ordinary physical activity, such as cycling from place to place or gardening, is practiced by 19% of the population, and up to 41% of the population does not practice any physical exercise or any sport, which represents an increase of 6% compared to 2009. Thus, the low level of physical activity can be considered a public policy problem that needs to be addressed at the national level (3). One of the theoretical concepts applicable to the promotion of mobility of the population is the Ecological Model of Behaviour (4). For the above model, the desired change in behaviour, in our case, the increase in the level of movement activity, will be more successful if we focus on influencing as many of the correlates and determinants of motion activity. We will work through multiple interventions at different levels (individual, interpersonal, institutional, communal and public) at the same time (5). At the institutional level, which includes schools, companies, health facilities or civic associations, it is possible to support mobility activities by creating conditions and environments for carrying out a specific physical activity for pupils, students, employees or residents (6). Especially in the case of schools, we have a tool for influencing a large number of individuals in the direction of their physical education. In the academic year 2015/16, despite the long-term decreasing trend in the number of university students, 149,031 citizens of the Slovak Republic (together with foreigners, it is 158,659 students) were studying at Slovak universities (7), accounting for about 2.8% of the whole Slovak population. University education is, for the majority of them, often the last formal learning environment in which they can acquire the knowledge and skills needed to lead an active lifestyle with lifelong positive health benefits (8, 9). Research suggests that incorporating compulsory education related with health or physical activity into university education studies may impact on health-related knowledge, attitudes and real behaviour in graduates (10). At the Slovak universities, however, we can, paradoxically, watch the opposite trend, when physical activities as a subject are often excluded from study programs, even among optional subjects, at humanities faculties, and in teacher study programs (11). From 36 Slovak and 4 foreign universities operating in Slovakia, it provides teaching of physical activity for students of 23 universities (57.5%) (12).

1.2 Objectives

On the example of two of two Slovak universities, Technical University of Kosice (TUKE) and P. J. Safarik University in Kosice (UPJS), we analyse the frequency of structured physical activity and health-related variables of their students, both in the context of the obligation and selection of hours of physical activity during university studies.

2 MATERIALS AND METHODS

In our research, are involved 3391 students from two Kosice universities, TUKE and UPJS. Data were collected in the academic year 2012/2013, in two waves, October/ November 2012 and April/ May 2013. There was applied questionnaire and measurements of somatic parameters. During the winter term, in October/ November 2012, 1993 students were involved (sample S1), 810 males and 1183 females; 1042 were students from TUKE and 951 from UPJS. During the summer term, in April/ May 2013, we again collected data from the next 1398 students (sample S2), 558 males and 840 females, 645 from TUKE and 753 from UPJS.

For the needs of this study, we prepared a non-standardized questionnaire, from which we gathered students' age, gender, the year of study, and the frequency of structured exercise activity during the last 6 months.

Somatic parameters were learned by measuring in an indoor sports hall. Students were dressed in light sports closing (shorts and T-shirts). Parameter body height (BH) was measured according to the instructions in sports metrology (13). Apparatus Omron BF 511 was used to learn values of the parameters body weight (BW), Body Mass Index (BMI) and percentage of body fat (% fat). Waist-hip ratio was measured with measuring tailor tape. according to instructions of the WHO (2011).

When evaluating the percentage of fat, we used the classification of Gallagher et al. (14) listed in the OMRON BF 511 manual for men and women of age 18–39. For men, the values were <8% low, 8.0–19.9% normal, 20.0–24.9 high and ≥25% very high. For females, the values were <21% low, 21.0–32.9% normal, 33.0–38.9% high and ≥39 very high.

WHR values were classified according to the WHO recommendations (15), and with respect to gender dimorphism – females: <0.75 excellent, 0.75–0.79 good, 0.80–0.86 average and >0.86 at risk, and males: <0.85 excellent, 0.85–0.89 good, 0.90–0.95 average and >0.95 at risk.

BMI was evaluated according to the WHO classification (16): ≤18.5 underweight, between 18.5 and 24.9 normal (healthy) weight, 25.0–29.9 overweight, and ≥30 obese.

To assess the significance of differences between groups in the frequency of structured movement activity, body fat percentage, BMI and WHR, we used the Kruskal Wallis test. We divided the research groups according to the year of study, into three sub-groups, namely: the 1st year, 2nd year, 3rd–6th year. To evaluate the magnitude of the statistical significance of the differences in the mean values of the monitored indicators, we used the t-test for independent files. Statistical significance was evaluated at $p < 0.05$.

Pedagogical interpretation is based on fundamental logical methods, mainly on analysis, comparison and generalization.

3 RESULTS

The basic characteristics of S1 and S2 are shown in Table 1. The mean values of the body height of both male and female groups were in the average body height of the Slovak population (13) of this age (average male 173–185 cm and female intervals 163–172 cm). The average body weight of male S1 was at the upper limit of the mean weight and the average weight of the S2 set in the overweight interval (male average 64–77 kg, overweight 77–89 kg). The average body weight of both groups of females was in the range of average population body weight (52–64 kg).

At the beginning of the academic year 2012/2013, from a total of 18,505 students of TUKE and UPJS, the subject physical activity was chosen by 2958 freshmen, 1622 in the second, 352 in the third, 412 in the fourth, 142 in the fifth and 5 in the sixth year of study. Obligation to complete the subject physical activities for all students of the 1st year and 2nd year of the UPJS Medical Faculty (n=406 resp. 407) and some other faculties of TUKE was reflected in their high percentage of enrolled students of the above years (74.9% and 46.8%, respectively).

The selectivity of physical activity subject in the 3rd to 6th years of both universities was again reflected in a significant drop in the number of students in physical activity lessons (Figure 1).

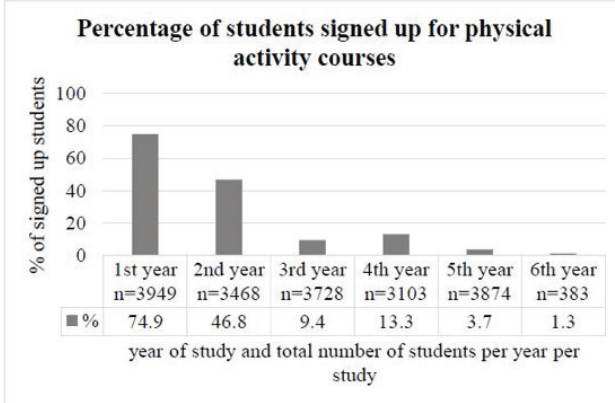

Figure 1. Percentages of TUKE and UPJS students signed for PA courses in each study year.

Table 1. Fundamental characteristics of our groups according to gender and year of study.

	1st year (n)		2st year (n)		3rd-6th year (n)		Total (N)	
Males	S1, n=518	S2, n=376	S1, n=204	S2, n=146	S1, n=88	S2, n=36	S1, n=810	S2, n=558
Age	19.7±1.7	20.7±1.3	20.7±1.2	21.9±1.3	23.1±3.8	23.2±1.4	20.3±2.2	21.1±1.5
BH(cm)	179.2±6.6	180±6.4	179.0±6.8	180.3±6.2	178.5±7.0	178.7±7.7	179.1±6.7	180.0±6.5
BW(kg)	75.7±12.7	77.9±13.7	77.6±14.4	80.4±11.5	79.3±18.2	78.5±13.2	76.6±13.9	78.6±13.1
Females	n = 622	n = 448	n = 367	n = 276	n = 194	n = 116	N = 1183	N = 840
Age	20.0±2.6	20.8±1.9	20.8±2.8	21.7±2.2	22.7±2.8	23.1±1.4	20.7±2.8	21.4±2.1
BH(cm)	166.1±6.3	166.7±6.1	166.2±6.2	167.4±6.1	166.7±6.0	167.6±5.7	166.2±6.2	167.1±6.1
BW(kg)	60.3±10.5	59.6±9.7	60.4±10.8	61.2±11.8	59.8±9.6	59.5±8.8	60.2±10.4	60.1±10.3

Legend: S1 – sample 1 (September 2012); S2 – sample 2 (May 2013)

By analysing the frequency of structured movement activity, we found that 38.8% of males and 62.9% of S1 females (beginning of the academic year) were involved in structured movement activity irregularly or not at all. At the same time, among males, the number of students engaged in exercise activity was 3 times a week higher than that of females. The influence of gender on the frequency of structured physical activity of university students was confirmed by our previous studies (17), as well as by another study by Mota and Esculcas (18). In S2 (the end of academic year), 13.6% of males and 29.7% of females were irregularly or not attracted to structured physical activity, which is less than in S1 for males and females. The difference between the two independent groups (S1 and S2) was statistically significant (Table 2). If we consider the performance of structured physical activity 1 times a week as insufficient, we can say that most of our students were not physically active at the beginning of the academic year (52.1% of males and 76.5% of females).

Table 2. T-tests between S1 and S2 regarding gender and year of study.

Gender:	**Males**				**Females**			
Health variables:	**FSPA**	**%FAT**	**BMI**	**WHR**	**FSPA**	**%FAT**	**BMI**	**WHR**
1st year								
S1	3.3±1.4	19.1±7.5	23.6±3.7	0.84±0.07	2.6±1.2	29.9±7.7	21.8±3.6	0,77±0,07
S2	3.8±1.1	18.8±7.6	23.9±3.9	0.85±0.07	3.3±1.1	28.7±6.8	21.3±3.0	0,74±0,06
p	**0.0001***	0.52	0.1498	**0.0015***	**0.0001***	**0.0095***	**0.0101***	**0.0001***
2nd year								
S1	3.4±1.2	20.4±7.7	24.2±4.1	0.84±0.8	2.8±1.1	30.5±7.2	21.9±3.8	0,76±0,06
S2	3.9±1.0	20.5±7.3	24.6±3.3	0.86±0.06	3.3±1.1	29.2±7.4	21.8±3.7	0,74±0,06
p	**0.0004***	0.965	0.2591	**0.0025***	**0.0001***	**0.024***	0.6519	**0.0002***
3rd-6th year								
S1	3.3±1.3	21.4±8.0	24.5±4.1	0.86±0.09	2.8±1.1	29.8±6.8	21.5±3.1	0,76±0,06
S2	3.8±1.1	20.4±7.0	24.4±3.1	0.85±0.07	3.4±1.1	28.7±6.6	21.3±3.2	0,73±0,08
p	**0.0259***	0.5234	0.9322	0.3231	**0.0001***	0.1803	0.6172	**0.0122***
Total								
S1	3.4±1.3	19.7±7.6	23.8±3.9	0.84±0.08	2.7±1.1	30.1±7.4	21.8±3.6	0,76±0,07
S2	3.8±1.1	19.3±7.5	24.2±3.8	0.86±0.07	3.3±1.1	28.9±7.0	21.4±3.3	0,74±0,06
p	**0.0001***	0.3877	0.11	**0.0004***	**0.0001***	**0.0003***	**0.0271***	**0.0001***

Legend: S1 – sample 1 (September 2012); S2 – sample 2 (May 2013); FSPA – frequency of structured physical activity (1); %FAT – body fat percentage (%); BMI – body mass index (kg. m-2); WHR – waist hip rate (1); *p<0.05.

In both groups of males and females (S1 and S2), we found higher average values of body fat (norms according to Gallagher et al., 2000 are 8–19.9% for men and 21–32.9% for women). More authors prove that there exist some systematic differences depending on the way of gaining data (19). Our apparatus OMRON BF 511 slightly overvalues the percentage of body fat, compared to skin folders (20) or apparatus OMRON BF 306 (21, 24). Despite the system measurement error, the measured results can be used to compare the percentage of body fat of the groups. For females from S1 group, for example, there were measured higher percentages of body fat, compared to S2 females in all groups in average by 1.2%, with statistically significant differences. Among males, the differences between the groups are not statistically significant. However, there is the trend in increasing the percentage of fat with the higher year of study (Table 3), both among males and females.

Average BMI values were found in both men and women of both groups in the recommended bands, with no significant differences between the groups (normal weight men and women 18.50–24.99; WHO, 2014) (Table 4). Several Slovak authors have come to similar results (19–25). In monitoring the distribution of students within single BMI bands, we found that, in case of males, 26.3% of S1 and 26.7% of S2 were in the overweight band, and 6% and 7.3%, respectively, in the obesity band. For our females, this distribution was smaller with 12.1% of S1 and 10.5% of S2 groups in the overweight band, and 3.5% and 1.9%, respectively, in the obesity band. The incidence of underweight in females was 11.7% in S1 and 14.5% in S2 (Table 4).

Table 3. T-tests between S1 and S2 regarding gender and year of study.

Males						Females					
N	Norms	Low	Normal	High	Very high	N	Norms	Low	Normal	High	Very high
		>25.0 <8.0	8.0-19.9	20.0-24.9	>25.0			<20.9	21.0-32.9	33.0-38.9	>39.0
S1	n	26	430	175	179	**S1**	n	103	714	225	141
810	%	3.2	53.1	21.6	22.1	**1183**	%	8.7	60.4	19	11.9
S2	n	27	297	117	117	**S2**	n	100	519	160	61
558	%	4.8	53.2	21	21	**840**	%	11.9	60.9	19	7.3

Legend: S1 – sample 1 (September 2012); S2 – sample 2 (May 2013).

Table 4. Absolute and relative distribution of BMI in September 2012 and May 2013 measurements.

Males, BMI						Females, BMI					
N	Norms	<18.5	18.5-24.9	25-29.9	30.0>	N	Norms	<18.5	18.5-24.9	25-29.9	30.0>
S1	n	28	520	213	49	**S1**	n	139	860	143	41
810	%	3.5	64.2	26.3	6	**1183**	%	11.7	72.7	12.1	3.5
S2	n	11	357	149	41	**S2**	n	122	614	88	16
558	%	2.0	64	26.7	7.3	**840**	%	14.5	73.1	10.5	1.9

Legend: S1 – sample 1 (September 2012); S2 – sample 2 (May 2013).

Average values of WHR of our group, both males and females, were found (Table 2) in recommended bands (norms of males ≤0.95 and females ≤0,85; WHO, 2011). Risk values of WHR can be seen among males of S1 in 5.4%, and of S2 in 6.5%. For females in S1, it was 7.8%, and for S2, 3.9% (Table 5). For these men and women, we can talk about increased health risks. In the first and second year of study groups, we observed a WHR index increase trend among males, but females, on the contrary, had a decrease in WHR in both groups. These trends were also manifested in a significant difference between both men and women. Similar results were also found by other authors (22–26).

Table 5. Absolute and relative distribution of WHR in September 2012 and May 2013 measurements.

Males						Females					
N	Norms	Excellent <0.85	Good 0.85-0.89	Average 0.90-0.95	At risk 0.96>	N	Norms	Excellent <0.75	Good 0.75-0.79	Average 0.80-0.85	At risk 0.86>
S1	n	470	203	93	44	**S1**	n	534	348	209	92
810	%	58	25.1	11.5	5.4	**1183**	%	45.1	29.4	17.7	7.8
S2	n	262	160	100	36	**S2**	n	535	198	74	33
558	%	47	28.7	17.9	6.5	**840**	%	63.7	23.6	8.8	3.9

Legend: S1 – sample 1 (September 2012); S2 – sample 2 (May 2013).

4 DISCUSSION

A significant decrease in the number of students present at physical activity lessons in the higher years of study (although we do not have complete facts about their physical activity), is for us a strong indicator of a lower interest in structured physical activity in higher years of university studies. Both groups of males and females that we observed at the beginning of school year (S1), were significantly less physically active, like groups at the end of school year (S2). From this, we can deduce that the compulsory subject of physical activity could lead to one of its main goals – to increase the level of physical activity of university students. Another deduction can be about the negative influence of summer vacations on the volume of movement activity. These findings relate mainly to the 1st and 2nd year of study, in which the comparison of differences in the frequency of structured movement activity was statistically significant in both men and women. The question is why students from the 3rd to the 6th year of schooling disappear from the hours of optional movement activities. Should not the obligation to pass a physical activity lead the students to take free hours of physical activity to maintain a higher level of their physical fitness? Did not we teach them that during the lessons? Should hours of physical activity be compulsory throughout the whole study? Or should we choose a different format (10), the introduction of compulsory hours of the subject Health Education, including not only physical education (practical and theoretical part), but also health psychology and nutrition education that can lead to long-term positive results. According to Keating et al. (28), there are three main reasons as to why we are unable to increase the level of physical activity of university students through their participation in lessons of physical activity, namely:

- Research on the physical activity of university students is not sufficient;
- research of the physical activity of university students lacks a multilevel approach (individual, interpersonal, institutional, communal and public);
- movement activity diagnostic tools are subjective and inconsistent, making comparisons of movement activity parameters between individual groups difficult or impossible.

Of course, thinking that changing all university students to practice regularly physical activities would be naive. However, not to attempt to influence as many of them as possible would be irresponsible from point of view of society in the light of the negative health, economic and social consequences of physical activity deficiency.

As stated in the University Act itself in Slovakia (29), the mission of higher education institutions 'is to develop a harmonious personality, knowledge, wisdom, good and creativity in man and to contribute to the development of education, science, culture and health for the welfare of society as a whole, thereby contributing to develop a knowledge-based society ... e.g. via contributing to the prevention and treatment of diseases. Considering both normal and structured physical activities as equivalent in terms of their health benefits (1), we think that the place of structured physical activity in movement education is indispensable. At the same time, numerous groups of individuals with low or high percentages of body fat and BMI as well as high WHR values should be our primary target groups in the field of health education for university students.

5 CONCLUSIONS AND RECOMMEDATIONS

The frequency of structured movement activity of students of selected colleges of high education is inadequate. Its support in the form of lessons of movement activities has its social justification in its current form, as well as its hidden limitations and deficiencies, the identification of which should be the subject of further research into the physical activity of university students. Considering the need to apply the multilevel approach, based on our findings on the prevalence of risk values with health-associated variables and considering the methodological weaknesses of our study, we therefore recommend further research in the following fields:

1. Monitoring of individual parameters of physical activity of university students (frequency, intensity, type and time of movement activities) at all universities in the Slovak Republic with a uniform diagnostic tool (subjective or objective). Our study is an example of the use of a non-standardized subjective diagnostic tool, in which we focus only on monitoring the frequency of structured movement activity, without identifying intensity, kind and time involved in a physical activity.
2. Monitoring health-related variables (the percentage of body fat, BMI, WHR) at all universities in the Slovak Republic by a uniform methodical procedure.
3. Monitoring the correlations of physical activity of college students in the research of identified groups of correlates of physical activity: a) demographic and biological factors, b) psychological, cognitive and emotional factors, c) attributes of behaviour and skills, d) social and cultural factors, e) environmental factors and f) characteristics of movement activity (30-32).
4. Monitoring the determinants of physical activity of university students through the monitoring of the influence of obligatory passing of hours of movement activities in the subject of Health Education, as independent variables, together with health-related indicators, knowledge, attitudes and actual behaviour of graduates. This monitoring can take the form of interventions supporting the physical activity of students in well-designed and conducted research experiments.
5. Identification of successful interventions to support physical activity of graduates and their transitions into conditions of other universities.
6. Analysing the structure and evaluation of the quality of the educational process on the lessons of physical activities carried out in the various educational environments of university education institutions. The real situation that only 9.4% of thirds, 13.3% of fours, 3.7% of fifth and 1.3% of sixths (Figure 1) chose physical activity may be, to a certain extent, also a reflection of dissatisfaction with the educational process and the educational environment in which this process takes place. As with other types of sports and fitness equipment in the developing fitness industry in Kosice, the introduction of basic principles of sport management into the management of movement education at universities appears to be a necessary step.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

FUNDING

The study was supported by the grant project VEGA 1/1343/12, entitled 'Selected risk factors of obesity and exercise prevention.'

ETHICAL APPROVAL

The study has been performed in accordance with the declaration of Helsinki and approved by the Ethical committee of the Faculty of Sports Studies, Masaryk University, Brno, Czech Republic.

REFERENCES

1. Dobry L, Cechovska I. Zdravotní benefity pohybové aktivnosti a behaviorální intervence. In: Hendl J, Dobrý L, et al. Zdravotní benefity pohybových aktivit: monitorování, intervence, evaluace. Praha: Karolinum, 2011:14-60.
2. Eurobarometer. Sport and physical activity, 2014. Accessed March 22nd, 2015 at: http://ec.europa.eu/health/nutrition_physical_activity/docs/ebs_412_en.pdf.
3. Kalman M, Hamrik Z. Je nizka uroven pohybove aktivity verejnepoliticky problem?. Telesna Kultura. 2013;5:96-114.
4. McLeroy KR, Bibeau D, Steckler A, Glanz K. An ecological perspective on health promotion programs. Health Educ Q. 1988;15(4):351-77.
5. Hendl J, Dobry L, et al. Zdravotni benefity pohybovych aktivit: monitorovani, intervence, evaluace Praha: Karolinum, 2011.
6. Bocarro JN, Kanters MA. Leisure, health, and physical activity. In: Dimensions of leisure for life: individuals and society. Champaign: Human Kinetics, 2010:67-87.
7. MSVVS SR: annual reports about state of universities in Slovakia in year 2016. Accessed February 8th, 2017 at: https://www.minedu.sk/vyrocne-spravy-o-stave-vysokeho-skolstva/.
8. McSharry P, Timmins F. An evaluation of the effectiveness of a dedicated health and well-being course on nursing students' health. Nurse Educ Today. 2016;44:26-32. doi: 10.1016/j.nedt.2016.05.004.
9. Sparling PB. College physical education: an unrecognized agent of change in combating inactivity-related diseases. Perspect Biol Med. 2003;46(4):579-87.
10. Pearman SN, Valois RF, Sargent RG, Saunders RP, Drane JW, Macera CA. The impact of a required college health and physical education course on the health status of alumni. J Am Coll Health. 1997;46(2):77-85. doi: 10.1080/07448489709595591.
11. Gerhatova B. Sucasny stav univerzitneho sportu v Slovenskej republike, Ministerstvo skolstva SR. CD-2009-26896/21007. 2009; 5:10.
12. Jancokova L, Pugschova B, Bendikova E. Telesná výchova na vysokých školách v slovenskej republike. ACC J. 2015;21:148-59.
13. Sedlacek J, Cihova I. Športová metrológia. Bratislava: ICM Agency, 2009.
14. Gallagher D, Heymsfield SB, Heo M, Jebb SA, Murgatroyd PR, Sakamoto Y. Healthy percentage body fat ranges: an approach for developing guidelines based on body mass index. Am J Clin Nutr. 2000;72(3):694-701.
15. World Health Organisation. Waist circumference and waist-hip ratio: report of a WHO expert consultation, 2011. Accessed February 20th, 2017 at: http://www.who.int/nutrition/publications/obsity/WHO_report_waistcircumference_and_ waisthip_ratio/en/.
16. World Health Organisation. The international classification of adult underweight, overweight and obesity according to BMI, 2014. Accessed January 15th, 2017 at: http://apps.who.int/bmi/index.jsp?introPage=intro_3.html.
17. Bakalar P, Matus I, Hancova M. The comparison of selected lifestyle variables of first-year students at two universities in Kosice. Phys Activ Rev. 2016;4:192-9.
18. Mota J, Esculas C. Leisure-time physical activity behavior: structured and unstructured choices according to sex, age, and level of physical activity. Int J Behav Med. 2002; 9(2):111-21.
19. Brtková M, et al. Body composition of undergraduates - comparison of four different measurement methods. Phys Activ Rev. 2014;2:38-44.
20. Jurkovicova J, et al. Prevalencia a trendy vyvoja rizikovych faktorov kardiovaskularnych chorob u vysokoskolakov: zivotne podmienky a zdravie. Bratislava: Urad Verejneho Zdravotnictva SR, 2010:142-51.
21. Hrcka J, Kovarova M, Benacka J. Pohybova aktivita edukantov fyzioterapie vo volnom case a jej reflexia na vybranych zdatnostnych a zdravotnych charakteristikach. Trnava: Univerzita sv. Cyrila a Metoda v Trnave, 2011.
22. Hrcka J, Bobrík M, Krska P. Od sebapoznania k autokultivácii cez pohybovú aktivitu vysokoškoláka. Telesná výchova a šport, Bratislava. 2006;16(2):22-6.
23. Krska P. La relation entre le développement physique des filles à l'école primaire et le niveau de leur performance motrice. Rev Int Sci Hum Naturelles. 2011;1:87-94.
24. Petrasova M, et al. Obvod pasa alebo BMI?. In: Zivotné podmienky a zdravie. Bratislava: Úrad Verejného Zdravotníctva SR, 2010:166-71.
25. Hertelyova Z, Salaj R, Chmelarova A, Dombrovsky P, Dvorakova MC, Kruzliak P. The association between lipid parameters and obesity in university students. J Endocrinol Invest. 2016;39(7):769-78. doi: 10.1007/s40618-015-0240-8.
26. Zidek J. Longitudinálne hodnotenie stavu telesného rozvoja študentov SJF STU Bratislava. In: 17. rocnik Medzinárodnej vedeckej konferencie »Od vyskumu k praxi«, 29.-30.11.2012. Bratislava: Nakladateľstvo STU, 2012:379-83.
27. Honz O, Cepkova A. Hodnotenie stavu telesneho rozvoja studentov povinnej telesnej vychovy. In: Telesna vychova, sport, vyskum na univerzitach. Zbornik referatov z 15. rocnika medzinarodnej vedeckej konferencie, 25.-26.11.2010. Bratislava: STU Bratislava, 2010:47-51.
28. Keating XD Guan J, Piñero JC, Bridges DM. A meta-analysis of college students' physical activity behaviors. J Am Coll Health. 2005;54(2):116-25. doi: 10.3200/JACH.54.2.116-126.
29. Zákon o vysokých školách 2014. Accessed February 1st, 2017 at: http://jaspi.justice.gov.sk/jaspiw1/htm_zak/jaspiw_zak_print.asp.
30. Trost SG Owen N, Bauman AE, Sallis JF, Brown W. Correlates of adults' participation in physical activity: review and update. Med Sci Sports Exerc. 2002;34(12):1996-2001. doi: 10.1249/01.MSS.0000038974.76900.92.
31. Sallis JF, Prochaska JJ, Taylor WC. A review of correlates of physical activity of children and adolescents. Med Sci Sports Exerc. 2000;32(5):963-75.
32. Cerar K, Kondrič M, Sindik J. The profiling of University of Ljubljana students according to their motives for exercise participation. Zdr Varst. 2017;56:107-14. doi: 10.1515/sjph-2017-0014.

Petek Šter M, Cvejanov Kezunović L, Cojić M, Petek D, Švab I. Specialty training in family medicine in Montenegro - an evaluation of the programme by the first generation of trainees. Zdr Varst. 2018;57(2):96-105. doi: 10.2478/sjph-2018-0013.

SPECIALTY TRAINING IN FAMILY MEDICINE IN MONTENEGRO – AN EVALUATION OF THE PROGRAMME BY THE FIRST GENERATION OF TRAINEES

SPECIALIZACIJA IZ DRUŽINSKE MEDICINE V ČRNI GORI – OCENA PRVE GENERACIJE SPECIALIZANTOV DRUŽINSKE MEDICINE

Marija PETEK ŠTER[1*], Ljiljana CVEJANOV KEZUNOVIĆ[2], Milena COJIĆ[2], Davorina PETEK[1], Igor ŠVAB[1]

[1]University of Ljubljana, Faculty of Medicine, Department of Family Medicine, Poljanski nasip 58, 1000 Ljubljana, Slovenia
[2]University of Montenegro, Medical Faculty of Podgorica, Department of Family Medicine, Montenegro

Received: Oct 16, 2017
Accepted: Mar 12, 2018

Original scientific article

ABSTRACT

Keywords:
specialty training in family medicine, Montenegro, evaluation of the programme, quantitative and qualitative analyses

Introduction: One of the aims of health care reform in Montenegro is to strengthen primary care. An important step forward is the implementation of specialty training in family medicine (FM). The aim of this article is to evaluate the implementation of specialty training in family medicine in Montenegro, regarding the content, structure and methods, by the first generation of trainees and the coordinator of the training.

Methods: A questionnaire was sent by mail in July and August 2017 to all 26 eligible trainees who started specialty training in 2013. Twenty-two of the 26 trainees (84.6%) responded. The questionnaire consisted of closed and open-ended questions related to the evaluation of the training. A descriptive quantitative and qualitative analysis with predefined themes and a semi-structured interview with the coordinator were carried out.

Results: The process of training in FM was assessed positively by both trainees and the coordinator. The positive assessment included that the specialisation course offered modern design through modules and practice, and trainees both improved their existing knowledge and skills and acquired new ones necessary for everyday work. The coordinator emphasised the importance of the introduction of new teaching methods and formative assessment, the important role of mentors, and the involvement of Slovenian colleagues in the teaching process and supervision of the programme.

Conclusions: The implementation of speciality training in FM in Montenegro was successful. Several assessment methods were used that can be further developed in individual structured feedback, which could stimulate the continual improvement of trainees' knowledge and competencies.

IZVLEČEK

Ključne besede:
specializacija družinske medicine, Črna Gora, ocena programa, kvantitativna in kvalitativna analiza

Izhodišča: *Eden izmed ciljev reforme zdravstvenega sistema v Črni Gori je okrepitev primarnega zdravstvenega varstva. Pomemben korak na tej poti je vpeljava specializacije iz družinske medicine (DM). Namen prispevka je oceniti uspešnost uvedbe specializacije iz družinske medicine v Črni gori glede vsebine, poteka in metod z vidika specializantov in nacionalne koordinatorice.*

Metode: *Vprašalnik smo po elektronski pošti v juliju in avgustu 2017 poslali vsem 26 specializantom, ki so specializacijo začeli v letu 2013. Odgovorilo je 22 od skupno 26 specializantov (84,6%). Vprašalnik je bil sestavljen iz vprašanj zaprtega in odprtega tipa, s katerimi smo pridobili podatke o poteku specializacije. Odgovore specializantov smo analizirali s pomočjo kvantitativne deskriptivne analize in kvalitativne tematske analize z vnaprej postavljenimi temami. Oceno koordinatorice smo pridobili s pomočjo pol-strukturiranega intervjuja.*

Rezultati: *Uvedba specializacije iz DM je bila ocenjena pozitivno tako s strani specializantov kot koordinatorice specializacije. Specializanti so ocenili program specializacije pozitivno, ker je sodobno zasnovana preko modulov in dela v praksi, omogoča izboljšanje obstoječega in pridobivanje novega znanja in nudi koristna znanja in veščine za delo v vsakodnevni praksi. Negativne ocene so bile namenjene izključno kliničnemu delu, ki ni bilo v zadostni meri prilagojeno potrebnemu kliničnemu znanju v družinski medicini. Koordinatorica je poudarila pomen vpeljave novih učnih metod in sprotnega ocenjevanja, vlogo mentorja, ki uči z zgledom in vključenost slovenskih kolegov v izvedbo in nadzor programa uvajanja specializacije.*

Zaključki: *Program specializacije iz DM v Črni Gori je bil uspešno implementiran. Pokazale so se možne izboljšave v procesu izobraževanja, predvsem pri vsebini in organizaciji kliničnih kroženj in pri sodelovanju s kliničnimi mentorji. Izpopolnjujejo se lahko tudi metode ocenjevanja, predvsem strukturirana individualna ocena specializanta, ki naj bi vzpodbujala nadaljnje specializantovo izpopolnjevanje znanja in kompetenc.*

***Corresponding author:** Tel. + 386 31 607 752; E-mail: marija.petek-ster@mf.uni-lj.si

1 INTRODUCTION

For decades, the World Health Organisation has underlined the importance of strong primary health care for better health of the population, for reducing inequality, for improving access to health care, and for lower costs (1, 2). Systems which are oriented towards secondary and tertiary health care are both more expensive and less effective (3).

In Montenegro, one of the former Yugoslavian countries, primary health care is community-oriented (4) and declared a priority by law (5, 6). The Ministry of Health of Montenegro prepared health care reform in 2003 and introduced new roles and responsibilities for primary health care teams. One of the main changes was that each patient must select a (personal) doctor who has a gate-keeping role and responsibility for the quality of service. One of the goals of health care reform was also to implement a curriculum of family medicine (FM) into undergraduate education, and to develop and implement the specialisation of family medicine. This process has been described in detail elsewhere (7).

The first step in implementing a specialisation in family medicine was an intensive 4-month course for almost all the primary care teams in the country, which started in 2005 with the help of Slovenian educators. From 2005 to 2011, eleven courses were organised, and 222 primary health care teams finished the training. The first results showed that the quality of work increased; primary care was more accessible, the organisation of the service improved, and patient satisfaction was higher (7).

The next step was the organisation of an additional one-year training programme for the most experienced General Practitioners (GPs) who were motivated towards teaching; these became the first specialists in family medicine. In 2012, twenty-four GPs completed this programme. It was intended as a short-term solution to create mentors for future trainees in family medicine. The programme was led by the Department of Family Medicine at the Faculty of Medicine, of the University of Ljubljana, as a part of a project by the World Bank (8).

The first generation of trainees to start the full four-year specialty training began their course in January 2013. The specialisation course in family medicine was led by a coordinator from the Faculty of Medicine of the University of Montenegro, in Podgorica, who is responsible for specialty training in family medicine under the supervision of the Department of Family Medicine of the Faculty of Medicine in Ljubljana. The specialisation course is based on modern concepts of teaching, described in the EURACT Educational Agenda (9). The Agenda was conceived to define which specific competences can be expected from the discipline of general practice/family medicine, and to enable the harmonisation of the different learning programmes in Europe. The Educational Agenda represents the basis for preparing relevant training programmes that are mainly competence-driven (10).

The specialisation course has practical and theoretical elements, which run side by side during both the family practice component and the hospital-based component. Its total length is 48 months; 24 months take place in family medicine practices working with a direct mentor (the family practice component), and the other 24 months take place in different clinical wards (the hospital-based component). The family practice component is further divided into two parts, namely: the first part lasts 5 months and the second part 19 months, of which 4 months are spent in the primary care paediatric offices and 15 months in family medicine practices. During the family practice component, 20 two-day modules of theoretical teaching are organised on the specific knowledge, skills and attitudes of family medicine (e.g., the organisation of the practice, the quality of care, the management of patients with chronic diseases, and drug prescribing).

The hospital-based component of the specialisation course takes place at the Clinical Centre of Montenegro, which represents the teaching basis of the Faculty of Medicine, and in some general hospital wards. The clinical rotations are as follows: 6 months of internal medicine, 3 months of surgery and paediatrics, and 2 months of gynaecology and psychiatry, while other specialties, e.g., dermatology, orthopaedics, etc., have one month each. The detailed programme of the specialisation course has been published elsewhere (11).

Before the implementation of the training programme, several obstacles in organisation, negative public and professional opinion, and political indifference had to be overcome. Many problems were exacerbated by the fact that in Montenegro specialisation in family medicine is not mandatory (7).

In general, doctors were not interested in applying for specialty training for financial reasons – the salary of trainees was smaller than what they had been able to earn before, and even after they finished the programme, it would still only be similar to that of doctors who had not completed the specialisation course.

Doctors on the training course temporarily lost their autonomy – before entering the programme, they worked independently, but during the training, they had to work under the supervision of mentors in the mentors' own practices. In addition, primary health care managers were not interested in sending their experienced GPs (most of them had at least five years of experience), as they lost part of their workforce and had to pay expenses.

The Faculty of Medicine did not fully support the development of the training course; they allocated only one lecturer (who was also involved in the teaching of another subject at the university) and two assistants. There was no Department of Family Medicine with administrative staff and devoted space, and financial resources for the coordination of the training course were very limited.

There was also no political will to legalise the specialisation in family medicine as obligatory for all GPs.

However, despite these many barriers, the specialisation course was carried out according to the programme, and in February and June 2017, trainees from the first generation completed the programme. Some of them have already passed the final examination. The evaluation of the programme is the first step in the quality improvement process to improve the process of this training. The aim of this article is to evaluate the implementation of specialty training in family medicine in Montenegro, regarding the content, structure and methods, by the first generation of trainees and the coordinator of the training.

2 PARTICIPANTS AND METHODS

2.1 Participants

All the 26 trainees in the first generation of the family medicine training, who began their training in 2013, were invited to participate in the study. Twenty-two (84.6%) of the trainees participated in the study, of whom 11 had already passed the final exam, while 10 trainees were prolonging their training (9 due to maternity leave) and one failed the exam.

2.2 Methods

A questionnaire was sent by post to all 26 eligible trainees in July and August 2017.

The questionnaire was developed based on the literature by researchers from both Faculties of Medicine involved in the training as educators. Specifically, the questionnaire was composed of one on the satisfaction of trainees with the training programme, prepared by the Irish College of General Practitioners (12), and the Job Evaluation Survey tool, a simple, validated tool to evaluate the satisfaction of trainees with their training (13). A consensus of all the researchers on the content of the questionnaire was reached, considering the aim of the study. Additionally, a former trainee who had recently passed the speciality exam was also involved in the preparation of the final version of the questionnaire.

The questionnaire consisted of the following combination of closed and open-ended questions: the demographic characteristics of the trainees, and questions related to the evaluation of the process of the training and the specialty exam. Evaluation of the training was made by using a Likert scale from 1 (very poor) to 5 (excellent) to assess the training in terms of usefulness, quality, learning methods, mentorship and organisation. The final questions asked the trainees how the training had influenced their work in the practice and how their expectations had been fulfilled.

A semi-structured interview was carried out by the two researchers (MPŠ and DP) with the coordinator of the training, to discover the obstacles in the implementation of the training and to evaluate the programme.

2.3 Statistical Analyses

In the quantitative part of the analyses, descriptive statistical methods, with mean and standard deviation in the case of a normal distribution of data, and range and median in the case of a non-normal distribution of data, were used.

Simple thematic qualitative analyses with predefined themes were carried out: the assessment of the specialty training; the role of mentors; the organisation of the specialty training; the influence on the work in practice; and the fulfilment of expectations. The themes for analysis of the semi-structured interview with the coordinator were: teaching methods, assessment of knowledge, the final exam, mentors, and foreign advisors. Open coding of the text quotations was carried out separately by two researchers (DP and MPŠ); where there were differences between the researchers, the final decision was reached by a consensus. The sub-themes which emerged from the coding were checked as to whether they fitted into the predefined themes. If any new themes emerged, they were added to the predefined themes.

3 RESULTS

3.1 Description of the Population

The basic demographical data of the 22 participating trainees are in Table 1. The trainees were from all regions of Montenegro and were predominantly female.

Table 1. Description of the participating trainees.

Characteristic	N or Mean	% or distribution of values, SD
Gender (Female)	19	86.4%
Age	39.9	from 35-57, SD 5.0 years
Age at the beginning of training	35.7	from 31-52, SD 4.7 years
Average grade of undergraduate education	8.1	from 7.0-9.7, SD 0.8
Years of working experience in FM before starting the training	6.3	from 2-20 years, SD 4.4 years

The trainees evaluated different aspects of training and the impact of the training on their daily practice. The evaluation of the training by Likert scale is set out in Table 2.

The trainees assessed the process of training with high scores. The highest mean was given for 'organisation,' but it also received the highest range – from poor to excellent. The teaching methods were also assessed very highly (between very good and excellent).

Table 2. Evaluation of the training.

Aspects of evaluation	Lowest/highest rate (range)	N or Mean
Were your expectations of the specialty training fulfilled? (Usefulness)	3-5 (2)	4.41 (0.73)
How would you assess the overall quality of the training (usefulness, quality, teaching methods)? (Quality)	3-5 (2)	4.41 (0.67)
Did you find the teaching methods to be appropriate to reaching the teaching goals? (Teaching methods)	3-5 (2)	4.62 (0.59)
How would you assess the role of your main mentor? (Mentorship)	3-5 (2)	4.55 (0.74)
How would you assess the organisation of the training? (Organisation)	2-5 (3)	4.68 (0.72)
Did the training have an impact on your daily practice? (Impact on daily practice)	3-5 (2)	4.43 (0.75)

3.2 Formative Assessment

In each year of the training, the trainees had to take a written test, called the 'progress test.' It consisted of 100 multiple choice questions from a database of 1400 questions prepared for the final exam and gave the trainees feedback about the required and obtained knowledge. Table 3 represents the results of the progress test; 60 or more points were required to pass the final exam.

Table 3. Results of the progress test.

Test year	N	Minimum number of points	Maximum number of points	Mean (SD)	The number (percentage) of trainees with at least 60 points (pass/fail criteria)
2013	19	31	74	57.7	10 (52.6%)
2014	21	63	94	80.4	21 (100%)
2015	14	53	75	65.9	11 (78.6%)
2016	17	56	84	71.7	15 (88.2%)

The percentage of trainees who obtained at least 60% of positive answers increased from the first to the last year of training, except for 2014, in which all the trainees successfully passed the progress test.

3.3 The Final Exam

Of the 22 participants in the evaluation, 12 had already taken the final exam, which consisted of 120 multiple-choice questions, 12 OSCE stations (Objective Structured Clinical Examination), two MEQs (Multiple Essay Questions) and an oral exam. The multiple-choice questions assess the trainee's knowledge, while the OSCE stations assess the trainee's skills. The assessment criteria for the OSCE stations were predefined to reduce the subjectivity of the observer. The MEQs assessed the student's ability to identify and resolve clinical problems by applying their existing knowledge. The answers to the MEQs were assessed by two independent assessors from the assessing committee, who arrived at a consensus.

Only those candidates who scored at least 60% of the points in the written exam (72 points), passed 9 out of the 12 OSCE stations, and satisfactorily answered both MEQs had the right to continue to the final oral exam.

Table 4 presents data on the grades in the different elements of the exam and in the final exam.

Table 4. Grades in the different elements of the exam.

Elements of the exam	Pass criteria	The number (%) of participants who passed this part of the exam	Mean number points (N=12)	Range, median
Written test (max. number of points: 120)	72 points (60%)	12 (100)	105.8	From 96 to 117, median 104
OSCE station (max. 12)	9 (75%)	12 (100)	11.8	From 10 to 12, median 12
MEQ questions	Excellent, very good or good	12 (100)		
Final exam	Pass	11 (91.7)		

A comparison of the results of the progress test and of the final exam shows that additional learning was needed to succeed in the final exam. One candidate was not successful in the final exam.

3.4 Qualitative Analyses of Data

3.4.1. Evaluation of the Programme and Exam by the Trainees

The content analysis with predefined themes revealed 64 codes that were attributed to the following themes: the assessment of the specialty training, the role of the mentors, the organisation of the specialty training, the influence on the work in practice, and the fulfilment of expectations. Most of the themes were presented by positive and negative aspects. To protect the anonymity of the trainees, the quotations are only identified by the trainee number.

Assessment of specialisation

There were 14 different codes for positive assessment, and 6 for negative. The positive assessment stated that the specialisation course offered teaching modules and practice which were based on modern educational theory, improved existing and acquired new knowledge, and offered practical useful knowledge and skills necessary for everyday work. It helped the trainees not only to master the principles of modern medical trends, but also improved professionalism, increased self-confidence, and improved the scientific approach to everyday work using guidelines and evidence-based medicine (EBM).

Fulfilment of expectations was unanimously high, from enough/sufficient to completely fulfilled and 'more than expected.'

Negative assessment was exclusively associated with the clinical components of rotations, where mentors were not adequately acquainted with the scope of clinical knowledge for FM, the lack of influence of the Department of Family Medicine on training in clinical rotations, and some clinical lectures being too theoretical. One opinion was also that the training programme was too ambitious for the existing working conditions.

I learned how to deal with science, to analyse my work, to defend my opinion, to accept mistakes, and not to be ashamed of presenting. Enforcing EBM is a great thing and a step forward in Montenegro. (Trainee 1)

The part of the module dealing with clinical branches was not well enough adapted to what we will be dealing with as family medicine specialists in the future. (Trainee 2)

The role of the main and direct mentors
To a great extent, the experience was very positive; the mentors were motivated, committed, enthusiastic, selfless, collaborative, good role models and friendly.

There were some negative comments regarding clinical mentors showing variable dedication and accessibility, and also that some were unprepared and insufficiently engaged, showing a lack of knowledge of the content and the specialisation course plan.

The clinical mentors were unprepared, mainly due to a lack of knowledge of the content and the specialisation course plan, i.e. the scope of work that future specialists should undertake. (Trainee 3)

The organisation of the specialty training
The trainees stated that the organisation was very good, offering continuity in learning with teaching organisations, and that the modules and practice were well-balanced throughout the course. Negative comments included that the practical and theoretical elements of the same field should be given simultaneously, and that more time should be spent in outpatient clinics. There were criticisms of the organisation of the clinical mentors and the quality of some lecturers at the beginning of the specialisation course.

Technical, accurate, concise, clear, open principles and without autocracy. (Trainee 1)

Perfect. (Trainee 4)

It would be much more beneficial to carry out a certain element practically and follow a theoretical module in the same field at the same time. (Trainee 2)

The influence of the training on work in the practice
The trainees stated that they had acquired a new approach to patients, new knowledge and skills, and more EBM and scientific reasoning. They also found the influence of the training in their changed attitudes towards work and medicine, specific methods of work (e.g., time as diagnostic criterion), and improved communication and self-confidence in their everyday work. The training influenced their organisation of teamwork, and the realisation of how important the satisfaction of both patients and health workers is as a quality criterion.

Through the specialisation course I have deepened the knowledge and skills necessary for working in the clinic, as well as the attitude that it is necessary to treat the patient rather than the disease, and to use time as a diagnostic criterion. (Trainee 5)

The assessment of the final exam
The exam was described as well-conceived, and appropriate for testing the necessary knowledge and skills for practical work. A human approach towards the trainees was mentioned. It was an important moment in the lives of the trainees. It was suggested that it should be organised over two days instead of one.

One of the most beautiful moments in my life. (Trainee 6)

All parts of the exam are intended for acquiring the practical knowledge and skills necessary for working in an outpatient clinic. (Trainee 5)

3.4.2. The evaluation of the programme and exam by the coordinator

During the interview, the coordinator assessed the process of the training and the final exam positively, and expressed the main points for the success, described below.

New teaching methods
Mixed teaching methods were introduced: fewer plenary lectures and more work in small groups; interactive learning and project work; and teaching of clinical skills on models. Small group work led by experienced group leaders fostered the changing of attitudes and changes in clinical practice. The professional integrity of trainees increased, and they were able to implement the new knowledge and attitudes in their practice.

The assessment of knowledge
Modern teaching and assessment methods, including formative assessment with progress tests, encouraged the upgrading of knowledge and continuity in learning.

The final exam
The complex structure of the final exam gave a comprehensive assessment of the candidate.

Mentors
The number of competent mentors and their distribution all over the country were not adequate to the needs of the

training. There were some enthusiastic mentors without trainees and some mentors in the capital with more than three trainees at the same time. Nevertheless, the mentors, especially the main mentors, had an extremely important role in the whole process of the training; most of the trainees recognised a role model in their mentor.

Foreign advisors

The involvement of our Slovenian colleagues in the teaching process, their supervision of the programme, and their participation in the final exam set the whole process at a higher level and gave it a better reputation at the national and international level.

4 DISCUSSION

4.1 Main Findings

A strong will and efforts of the coordinator and team involved in the process of the training brought the project to a successful conclusion. The first generation of specialist family medicine trainees in Montenegro have successfully finished their specialty training.

The evaluation of the programme by the trainees and the coordinator showed that it did not only increase their knowledge and skills, but also increased their self-confidence and improved professionalism and scientific approach in their everyday work, using guidelines and evidence-based medicine.

4.2 Comparison with the Existing Literature

4.2.1 The Evaluation of the Process of Training and Formative Assessment

Training in family medicine, taking into account the EURACT Educational Agenda (9) and modern teaching methods, and also including constant feedback from mentors according to the 'Slovenian model' of training (14), was well accepted by the trainees in Montenegro. There is one important difference between the two programmes (namely, Slovenian and Montenegrin) – in Montenegro the trainees lose contact with general practice and with their main mentors for two years during their clinical rotations, because, at that time, all the teaching activities take place in hospitals.

The organisation of the training was in general assessed very highly. Most of the criticisms came from lower satisfaction with clinical rotations, mainly because the clinical mentors were not well acquainted with the training programme and goals.

During the training of the first group of Montenegro trainees, progress tests were used annually to evaluate the level of knowledge, and we found that the differences in knowledge reduced through the process of training (15). We did not use the OSCE method for formative purposes assessment because it has lower psychometric standards (16). Longitudinal and competence-based assessment were also found to be the currently preferred approach for FM specialty training in other studies, such as in a survey based on a convenient sample in five European countries (Denmark, Germany, Poland, the Netherlands and the United Kingdom) (17).

One of the challenges of teaching medical trainees is to choose an assessment method that is directed towards enhancing learning in addition to assessing clinical competence. Workplace-based assessments allow trainees to continually gather evidence of learning and formative feedback (18).

Feedback in workplace-based clinical settings often relies on expert trainers' judgements of the directly observed trainee (15, 18). Close contact between the mentor and the trainee working in the same practice during the family practice component of the rotation enables constant feedback. According to the results of our study, the trainees assessed their mentor's feedback as valuable and often took their mentors as a role model. However, this assessment was not structured, and it relied on the personal approach of the mentor. In the future, the feedback of mentors will need to be further developed and structured according to the developing competencies and progress of the trainees, so that it is useful for the trainees and feasible for the mentors at the same time (19, 20).

One of the important achievements of the training was the participants' feelings that the training helped them to improve the quality of their work and patient safety. The trainees mentioned that they felt more competent in decision-making and felt more self-confident and less vulnerable to potential medical errors and complaints (21). A unique goal of the training programme was to give trainees an understanding of the holistic and generalist approach, on the one hand, and the usefulness of EBM, on the other, and to see possibilities for future development of the discipline (22, 23).

4.2.2. The Final Exam

The use of OSCEs for the assessment of clinical skills in a standard setting has been shown to be normative in all high stake exams (16).The differences in clinical skills between the trainees were far smaller than the differences in the written part of the exam. One of the reasons for a good performance in the OSCEs was the limited number of OSCE stations and that the trainees could relatively easily gain the skills at least at a moderate level. In the future, the set of OSCE stations should be increased to enable the testing of various skills which a FM specialist must master. In the MEQs, and especially in the oral exam, we tested the level of critical thinking based on clinical knowledge.

According to the findings of Ross and co-authors, there is a significant positive correlation between critical thinking skills and performance on knowledge tests (24). In addition, good critical thinking skills have been found to predict success in family medicine certification examinations. An assessment of critical thinking in the progress tests during the training may help to identify applicants more likely to be successful in the final certification exam (25).

Finally, an important emotional aspect of the exam was that it presented a positive experience, even 'a beautiful moment in life,' and gave the colleagues necessary confidence for their future professional careers and positive incentives for future learning.

Mentorship

Mentorship was shown to be extremely important in specialty training. Mentors have different roles, from organisational ones to very personal ones (being a friend); for most of the trainees, the mentor also became a role model. According to Hesketh et al., being a good mentor means being a good clinician, knowing the programme and goal of the training, but also having appropriate personal characteristics (26).These expectations have been found in other literature – the mentor's ability to be a personal 'role model' and coaching is coupled with their clinical and coordinative work with family medicine trainees (27). From the trainees' feedback it seems that the main mentors fulfilled all the expectations. This is very encouraging, especially if we consider that there was a severe shortage of appropriate main mentors, and that some family physicians were mentoring up to three trainees. The main shortcoming of the clinical mentors was their lack of knowledge of the content and specialisation plan. The clinical mentors did not have previous experience with mentoring family medicine trainees and sometimes had unrealistic expectations (e.g., they expected too much of the trainees' clinical knowledge, and did not understand the role of the family medicine specialist in the system). Evidently, the problem is not only local, as we can find the same opinion in the literature, where Bulc et al. and Švab et al. emphasise that all teachers participating in the training of family medicine should be familiar with the basic characteristics of the discipline and theoretical framework of family medicine (28, 29). For the future, it seems there is a need to organise training for clinical mentors as well, so that they can become familiar with the aims, content, process and methods of teaching and giving feedback to the trainees (27). Further development of the programme and content for all clinical rotations is also necessary.

In Slovenia, which has almost 400 trainees at the moment, comments from the trainees are similar to those in Montenegro. To improve satisfaction with the clinical rotations and clinical mentorship, several regional coordinators have been implemented in the training programme. They represent a coordinative and pedagogical structure of working in the local environment, where most of the clinical rotations are performed, to make practical improvements in the training process (27, 30).

The recognition of family medicine as an academic discipline, and the support of the University and the Faculty of Medicine of Montenegro in establishing a Department of Family Medicine, would overcome many obstacles in the implementation of the programme. A department with professional personnel, an organisational structure and financial resources is necessary for a stable situation, which can offer conditions for improvement.

4.3 Limitations of the Study

In this study, we assessed the process of implementation of speciality training in family medicine. However, our study has several limitations. We included trainees who had not yet passed the specialty exam; these trainees (10 out of 22) may have assessed the process of training more positively, in order to try to present themselves positively to their future examination committee.

Due to the reasons of feasibility (trainees living in different parts of the country, where some areas are not very well connected to the capital), we sent a questionnaire with open-ended questions to participants by post and asked them for written answers. Some of the participants gave us no answers or very general statements in reply to the open questions, mainly to the questions related to the organisation of the specialty course and the assessment of the exam.

As the study was not anonymous, the participants tended not to answer the open-ended questions or gave relatively general, not very critical answers. Other methods, e.g., a focus group study or more in-depth one-to-one interview with all the trainees, could have given us a more detailed and accurate view of the satisfaction of the trainees with the programme, the process of training and exam, but these two methods were not feasible on this occasion.

The assessment of quality is a complex process; many subjects can assess quality, including patients, colleagues, professional organisations, health care authorities and society in general, which assesses social acceptance. In our study, the evaluation of the implementation of the specialty training was made only by the trainees and the coordinator of training. The view of the coordinator of training is subjective and, from that point of view, biased.

5 CONCLUSION

New teaching methods, mentorship and formative assessment were introduced into the education process for the first time. The implementation of the evidence into the medical training, considering the feedback of the trainees and teachers, helps to change educational practice towards the goal. This study represents the first attempt to evaluate the process, results and satisfaction with the training programme. In the future, other methods should be implemented, such as a more structured evaluation of the progress of the trainee.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

ETHICAL APPROVAL

Ethical approval was not necessary according to practice in Montenegro, as only anonymous data of the trainees who voluntarily participated in the survey were used.

ACKNOWLEDGMENTS

We would like to thank all the trainees and colleagues who participated in the research.

REFERENCES

1. World Health Organization. Declaration of Alma-Ata: International Conference on Primary Health Care, Alma-Ata, USSR, 6–12 September 1978. Geneva: WHO, 1978. Accessed January 28th, 2018 at: http://www.who.int/hpr/NPH/docs/declaration_almaata.pdf.
2. Starfield B, Shi L, Macinko J. Contribution of primary care to health systems and health. Milbank Q. 2005;83:457-502.
3. Kringos D, Boerma W, Bourgueil Y, Cartier T, Dedeu T, Hasvold T, et al. The strength of primary care in Europe: an international comparative study. Br J Gen Pract. 2013; 63(616):e742-50. doi: 10.3399/bjgp13X674422.
4. Klančar D, Svab I. Primary care principles and community health centres in the countries of former Yugoslavia. Health Policy. 2014;118:166-72.
5. Saric M, Rodwin V. The once and future health system in the former Yugoslavia: myths and realities. J Public Health Policy. 1993;14:220-37.
6. Svab I, Rotar Pavlic D, Radic S, Vainiomaki P. General practice east of Eden: an overview of general practice in Eastern Europe. Croat Med J. 2004;45:53-42.
7. Cvejanov Kezunović L, Drecun M, Švab I. Primary care reform in Montenegro. Zdr Varst. 2013;52:247-54. doi: 10.2478/sjph-2013-0025.
8. Petek Šter M, Švab I, Kolšek M, Kersnik J. Zaključek uvajanja projekta Svetovne banke uvajanja specializacije iz družinske medicine v Črni Gori – projekt Svetovne banke. Isis. 2013:22:48-9.
9. Heyrman J, editor. The EURACT Educational Agenda. European Academy on Teachers in General Practice. EURACT, Leuven, 2005. Accessed September 25th, 2017 at: http://euract.woncaeurope.org/sites/euractdev/files/documents/publications/official-documents/euract-educationalagenda.pdf.
10. Klemenc Ketis Z, Svab I. Using movies in family medicine teaching: a reference to EURACT educational agenda. Zdr Varst. 2017;56:99-106. doi: 10.1515/sjph-2017-0013.
11. Pravilnik o specijalizacijama („Sl. List CG“ 17/14 od 04.04.2014). Accessed September 25th, 2017 at: http://www.sluzbenilist.me/PravniAktDetalji.aspx?tag=%7B1777FE38-9C46-42E9-9BC3-174A275D4208%7D.
12. O'Kelly Fergus M, O'Kelly DarachÓC. A National Survey of GP Trainees 2012. TCD/HSE Higher Specialist Training Scheme in General Practice. Dublin: Trinity College, Department of Public Health & Primary Care, 2012.
13. Wall D, Goodyear H, Singh B, Whitehouse A, Hughes E, Howes J. A new tool to evaluate postgraduate training posts: the Job Evaluation Survey Tool (JEST). BMC Med Educ. 2014:14:210. doi: 10.1186/1472-6920-14-210.
14. Bulc M, Svab I, Pavlic DR, Kolsek M. Specialist training of Slovene family physicians. Eur J Gen Pract. 2006;12:128-32. doi: 10.1080/13814780600780759.
15. Pelgrim EA, Kramer AW, Mokkink HG, van der Vleuten CP. The process of feedback in workplace-based assessment: organisation, delivery, continuity. Med Educ. 2012;46(6):604-12. doi: 10.1111/j.1365-2923.2012.04266.x.
16. Kreptul D, Thomas RE. Family medicine resident OSCEs: a systematic review. Educ Prim Care. 2016;27(6):471-7. doi: 10.1080/14739879.2016.1205835.
17. Van der Vleuten CPM, Driessen EW. What would happen to education if we take education evidence seriously? Perspect Med Educ. 2014;3:222-32. doi: 10.1007/s40037-014-0129-9.
18. Flum E, Maagaard R, Godycki-Cwirko M, Scarborough N, Scherpbier N, Ledig T, et al. Assessing family medicine trainees - what can we learn from the European neighbours? GMS Z Med Ausbild. 2015 13;32(2): :Doc21. doi: 10.3205/zma000963. eCollection 2015.
19. Govaerts M, van der Vleuten CP. Validity in work-based assessment: expanding our horizons. Med Educ. 2013;47(12):1164-74. doi: 10.1111/medu.12289.
20. de Jong J, Visser M, Van Dijk N, van der Vleuten C, Wieringa-de Waard M. A systematic review of the relationship between patient mix and learning in work-based clinical settings: a BEME systematic review: BEME Guide No. 24. Med Teach. 2013;35:e1181-96. doi: 10.3109/0142159X.2013.797570.
21. Greenhalgh T, Howick J, Maskrey N. Evidence based medicine: a movement in crisis? BMJ. 2014;348:g3725. doi: 10.1136/bmj.g3725.
22. Premji K, Upshur R, Légaré F, Pottie K. Future of family medicine: role of patient-centred care and evidence-based medicine. Can Fam Physician. 2014;60:409-12.
23. Ivetić V, Pašić K, Selič P. The effect of an educational intervention in family phisicians on self-rated quality of life in patients with medically unexplained symptoms. Zdr Varst. 2017;56:91-8. doi: 10.1515/sjph-2017-0012.
24. Ross D, Schipper S, Westbury C, Linh Banh H, Loeffler K, Allan GM, et al. Examining critical thinking skills in family medicine residents. Fam Med. 2016;48(2):121-6.
25. Al-Wassia H, Al-Wassia R, Shihata S, Park YS, Tekian A. Using patients' charts to assess medical trainees in the workplace: a systematic review. Med Teach. 2015 ;37(Suppl 1):S82-7. doi: 10.3109/0142159X.2015.1006599.
26. Hesketh EA, Laidlaw JM. Developing the teaching instinct 5: mentoring. Med Teach. 2003;25:9-12. doi: 10.1080/0142159021000067011.

27. Petek D, Vidič Hudobivnik P, Jančar V, Petek B, Klemenc-Ketiš Z. Regional coordinators: a new teaching opportunity in family medicine training. BMC Med Educ. 2016;16:141. doi: 10.1186/s12909-016-0667-4.
28. Bulc M, Svab I, Radic S, de Sousa JC, Yaphe J. Faculty development for teachers of family medicine in Europe: reflections on 16 years' experience with the international Bled course. Eur J Gen Pract. 2009;15:69-73. doi: 10.1080/13814780903071930.
29. Švab I, Allen J, Žebiene E, Petek Šter M, Windak A. Training experts in family medicine teaching. Eur J Gen Pract. 2016;22:58-63. doi: 10.3109/13814788.2015.1118456.
30. Klemenc-Ketis Z, Svab I, Petek-Ster M, Bulc M, Buchanan J, Finnegan H, et al. Twenty-five years of the international Bled course for teachers of family medicine in Europe: glancing back and looking forward. Eur J Gen Pract. 2016;22:262-6. doi: 10.1080/13814788.2016.1230604.

Veninšek G, Gabrovec B. Management of frailty at individual level - clinical management: systematic literature review.
Zdr Varst. 2018;57(2):106-115. doi: 10.2478/sjph-2018-0014.

MANAGEMENT OF FRAILTY AT INDIVIDUAL LEVEL - CLINICAL MANAGEMENT: SYSTEMATIC LITERATURE REVIEW

MENEDŽMENT KRHKOSTI NA RAVNI POSAMEZNIKA – KLINIČNI MENEDŽMENT: SISTEMATIČNI PREGLED LITERATURE

Gregor VENINŠEK[1], Branko GABROVEC[2*]

[1]University Medical Center Ljubljana, Center for Geriatric Medicine, Zaloška 2, 1000 Ljubljana, Slovenia
[2]National Institute of Public Health, Health Care Center, Trubarjeva 2, 1000 Ljubljana, Slovenia

Received: Aug 14, 2017
Accepted: Jan 23, 2018

Review article

ABSTRACT

Introduction: To deliver quality management of a frail individual, a clinician should understand the concept of frailty, be aware of its epidemiology and be able to screen for frailty and assess it when it is present, and, finally, to recommend successful interventions.

Methodology: A systematic literature search was conducted in the following databases: PubMed, Cochrane, Embase, Cinahl and UpToDate. The criterion in selecting the literature was that articles were published in the period from 2002 to 2017. From 67432 initial hits, 27 publications were selected.

Results: Useful interventions to address frailty are supplementation of vitamin D, proper nutrition, multicomponent training, home-based physiotherapy and comprehensive geriatric assessment, particularly when performed in geriatric wards.

Conclusion: Comprehensive geriatric assessment is an effective way to decrease frailty status especially when performed in geriatric wards. Multicomponent physical training and multidimensional interventions (physical training, nutrition, vitamin D supplementation and cognitive training) are effective measures to reduce frailty.

Keywords:
frailty, geriatric, comprehensive geriatric assessment, Joint Action ADVANTAGE

IZVLEČEK

Uvod: *Za kakovostno upravljanje krhkega posameznika mora klinik razumeti koncept krhkosti ter prepoznavanje in priporočanje uspešnih intervencij.*

Metode: *Za to raziskavo je bil izveden sistematičen pregled literature v naslednjih bazah: PubMed, Cochrane, Embase, Cinahl in UpToDate. Vključitveni kriterij je bil izbor literature, objavljene v zadnjih 15 letih, od leta 2002 do leta 2017. Od 67.432 zadetkov je bilo izbranih 27 publikacij.*

Rezultati: *Koristne intervencije za obravnavo krhkosti so dodajanje vitamina D, pravilna prehrana, večkomponentna telesna vadba, fizioterapija na domu in obsežna geriatrična ocena, ki se uporablja na geriatričnih oddelkih.*

Zaključki: *Če se celovita geriatrična ocena na geriatričnih oddelkih izvaja, ta povečuje možnost pacientovega preživetja in kognicije. Večkomponentna fizična vadba in večdimenzionalne intervencije, ki temeljijo na celoviti geriatrični oceni, so učinkovite pri zmanjševanju krhkosti.*

Ključne besede:
krhkost, geriatrija, geriatrične ocene, Joint Action ADVANTAGE

***Corresponding author:** Tel. + 386 40 381 470; E-mail: branko.gabrovec@nijz.si

1 INTRODUCTION

Functional capacities in healthy individuals are developed and strengthened until adulthood and slowly decline thereafter. A decline in multiple physiological systems results in frailty (1). The prevalence of frailty progresses with age and we can find 2–5% of the population with frailty in the age group between 18 and 34 (2). Determinants of frailty are gender, age, income, lifestyle, marital status and multimorbidity as the key determinant (3). Frailty is associated with incapacity and/or multimorbidity, but should not be equated with it (4). With older people frailty is a common cause condition leading to death. In the last year of life, frailty is connected to a persistent or advanced disability in basic daily activities, which is similar to an individual with organ failure (5).

Comprehensive geriatric assessment (CGA) is the most comprehensively researched model for healthcare delivery to frail older patients (6).

Frailty among older persons is a dynamic process characterised by frequent transitions between frailty states over time. Clinical management of frailty at the individual level includes prevention at the individual level, detection and management of a frail individual (7). Priorities of healthcare services and their differences between providers and recipients should be taken into account particularly in the health care of older patients and the design of healthcare policies and research (8).

Determinants of frailty have to be systematically checked to be able to recognise an individual who is at a high risk to develop frailty (3).

1.1 Aims and Objectives

Aim: To define interventions in a successful clinical management of frail people.

Objective: To conduct a systematic review of relevant literature for the time period from 1 January 2002 to 31 May 2017.

2 METHODS

2.1 Review Methods

Descriptive research methodology was used to review peer-reviewed medical literature. A systematic review of literature was conducted, as it enabled us to obtain data from various sources and ensured a holistic understanding of the research subject. The search for literature was conducted in the PubMed, Cochrane, Embase, Cinahl and UpToDate databases by means of several combinations of selected search words in the English language and their synonyms, with Boolean operators AND or: Comprehensive Geriatric Assessment *() OR Frail Disability *() OR Frailty treatment *() OR Frail Older adult *() OR Frailty Screening *() OR Frailty management *() OR Frailty Intervention Therapy *() OR Functional Decline *() OR Frail Older person *() OR Geriatric Vulnerable *() OR Elderly Vulnerable *() OR Frailty Scale *(); searching in the title, key words and the abstract.

The selection criterion for articles to be included in the review was that they were published during the last 15 years. Key words were selected from a proposal of key words that was prepared by the task leader and the working group focusing on Clinical Management as part of the European Commission project 'Joint Action on Frailty Prevention – JA ADVANTAGE,' Work Package 6 – Management of Frailty at Individual Level.

In addition to language and publication time restrictions, the main inclusion factors were also peer-review scientific journals, international documents, professional guidelines, standards and research studies performed in the EU which comprehensively investigate and describe management of frailty through clinical management. The exclusion criteria were: editorials, letters, interviews, posters and no access to full text.

We have also included grey documents which were identified and proposed by the task leader and the working group focusing on Clinical Management as part of the European Commission project 'Joint Action on Frailty Prevention – JA ADVANTAGE,' Work Package 6 – Management of Frailty at Individual Level. Grey documents were identified by means of an opportunistic search, that is, a targeted or focused one, based on the information that each partner in the project Consortium could give regarding their own country. The term grey literature was used to describe information which is not published commercially or is otherwise hard to find. This includes items, such as government reports, NGO reports, theses, technical reports, white papers, etc.

2.2 Results of the Review

The total number of all search results was 67432. After excluding duplicates and considering inclusion criteria, the final 27 articles remained for analysis.

The process of literature review is displayed in a search table (Table 1) and in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) diagram (9), as shown in Figure 1.

Table 1. Search table.

	Key word	No. of hits	Chosen hits	Repeated chosen hits	Repeated chosen hits
PubMed	Comprehensive Geriatric Assessment	30541	12	12	4
	Frail Disability	1332	4	4	1
	Frailty treatment	3689	8	8	3
	Frail Older adult	11223	6	4	2
	Frailty Screening	3	9	3	2
	Frailty management	1491	7	7	2
	Frailty Intervention Therapy	409	9	9	2
	Functional Decline	14123	11	2	2
Cochrane	Comprehensive Geriatric Assessment	287	2	2	2
	Frail Older person	44	2	1	1
	Geriatric Vulnerable	70	1	1	1
	Elderly Vulnerable	175	1	1	1
Embase	Comprehensive Geriatric Assessment	880	2	0	0
	Frailty Scale	148	2	0	0
	Functional decline	11000	16	16	2
CINAHL	Comprehensive Geriatric Assessment	410	5	5	1
	Frailty Scale	53	0	0	0
UpToDate	Frail Older adult	795	2	0	0
	Frailty Intervention Therapy	305	13	0	0
	Frail Older person	390	6	0	0
Other sources		1			1
		67432	118		27

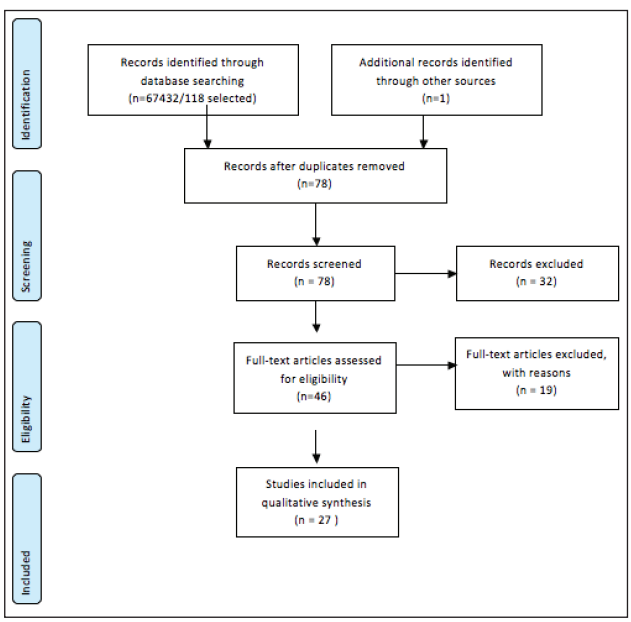

Figure 1. Flowchart of search strategy and literature selection process

2.3 Quality Assessment of the Review

Results of the quality assessment of systematic literature review, as shown in Table 2.

Table 2. Results of the quality assessment of systematic literature review.

Criteria	Yes	No	Other
1. Is the review based on a focused question that is adequately formulated and described?	X		
2. Were eligibility criteria for included and excluded studies predefined and specified?	X		
3. Did the literature search strategy use a comprehensive, systematic approach?	X		
4. Were titles, abstracts, and full-text articles dually and independently reviewed for inclusion and exclusion to minimize bias?	X		
5. Was the quality of each included study rated independently by two or more reviewers, using a standard method to appraise its internal validity?	X		
6. Were the included studies listed along with important characteristics and results of each study?	X		
7. Was publication bias assessed?	X		
8. Was heterogeneity assessed? (This question applies only to meta-analyses.)		X	

3 RESULTS

Table 3. Results of the review and literature analysis.

Author and year	Research design	Sample	Research purpose	Key findings
Kehler et al., 2017	Cross-sectional. Survey	n=7353	To examine and compare the prevalence of frailty in Canadians 18–79 years old using the Accumulation of Deficits and Fried models of frailty.	Data show that frailty is prevalent already in younger adults, has increasing prevalence with age, which varies depending on which frailty tool is used.
Gobbens et al., 2010	Cross-sectional	75 years old and older n=484	To determine which determinants predict frailty and domains of frailty.	The effect of the determinants of frailty differs across frailty domains.
Gill et al., 2006	Prospective study	70 years and older n=754	To determine the transition rates between frailty states.	Frailty is a dynamic process, characterised by frequent transitions between frailty states over time.
Fried et al., 2001	Prospective and observational study	65 years and older n=5317	To develop and operationalize a phenotype of frailty in older adults.	The study provides a potentially standardised definition for frailty.
Clegg et al., 2013	Literature review and observational study	80 years old and older	A research on how frailty develops, how it might be prevented and how it can be detected reliably.	Landmark studies have developed valid models for frailty.
Kan et al., 2008	Literature review, Expert panel	Geriatric Advisory Panel	To perform a comprehensive review of the definitions and assessment tools on frailty.	No consensus on the definition of frailty, but there was an agreement to consider frailty as a pre-disability stage.

Author and year	Research design	Sample	Research purpose	Key findings
Dent et al., 2016	Literature review	65 years old and older n=29	An overview of the definitions and measurements of frailty in research and clinical practice.	A summary of the main strengths and limitations of existing frailty measurements.
Stoicea et al., 2016	Literature review	Reviews of six scales.	Review scales for measuring frailty.	By identifying the most time-efficient criteria, a comprehensive and clinically effective scale, a universal scale can be implemented.
Subra et al., 2012	Literature and platform review, observational study	65 years old and older n=160	The presentation of the main characteristics of the new Platform.	The Platform clinically evaluates and intervenes on frailty for the first time at the general population level.
Vellas et al., 2013	Screening tool review and observational study	65 years old and older n=442	A screening tool for frailty	The use of the GFST may help at raising awareness about the importance of identifying frailty.
Morley et al., 2013	Consensus group	Delegates from 6 major international, European, and US societies.	To create 4 major consensus points on the specific form of frailty.	Physical frailty can potentially be prevented or treated.
Sutton et al., 2016	Literature review	73 articles selected 60 years old and older	To identify existing multi-component frailty assessment tools that were developed to assess frailty.	The TFI has the most robust evidence of reliability and validity.
Ellis et al., 2011	Review of randomised controlled trials	Two reviews	To evaluate the effectiveness of CGA in the hospital.	CGA increases a patient's likelihood of being alive and in their own home.
Theou et al., 2011	Literature review	47 studies selected	To examine the effectiveness of current exercise interventions for the management of frailty.	Evidence suggests that exercise has a positive impact on some physical determinants of frailty.
Beaudart et al., 2014	Literature review, Meta-analyse	30 studies selected	To summarise with a meta-analysis the effects of vitamin D supplementation.	Vitamin D supplementation has a small positive impact on muscle strength.
Bruyère et al., 2017	Literature review	No data	A review of the evidence regarding the role of vitamin D.	Several studies suggest a potential effect of vitamin D on physical frailty.
Cesari et al., 2015	Exploratory analyses	Mean age=76.8 years n=424	To explore whether a physical activity intervention can reduce prevalence and severity of frailty.	Regular PA may reduce frailty, especially in individuals at higher risk of disability.

Author and year	Research design	Sample	Research purpose	Key findings
Ng et al., 2015	Randomised controlled trial	Mean age=70 years n=151	To compare the effects of 6-month-duration interventions vs. control in reducing frailty.	Physical, nutritional, and cognitive interventional approaches were effective in reversing frailty.
Song et al., 2010	Prospective cohort study	Aged from 65 to 102 years n=2740	To evaluate the prevalence and 10-year outcomes of frailty in older adults.	The prevalence of frailty increases with age and, at any age, lessens survival.
Puts et al., 2017	Literature review	65 years old and older 14 studies selected	To review policies that are designed to prevent or reduce the level of frailty.	The best interventions and policies to prevent or reduce the level of frailty.
Turner et al., 2014	Literature review, Report	No data	To create proactive, integrated, person-centred and community-based response to frailty.	The British Geriatrics Society Fit for Frailty guideline is by consensus the best practice guidance for managing frailty.
Collard et al., 2012	Literature review	65 years old and older 21 studies selected	To systematically compare and pool the prevalence of frailty, including pre-frailty.	Different operationalization of frailty status results in widely differing prevalence between studies.
Gill et al., 2004	Randomised controlled trial	75 years old and older n=188	To determine whether a home-based physical therapy program prevents a decline in several higher-level measures of physical function.	Home-based pre-habilitation program offered modest, but consistent benefits.
Chan et al., 2012	Randomised controlled trial	65–79 years old n=117	To report interventions targeting the improvement of frailty status as an outcome.	The three-month intervention resulted in short-term frailty status improvement.
Li et al., 2010	Randomised controlled trial	65 years old and older n=310	To assess the effectiveness of CGA.	CGA showed a favourable outcome in frail and pre-frail older people.
Cameron et al., 2013	Randomized controlled trial	Mean age=83,3 years n=216	To determine whether an intervention could reduce frailty and improve mobility.	Frailty and mobility disability can be successfully treated.
Behm et al., 2016	Randomised controlled trial	80 years old and older n=459	To determine whether preventive home visits could postpone deterioration in frailty.	The results of this study show the potential of health promotion to older persons.

3.1 Summary of Studies Included in Review

3.1.1 Definition of Frailty

Although frailty is a commonly used term to indicate older persons at an increased risk for adverse outcomes, the consensus about how to define it is lacking (17). One consensus definition quotes 'frailty as a medical syndrome with multiple causes and contributors that is characterized by diminished strength, endurance, and reduced physiologic function that increases an individual's vulnerability for developing increased dependency and/or death' (17). Physical frailty is considered to be a consequence of a cycle of decreasing energy expenditure, negative energy balance and sarcopenia (10). It is a state of poor homeostatic reserve due to critically decreased physiological reserves and is considered as a state of pre-disability (11, 12, 26). Other components, such as cognition, mood, social circumstances, living environment, income, lifestyle, multimorbidity, disability and sensory impairment, should also be included as domains of frailty (3, 12).

3.1.2 Epidemiology of Frailty

Up to 50 years of age, frailty is more prevalent when defined by Fried criteria, but after this age, it becomes more prevalent when defined as an accumulation of deficits or Frailty index (2). In general, the prevalence of frailty defined as an accumulation of deficits is 1.3–1.37 times more prevalent than when it is defined by Fried criteria (2, 27). General prevalence of frailty is 9.9% and 13.6% and of pre-frailty 44.2% and 34.5%, respectively, when defined by Fried criteria and by the broad definition (27). The prevalence of frailty increases with age, is more prevalent in women than in men, and can be as high as 39.1% in men aged 85 years or older and 45.1% in women in the same age group (24).

3.1.3 Tools for Screening and Diagnosing Frailty

There are literally dozens of tools designated to assess frailty, ranging from simple to multicomponent (10–15, 18, 26). There are two principal frailty models, namely: the phenotype model (Fried model or CHS Index) and the cumulative deficit model (Frailty index) (10, 11). Among the definitions of frailty that are valid and reliable for predicting the outcome, Fried Frailty Phenotype, Frailty Index of Accumulated Deficits and Study of Osteoporotic Fractures Index were useful in clinical and population settings, while Frailty Index based on CGA, Edmonton Frailty Scale and Clinical Frailty Scale were useful only in clinical settings (13). In general, of the 38 assessment tools, only the Frailty Index-CGA and Tilburg Frailty Indicator showed significant evidence of reliability and validity (18). There is still no consensus regarding which tool should be used for screening and diagnosing frailty (12). Fried criteria and Frailty Index of Accumulated Deficits appear to be the most robust assessment tools to be used by clinicians and researchers today, and should consequently prove to be the most useful ones either for screening and diagnosing frailty (Fried criteria) or as an assessment and follow-up tool (Frailty index derived from CGA) (13).

3.1.4 Interventions in Frailty

Supplementation of vitamin D might have positive effects on muscle strength and physical frailty in adults over 65 years old and vitamin D deficient individuals (20, 21). Regular physical activity effectively decreases the number of frailty criteria and the prevalence of frailty in community-dwelling sedentary older people (22). Exercise has a positive impact on some physical outcomes and on functional ability in frail older people (19). Multicomponent training interventions performed three times per week for 30–45 minutes per session over a period of more than 5 months seem to be superior to other exercise programs (19). A home modification and progressive competency-based exercise programme can reduce the level of frailty in older people (25).

In a community-dwelling pre-frail or frail older people, nutrition, cognitive training, physical activity and combination treatment in duration of 6 months improve frailty score and frailty status (23). Combined training of a shorter duration is effective, but the results are less sustainable (28).

CGA consisting of evaluation and management of frail older people can be an effective way to decrease frailty status (29, 30). When performed in geriatric wards, comprehensive geriatric assessment increases a patient's likelihood of being alive, at home and experiencing improved cognition (32).

Home-based physiotherapy seems to decrease frailty, but preventive home visits are not very effective (31, 33).

4 DISCUSSION

We identified four main areas essential for clinical management of frailty: definition of frailty, epidemiology of frailty, tools for screening and diagnosing frailty and successful interventions for decreasing frailty.

Frailty is not a disease with a disturbing set of symptoms and signs that would prompt an individual to seek the attention of medical personnel. A potentially frail individual should therefore primarily be approached in a proactive manner.

Studies show a unanimous consent that frailty carries the risk of poor outcomes. Defining frailty remains elusive, but the concept emerging from the efforts to do so encompasses the influence of irreversible or

non-preventable (age, ethnicity, etc.) and reversible or preventable (morbidity, income, lifestyle, etc.) determinants that cause a decline in physiologic reserve, resulting in poor homeostatic reserve that can be critically challenged with minor intrinsic or extrinsic stressors resulting in morbidity, decreased functional ability or disability, or death.

As a proactive approach is sensible, individuals should be screened and assessed for frailty when present. It is neither practical nor feasible to evaluate the entire population but targeting those with determinants associated with frailty and older population makes sense with support in epidemiological data.

There are many tools to screen for and diagnose or assess frailty in an individual person. As screening for frailty is performed more feasibly when focusing on physical frailty, it could be the first step in clinical management. Subsequent assessment should include CGA to identify all potential contributors and plan the interventions and follow-up. The CGA derived Frailty index is better suited for evaluating the effect of interventions than were the tools for assessing physical frailty (i.e., Fried criteria).
From a clinical point of view, the evidence that physical interventions, provided that they are sufficiently intensive and performed over a sufficient time span, are successful in the treatment of frailty is highly regarded. To the best of our knowledge, only the data from one RCT show both the effect of cognitive training as well as the explicit effect of nutrition intervention (protein, energy, vitamin and mineral supplementation) on frailty (24). Although it is recommended to supplement vitamin D in older people in order to alleviate the consequences of frailty, there are only conditional data to support treatment of frailty with vitamin D. In this regard, we consider vitamin D as more of a marker than a risk factor or contributor for frailty. CGA appears to have a central role in the management of frailty. There are robust data of its effectiveness when performed in specialized wards for hospitalized frail older people, who are the most vulnerable frail population. Interventions are much more effective when implemented in those populations that at the greatest risk, and in this regard, geriatric wards should be highly encouraged to perform CGA.

The value of our review lies in a comprehensive evaluation of all the elements necessary to provide care to a frail person. We believe the presented work is very informative, not only for busy clinicians unfamiliar with concept of frailty, but also for service planners, providers and payers, since frailty prevention, postponement or treatment involves many stakeholders and/or requires a multidisciplinary approach.

There are some limitations to our review. Because there is no generally accepted definition of frailty, we very likely missed many studies that could otherwise be included in this review. We did not find a substantial body of new research on this topic, therefore, the majority of interventions have already been more or less firmly and explicitly recommended in the report from the consensus conference with the participation of experts from six major international, European and US societies published in 2013 (17).

We are aware of the development of drugs to treat sarcopenia and we look forward to studies that will evaluate those drugs in the context of frailty prevention and treatment (34).

To the best of our knowledge, several questions remain unanswered, such as whether different age groups require different approaches to the issue of frailty, whether management and treatment of multimorbidity can have an effect on frailty, and whether public health measures can be effective in preventing and treating frailty.

5 CONCLUSION

The aim of this research was to define interventions in a successful clinical management of frail people. For the purposes of this research, a systematic literature review method was used. The method proved to be appropriate and the aim was achieved. Our research can serve as a base for a comprehensive model of clinical management of frailty.

Results of this review show that prevalence of frailty ranges from 5% to more than 45%, depending on the definition and age group. Although not ideal, Fried criteria and Frailty Index of Accumulated Deficits can be recommended for clinical work and research purposes. They can be used consequently, as Fried criteria are more feasible for screening, whereas Frailty Index, derived from comprehensive geriatric assessment, is better suited for management and follow-up. Comprehensive geriatric assessment is a multidimensional, multidisciplinary diagnostic instrument addressing medical, psychosocial, functional and social capabilities and limitations of older persons, which aims to generate a plan of treatment and follow-up and is, therefore, a core activity in geriatric medicine (6). Multicomponent physical training of appropriate duration and frequency, and multidimensional interventions combining vitamin D, nutrition, cognitive training and physical activity, particularly when based on comprehensive geriatric assessment, are effective to reduce frailty.

The main drawback of the current literature review is the fact that it does not include a meta-analysis of included results.

CONFLICTS OF INTEREST

The authors declare that no conflicts of interest exist.

FUNDING

This publication arises from the Joint Action '724099 / ADVANTAGE', which has received funding from the European Union's Health Programme (2014–2020). The content of this report represents the views of the author only and is his/her sole responsibility; it cannot be considered to reflect the views of the European Commission and/or the Consumers, Health, Agriculture and Food Executive Agency or any other body of the European Union. The European Commission and the Agency do not accept any responsibility for the use that may be made of the information it contains.

ETHICAL APPROVAL

Not applicable.

REFERENCES

1. Fried LP, Xue QL, Cappola AR, Ferrucci L, Chaves P, Varadhan R, et al. Nonlinear multisystem physiological dysregulation associated with frailty in older women: implications for etiology and treatment. J Gerontol A Biol Sci Med Sci. 2009;64(10):1049-57. doi: 10.1093/gerona/glp076.
2. Kehler DS, Ferguson T, Stammers AN, Bohm C, Arora RC, Duhamel TA, et al. Prevalence of frailty in Canadians 18-79 years old in the Canadian Health Measures Survey. BMC Geriatr. 2017;17(1):28. doi: 10.1186/s12877-017-0423-6.
3. Gobbens RJ, van Assen MA, Luijkx KG, Wijnen-Sponselee MT, Schols JM. Determinants of frailty. J Am Med Dir Assoc. 2010;11(5):356-64. doi: 10.1016/j.jamda.2009.11.008.
4. Fried LP, Ferrucci L, Darer J, Williamson JD, Anderson G. Untangling the concepts of disability, frailty, and comorbidity: implications for improved targeting and care. J Gerontol A Biol Sci Med Sci. 2004;59(3):255–63. doi: 10.1093/gerona/59.3.M255.
5. Gill TM, Gahbauer EA, Han L, Allore HG. Trajectories of disability in the last year of life. N Engl J Med. 2010;362(13):1173–80. doi: 10.1056/NEJMoa0909087.
6. Welsh TJ, Gordon AL, Gladman JR. Comprehensive geriatric assessment – a guide for the non-specialist. Int J Clin Pract. 2014;68(3):290-3. doi: 10.1111/ijcp.12313.
7. Gill TM, Gahbauer EA, Allore HG, Han L. Transitions between frailty states among community-living older persons. Arch Intern Med. 2006;166(4):418-23. doi: 10.1001/archinte.166.4.418.
8. Akishita M, Ishii S, Kojima T, Kozaki K, Kuzuya M, Arai H, et al. Priorities of health care outcomes for the elderly. J Am Med Dir Assoc. 2013;14(7):479-84. doi: 10.1016/j.jamda.2013.01.009.
9. Moher D, Shamseer L, Clarke M, Ghersi D, Liberati A, Petticrew M, et al. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. Syst Rev. 2015;4(1):1. doi: 10.1186/2046-4053-4-1.
10. Fried LP, Tangen CM, Walston J, Newman AB, Hirsch C, Gottdiener J, et al. Frailty in older adults: evidence for a phenotype. J Gerontol A Biol Sci Med Sci. 2001;56(3):146-56. doi: 10.1093/gerona/56.3.M146.
11. Clegg A, Young J, Iliffe S, Rikkert MO, Rockwood K. Frailty in elderly people. Lancet. 2013;381(9868):752-62. doi: 10.1016/S0140-6736(12)62167-9.
12. Abellan van Kan G, Rolland Y, Bergman H, Morley JE, Kritchevsky SB, Vellas B, et al. The I.A.N.A. task force on frailty assessment of older people in clinical practice. J Nutr Health Aging. 2008;12(1):29-37. doi: 10.1007/BF02982161.
13. Dent E, Kowal P, Hoogendijk EO. Frailty measurement in research and clinical practice: a review. Eur J Intern Med. 2016;31:3-10. doi: 10.1016/j.ejim.2016.03.007.
14. Stoicea N, Baddigam R, Wajahn J, Sipes AC, Arias-Morales CE, Gastaldo N, et al. The gap between clinical research and standard of care: a review of frailty assessment scales in perioperative surgical settings. Front Public Health. 2016;4:150. doi: 10.3389/fpubh.2016.00150.
15. Subra J, Gillette-Guyonnet S, Cesari M, Oustric S, Vellas B, Platform Team. The integration of frailty into clinical practice: preliminary results from the Gérontopôle. J Nutr Health Aging. 2012;16(8):714-20. doi: 10.1007/s12603-012-0391-7.
16. Vellas B, Balardy L, Gillette-Guyonnet S, Abellan Van Kan G, Ghisolfi-Marque A, Subra J, et al. Looking for frailty in community-dwelling older persons: the Gérontopôle Frailty Screening Tool (GFST). J Nutr Health Aging. 2013;17(7):629-31. doi: 10.1007/s12603-013-0363-6.
17. Morley JE, Vellas B, Abellan van Kan G, Anker SD, Bauer JM, Bernabei R, et al. Frailty consensus: a call to action. J Am Med Dir Assoc. 2013;14(6):392-7. doi: 10.1016/j.jamda.2013.03.022.
18. Sutton JL, Gould RL, Daley S, Coulson MC, Ward EV, Butler AM, et al. Psychometric properties of multicomponent tools designed to assess frailty in older adults: a systematic review. BMC Geriatr. 2016;16:55. doi: 10.1186/s12877-016-0225-2.
19. Theou O, Stathokostas L, Roland KP, Jakobi JM, Patterson C, Vandervoort AA, et al. The effectiveness of exercise interventions for the management of frailty: a systematic review. J Aging Res. 2011;2011:569194.doi: 10.4061/2011/569194.
20. Beaudart C, Buckinx F, Rabenda V, Gillain S, Cavalier E, Slomian J, et al. The effects of vitamin D on skeletal muscle strength, muscle mass, and muscle power: a systematic review and meta-analysis of randomized controlled trials. J Clin Endocrinol Metab. 2014;99(11):4336-45. doi: 10.1210/jc.2014-1742.
21. Bruyère O, Cavalier E, Buckinx F, Reginster JY. Relevance of vitamin D in the pathogenesis and therapy of frailty. Curr Opin Clin Nutr Metab Care. 2017;20(1):26-9. doi: 10.1097/MCO.0000000000000334.
22. Cesari M, Vellas B, Hsu FC, Newman AB, Doss H, King AC, et al. A physical activity intervention to treat the frailty syndrome in older persons - results from the LIFE-P Study. J Gerontol A Biol Sci Med Sci. 2015;70(2):216-22. doi: 10.1093/gerona/glu099.
23. Ng TP, Feng L, Nyunt MS, Niti M, Tan BY, et al. Nutritional, physical, cognitive, and combination interventions and frailty reversal among older adults: a randomized controlled trial. Am J Med. 2015;128(11):1225-36. doi: 10.1016/j.amjmed.2015.06.017.
24. Song X, Mitnitski A, Rockwood K. Prevalence and 10-year outcomes of frailty in older adults in relation to deficit accumulation. J Am Geriatr Soc. 2010;58(4):681-7. doi: 10.1111/j.1532-5415.2010.02764.x.
25. Puts MTE, Toubasi S, Andrew MK, Ashe MC, Ploeg J, Atkinson E, et al. Interventions to prevent or reduce the level of frailty in community-dwelling older adults: a scoping review of the literature and international policies. Age Ageing. 2017;46(3): 383-92. doi: 10.1093/ageing/afw247.

26. Turner G, Clegg A, British Geriatrics Society, Age UK, Royal College of General Practioners. Best practice guidelines for the management of frailty: a British Geriatrics Society, Age UK and Royal College of General Practitioners report. Age Ageing. 2014;43(6):744-7.doi: 10.1093/ageing/afu138.
27. Collard RM, Boter H, Schoevers RA, Oude Voshaar RC. Prevalence of frailty in community-dwelling older persons: a systematic review. J Am Geriatr Soc. 2012;60(8):1487-92.doi: 10.1111/j.1532-5415.2012.04054.x.
28. Chan D-DC, Tsou H-H, Yang R-S, Tsauo J-Y, Chen C-Y, Hsiung CA, et al. A pilot randomized controlled trial to improve geriatric frailty. BMC Geriatr. 2012;12:58. doi: 10.1186/1471-2318-12-58.
29. Li CM, Chen CY, Li CY, Wang WD, Wu SC. The effectiveness of a comprehensive geriatric assessment intervention program for frailty in community-dwelling older people: a randomized, controlled trial. Arch Gerontol Geriatr. 2010;50(Suppl 1):S39-42. doi: 10.1016/S0167-4943(10)70011-X.
30. Cameron ID, Fairhall N, Langron C, Lockwood K, Monaghan N, Aggar C, et al. A multifactorial interdisciplinary intervention reduces frailty in older people: randomized trial. BMC Med. 2013;11:65. doi: 10.1186/1741-7015-11-65.
31. Behm L, Eklund K, Wilhelmson K, Zidén L, Gustafsson S, Falk K, et al. Health Promotion can postpone frailty: results from the RCT elderly persons in the risk zone. Public Health Nurs. 2016;33(4):303-15. doi: 10.1111/phn.12240.
32. Ellis G, Whitehead MA, O'Neill D, Langhorne P, Robinson D. Comprehensive geriatric assessment for older adults admitted to hospital:meta-analysis of randomised controlled trials. BMJ. 2011;343:d6553. doi: https://doi.org/10.1136/bmj.d6553.
33. Gill TM, Baker DI, Gottschalk M, Peduzzi PN, Allore H, Van Ness PH. A prehabilitation program for the prevention of functional decline: effect on higher-level physical function. Arch Phys Med Rehabil. 2004;85(7):1043–9. doi: 10.1016/j.apmr.2003.10.021.
34. Rooks D, Praestgaard J, Hariry S, Laurent D, Petricoul O, Perry RG, et al. Treatment of sarcopenia with bimagrumab: results from a phase ii, randomized, controlled, proof-of-concept study. J Am Geriatr Soc. 2017;65(9):1988-95. doi: 10.1111/jgs.14927.

National Institute of Public Health
Trubarjeva 2, 1000 Ljubljana, Slovenia
zdrav.var@nijz.si
http://www.nijz.si/sl/nijz/revija-zdravstveno-varstvo
++386 1 2441 543

INSTRUCTIONS FOR AUTHORS

Journal: **Zdravstveno varstvo (ZV)** ISSN 0351-0026 (print edition) / **Slovenian Journal of Public Health (SJPH)** ISSN 1854-2476 (electronic edition)

Slovenian Journal of Public Health publishes internationally oriented articles on the broad area of public health and encourages interdisciplinary approach to public health. It focuses on all specific issues in public health especially in Central and South East Europe, i.e. primary care, prevention of communicable and noncommunicable diseases, health promotion, environmental and occupational health, organization and management in public health, social and economical aspects of public health.

The journal publishes original invited editorials, research papers, study protocols, and systematic reviews in English language only.

Instructions are in accordance with the Uniform Requirements for Manuscripts Submitted to Biomedical Journals. Complete instructions are published in N Engl J Med 1997; 336: 309-15 and in Ann Intern Med 1997; 126: 36-47 and on the URL address: http://www.icmje.org.

Editorial Office accepts only articles, that have not been published elsewhere and are not being considered for publication in other journals. Parts of the article, summarized after other sources (especially illustrations and tables) should include the author's and publisher's permission for reproduction.

ETHICAL GUIDELINES

Submission of a manuscript to ZV/SJPH implies that all authors have read and agreed to its content. Research involving human subjects (including human material or human data) that is reported in the manuscript must have been performed in accordance with the Declaration of Helsinki of 1975, as revised in 2000 and must have been approved by an appropriate ethics committee. A statement detailing this, including the name of the ethics committee and the reference number where appropriate, must appear at the end of all manuscripts reporting research on human subjects. If a study has been granted an exemption from requiring ethics approval, this should also be detailed at the end of the manuscript. The authors must explain the rationale for their approach, and demonstrate that the institutional review body explicitly approved the doubtful aspects of the study. Further information and documentation to support this should be made available to editors on request. Manuscripts may be rejected if the editors consider that the research has not been carried out within an ethical framework. In rare cases, the editors may contact the ethics committee for further information.

For all research involving human subjects, informed consent to participate in the study should be obtained from participants (or their parent or guardian in the case of children) and a statement to this effect should appear in the manuscript.

For all articles that include information or images relating to individual participants, written informed consent for the publication of these images must be obtained from the participant (or their parent or guardian in the case of children) and a statement to this effect should be included in the manuscript. These documents must be made available to editors if requested, and will be treated confidentially.

For research carried out on animals, authors are encouraged to comply with the "Animal Research: Reporting In Vivo Experiments" (ARRIVE) guidelines and must comply with local or institutional ethics approval requirements on the care and use of animals for research. A statement detailing such ethics approval and/or guidelines must be included in the manuscript. Relevant information should be included in the article as outlined in the guidelines.

Authors who have done the project with the support of a company, should indicate this in the statement at the end of the manuscript.

ZV/SJPH requires authors to declare any competing financial or other interest in relation to their work. All competing interests that are declared must be listed at the end of the manuscript.

Required statements at the end of the manuscript are:

CONFLICTS OF INTEREST (The authors declare that no conflicts of interest exist.)

FUNDING (The study was financed by ...)

ETHICAL APPROVAL (Received from the ...)

PLAGIARISM DETECTION

ZV/SJPH publisher is a member of the CrossCheck plagiarism detection initiative. In cases of suspected plagiarism CrossCheck report is available to the editors of the ZV/SJPH to detect instances of overlapping and similar text in submitted manuscripts. CrossCheck is a multi-publisher initiative allowing screening of published and submitted content for originality.

MANUSCRIPT SUBMISSION

We recommend the use of video instructions for authors. The ZV/SJPH welcomes submissions in electronic form to the Web-based peer review system, Editorial Manager at http://www.editorialmanager.com/sjph/ to receive all submissions and no longer accepts submissions by e-mail or post. The Editorial Office will only accept the post delivery of the Authorship and Copyright Transfer Agreement which requires the authors' signatures. Kindly send them together with the electronic submission of the manuscript to the address: National Institute of Public Health, Zdravstveno varstvo, Trubarjeva 2, 1000 Ljubljana, Slovenia.

Please register in Editorial Manager as 'author'. The first registration will require the entry of the author's data. All further entries will only require the entry of login data, which will be sent to your e-mail address after the first registration in the system.

After a successful login, complete all the required structured fields. Confirm the statement that your contribution has not yet been published or considered for publication in any other journal, and that the contribution was read and approved by other authors, and that if the contribution includes experiments on humans or animals, these were performed in accordance with the principles of the Helsinki-Tokyo Declaration or in accordance with the ethical principles.

Complete the data on the author and co-authors accurately and in full. Provide the corresponding author (with full address, telephone number and e-mail address), who will communicate with the Editorial Office and other authors.

The language of the manuscript is English. Original studies and reviews must include Slovenian language translations of the title, the abstract and key words. English speaking authors submit all the text only in English, obligatory secondary abstract is the same as the first abstract (please repeat it in English).

A special field for translation is provided only for the second language (Slovenian language) version of the abstract; other data must be written in the requested fields bilingually. The first abstract is always in English (limit 250 words), the secondary abstract is in Slovenian language with limitation of 400 words (extended abstract). English speaking authors submit all the text only in English!

After the entry of the structured data, please submit the attachment - the manuscript (from the Introduction part onward), which may not include author's data already written in the structured fields. The name of the file may not include the author's personal data or titles of institutions included in the preparation of the manuscript. Include graphic and image material in the text where it should be positioned. Submit only one document (one attached file).

Please use Line counter in the Word program.

When submitting the manuscript, follow the instructions provided by the system; you can also use 'Editorial Manager's Tutorial for Authors'.

The system works best with the latest version of Acrobat.

If you have difficulties submitting your manuscript, please contact the journal office at zdrav.var@nijz.si.

Our Web-based system provides full electronic capabilities not only for submission, but also for peer review and status updates. It also speeds manuscript turnaround and provides global access for authors, reviewers, and editors. Authors, reviewers, and editors receive automatic e-mail messages from Editorial Manager when significant events occur.

We give some detailed instructions in the continuation.

Manuscript should be written in Word for Windows word processor. Contribution should be typed with double-spaced with margins of at least 25 mm.

Original scientific articles should be divided into following headings: 1 lntroduction, 2 Methods, 3 Results, 4 Discussion and 5 Conclusions (this is also the structure of the abstract). Other types of articles and systematic review articles can be designed differently, but the division in headings and subheadings should be clearly evident from the size of characters in the titles. Headings and subheadings should be numbered decadally by standard SIST ISO 2145 and SIST ISO 690 (e. g. 1, 1.1, 1.1.1 etc.).

LENGTH

Required length for invited editorial is 250 to 1000 words and for research article 2000 to 4500 words with tables and references.

TITLE AND AUTHORS

The title of the article should be short and concise, descriptive and not affirmative (statements are not allowed in the title). Names of authors with concise academic and professional degrees and full adress of the department, institution or clinic where the work has been performed should be cited. Authors should be qualified for authorship. They should contribute to the conception, design, analysis and interpretation of data, and they should approve the final version of the contribution.

ABSTRACT AND KEY WORDS

The abstract of the original scientific article should be structured (Introduction, Methods, Results, Conclusions) and of no more than 250 words (Slovenian language abstracts are limited to 400 words). The abstract should be written in third person. The abstract of a original scientific article should state the purpose of the investigation, basic procedures, main findings together with their statistical significance, and principal conclusions. 3 - 10 key words should be cited for the purpose of indexing. Terms from MeSH - Medical Subject Headings listed in Index Medicus should be used. The abstract should normally be written in one paragraph, only exceptionally in several. The author propose the type of the artlice, but the final decision is adopted by the editor on the base of the suggestions of the professional reviewers.

REFERENCES

We recommend authors to review prior issues of our journal (the last five years) for any relevant literature on their paper's topic.

Each mentioning of the statements or findings by other authors should be supported by a reference. References should be numbered consecutively in the same order in which they appear in the text. Reference should be cited at the end of the cited statement. References in text, illustrations and tables should be indicated by Arabic numerals in parentheses ((1), (2, 3), (4-7) etc). References, cited only in tables or illustrations should be numbered in the same sequence as they will appear in the text. Avoid using abstracts and personal communications as references (the latter can be cited in the text). The list of the cited literature should be added at the end of the manuscript. Literature should be cited according to the enclosed instructions that are in accordance with those used by U. S. National Library of Medicine in Index Medicus. The titles of journals should be abbreviated according to the style used in Index Medicus (complete list on the URL address: http://www.nlm.nih.gov). List the names of all authors, if there are six authors or more, list the first six authors than add et al.

If the article/book has a DOI number, the author should include it at the end of the reference.

EXAMPLES FOR LITERATURE CITATION

example for a book:

1. Anderson P, Baumberg P. Alcohol in Europe. London: Institute of Alcohol Studies, 2006.

example for the chapter in a book:

2. Goldberg BW. Population-based health care. In: Taylor RB, editor. Family medicine. 5th ed. New York: Springer, 1999:32-6.

example for the article in a journal:

3. Florez H, Pan Q, Ackermann RT, Marrero DG, Barrett-Connor E, Delahanty L, et al. Impact of lifestyle intervention and metformin on health-related quality of life: the diabetes prevention program randomized trial. J Gen Intern Med. 2012;27:1594-601. doi: 10.1007/s11606-012-2122-5.

example for the article in a journal with no author given:

4. Anon. Early drinking said to increase alcoholism risk. Globe. 1998;2:8-10.

example for the article in a journal with organization as author:

5. Women's Concerns Study Group. Raising concerns about family history of breast cancer in primary care consultations: prospective, population based study. Br Med J. 2001;322:27-8.

example for the article from journal volume with supplement and with number:

6. de Villiers TJ. The role of menopausal hormone therapy in the management of osteoporosis. Climacteric. 2015; 18(Suppl 2):19-21. doi: 10.3109/13697137.2015.1099806.

example for the article from collection of scientific papers:

7. Hickner J, Barry HC, Ebell MH, Ettenhofer T, Eliot R, Sugden K, et al. Suicides and non-suicidal deaths in Slovenia: molecular genetic investigation. In: 9th European Symposium on Suicide and Suicidal Behaviour. Warwick: University of Oxford, 2002:76.

example for master theses, doctor theses:

8. Shaw EH. An exploration of the process of recovery from heroin dependence: doctoral thesis. Hull: University of Hull, 2011.

example for electronic sources:

9. EQ-5D, an instrument to describe and value health. Accessed January 24th, 2017 at: https://euroqol.org/eq-5d-instruments/.

TABLES

Type on the place in the text where they belong. Tables should be composed by lines and columns which intersect in fields. Number tables consecutively. Each table should be cited in the text and supplied with a brief title. Explain all the abbreviations and non-standard units in the table.

ILLUSTRATIONS

Illustrations should be professionally drawn. When preparing the illustrations consider the black-and-white print. Illustration material should be prepared in black-and-white (not in color!). Surfaces should have no tone-fills, hatchings should be chosen instead (in case of bar-charts, so called pie-charts or maps). In linear graphs the individual lines should also be separated by various kinds of hatching or by different markers (triangles, asterisks ...), but not by color. Graphs should have white background (i. e. without background).

Letters, numbers or symbols should be clear, even and of sufficient size to be still legible on a reduced illustration. Freehand or typewritten lettering in the illustration is unacceptable.

Each figure should be cited in the text.

Accompanying text to the illustration should contain its title and the necessary explanation of its content. Illustration should be intelligible also without reading the manuscript. Ali the abbreviations from the figure should be explained. The use of abbreviations in the accompanying text to the illustration is unacceptable. Accompanying texts to illustrations should be written in the place of their appearing in the text.

lf the identity of the patient can be recognized on the photograph, a written permission of the patient for its reproduction should be submitted.

UNITS OF MEASUREMENT

Should be in accordance with International System of Units (SI).

ABBREVIATIONS

Avoid abbreviations, with the exception of internationally valid signs for units of measurement. Avoid abbreviations in the title and abstract. The full term for which an abbreviation stands should precede its first use in the text, abbreviation used in further text should be cited in parentheses.

EDITORIAL WORK

The received manuscript is submitted by the editor to three international professional reviewers. After the reviewing process, the contribution is sent to the author for approval and consideration of corrections. The final copy is than again submitted to the Editorial Office. During the editorial process, the secrecy of the contribution content is guaranteed. All the articles are language edited. Author receives in consideration also the first print, but at this stage corrigenda (printing errors) only are to be considered. Proofreading should be returned in three days, otherwise it is considered that the author has no remarks.

The journal office strives for rapid editorial process. Authors should adhere to the deadlines set by them in letters; otherwise it may happen that the article will be withdrawn from the editorial process.

Any appeal of the authors deals the Editorial Board of the ZV/SJPH.

When the manuscript is accepted for publication, the author must assigns copyright ownership of the material to the National Institute of Public Health as a publisher. Any violation of the copyright will be legally persecuted.

ZV/SJPH does not have article processing charges (APCs) nor article submission charges.

The author receives one copy of the print issue in which the article is published.

Nacionalni inštitut za javno zdravje
Trubarjeva 2, 1000 Ljubljana, Slovenija
zdrav.var@nijz.si
http://www.nijz.si/sl/nijz/revija-zdravstveno-varstvo
++386 1 2441 543

NAVODILA AVTORJEM

Revija: **Zdravstveno varstvo (ZV)** ISSN 0351-0026 (tiskana izdaja) / **Slovenian Journal of Public Health (SJPH)** ISSN 1854-2476 (elektronska izdaja)

Navodila so v skladu z Uniform Requirements for Manuscripts Submitted to Biomedical Journals. Popolna navodila so objavljena v N Engl J Med 1997; 336: 309-15 in v Ann Intern Med 1997; 126: 36-47 in na spletni strani http://www.icmje.org.

ETIČNI STANDARDI

Uredništvo sprejema v obdelavo le članke s širšo mednarodno javnozdravstveno tematiko, ki še niso bili in ne bodo objavljeni drugje. Dele članka, ki so povzeti po drugi literaturi (predvsem slike in tabele), mora spremljati dovoljenje avtorja in založnika prispevka, da dovoli naši reviji reprodukcijo.

Oddan rokopis morajo prebrati vsi avtorji in se z njegovo vsebino strinjati.

Raziskave na ljudeh (vključno s človeškimi materiali in osebnimi podatki) morajo biti izpeljane v skladu s Helsinško deklaracijo in potrjene s strani nacionalne etične komisije. V izjavi na koncu rokopisa morajo avtorji podati izjavo o etiki raziskav na ljudeh, ki mora vsebovati ime etične komisije in referenčno številko obravnave. Poročanje o raziskavah na ljudeh brez potrdila etične komisije zahteva dodatno razlago v poglavju o metodah dela. Na zahtevo Uredništva je avtor dolžan predložiti vso dokumentacijo o obravnavi raziskovalne etike njegovega rokopisa. Uredništvo si pridržuje pravico, da kontaktira etično komisijo.

Prav tako morajo avtorji, ki poročajo o ljudeh ali posredujejo javnosti njihovo slikovno gradivo, pridobiti dovoljenja vseh sodelujočih, da se z vključitvijo v raziskavo strinjajo (v primeru otrok so to starši ali skrbniki). Izjavo o pridobitvi teh dovoljenj morajo avtorji podati v poglavju o metodah dela. Uredništvo si pridržuje pravico vpogleda v to dokumentacijo.

Raziskave na živalih morajo biti izpeljane v skladu z navodili “Animal Research: Reporting In Vivo Experiments” (ARRIVE) in potrjene s strani nacionalne etične komisije. V poglavju o metodah dela in v izjavi na koncu rokopisa morajo avtorji podati izjavo o etiki raziskav na živalih z veljavno številko dovoljenja.

V izjavi na koncu rokopisa morajo biti zapisani morebitni finančni ali drugi interesi farmacevtske industrije ali proizvajalcev opreme ter inštitucij, povezani z objavo v ZV/SJPH.

Avtorji morajo na koncu rokopisa zapisati sledeče izjave:

CONFLICTS OF INTEREST (The authors declare that no conflicts of interest exist.)

FUNDING (The study was financed by ...)

ETHICAL APPROVAL (Received from the… ali opis etičnega vidika raziskave)

PLAGIATI

Kadar uredništvo ugotovi, da je rokopis plagiat, se rokopis takoj izloči iz uredniškega postopka. Plagiatorstvo ugotavljamo s programom za odkrivanje plagiatov CrossCheck plagiarism detection system.

ELEKTRONSKA ODDAJA PRISPEVKA

Priporočamo uporabo videoposnetka z navodili za avtorje. Prispevke oddajte v elektronski obliki s pomočjo spletne aplikacije Editorial Manager, ki se nahaja na spletnem naslovu http://www.editorialmanager.com/sjph/. V uredništvo sprejemamo po pošti le še Izjave o avtorstvu in avtorskih pravicah, ki zahtevajo lastnoročni podpis. Prosimo, da jih pošljete hkrati z elektronsko oddajo prispevka na naslov: Nacionalni inštitut za javno zdravje, za revijo Zdravstveno varstvo, Trubarjeva 2, 1000 Ljubljana.

V spletno uredniško aplikacijo se prijavite kot ‘avtor’. Prva prijava zahteva vnos podatkov o avtorju, vse naslednje prijave pa le še vnos podatkov za prijavo, ki jih na svoj elektronski naslov prejmete po prvi prijavi v sistem.

Po uspešni prijavi izpolnite vsa zahtevana strukturirana polja. Potrdite izjavo, da vaš prispevek še ni bil objavljen ali poslan v objavo kakšni drugi reviji, da so prispevek prebrali in se z njim strinjajo vsi avtorji, da so raziskave na ljudeh oz. živalih opravljene v skladu z načeli Helsinško-Tokijske deklaracije oz. v skladu z etičnimi načeli.

Avtorji, ki v objavo pošiljate raziskovalno delo, opravljeno s pomočjo nekega podjetja, to navedite na koncu rokopisa v izjavi o financiranju.

Polje 'Comments' je namenjeno vašim dodatnim razlagam, navedete lahko tudi predlog recenzentov z imeni, nazivi, e-naslovi in zaposlitvijo.

Podatke o avtorju in soavtorjih vnesite kar se da natančno in popolno. Naveden naj bo korespondenčni avtor (s polnim naslovom, telefonsko številko in elektronskim naslovom), ki bo skrbel za komunikacijo z uredništvom in ostalimi avtorji.

Jezik prispevka je angleščina. Objavljamo izvirne znanstvene članke, sistematične pregledne znanstvene članke, metodologije raziskav in vabljene uvodnike. Pri izvirnih, metodoloških in sistematičnih preglednih znanstvenih prispevkih morajo biti naslov, izvleček in ključne besede prevedeni tudi v slovenščino.

Naslov, ključne besede in izvleček se oddajajo dvojezično v angleščini in slovenščini v strukturirana polja. Posebno polje za zapis v drugem jeziku obstaja le za izvleček, preostale podatke vnesite v obeh jezikih v ustrezno isto polje. Prvi izvleček je vselej v angleškem jeziku (do 250 besed - sistem vam besede sproti šteje), drugi pa v slovenskem jeziku (razširjen izvleček - do 400 besed).

Po vnosu strukturiranih podatkov oddajte še priponko - rokopis (od 1 Uvod naprej), ki ne sme zajemati podatkov, ki ste jih vnesli že pred tem v strukturirana polja, zlasti ne podatkov o avtorjih. Ime datoteke ne sme vključevati avtorjevih osebnih podatkov, prav tako ne imen ustanov, vključenih v pripravo rokopisa. Grafično in slikovno gradivo je kot ves rokopis v angleškem jeziku. Vključite ga v besedilo na mesto, kamor le-to sodi in ga opremite z naslovom. Oddate torej le en sam dokument, eno priponko. V Wordu uporabite možnost Postavitev strani/Številke vrstic (tako bo na robu vsake vrstice dokumenta dodana številka vrstice).

Pri oddaji sledite napotkom, ki vam jih ponuja sistem, pomagate pa si lahko tudi z 'Editorial Manager's Tutorial for Autors'.

Sistem najbolje deluje, če uporabljate zadnjo različico Acrobata.

Če pri oddajanju rokopisa naletite na nepremostljive težave, se za pomoč obrnite na naslov uredništva: zdrav.var@nijz.si.

V nadaljevanju podajamo še nekaj natančnejših napotkov.

ROKOPIS

Besedila naj bodo napisana z urejevalnikom Word for Windows 97-2003. Robovi naj bodo široki najmanj 25 mm. Znanstveni članki naj imajo naslednja poglavja: uvod, metode, rezultati, razpravljanje in zaključek. Uvodniki in sistematični pregledni članki so lahko zasnovani drugače, vendar naj bo razdelitev na poglavja in podpoglavja jasno razvidna iz velikosti črk naslovov. Poglavja in podpoglavja naj bodo številčena dekadno po standardu SIST ISO 2145 in SIST ISO 690 (npr. 1, 1.1, 1.1.1 itd.).

DOLŽINA PRISPEVKOV

Zahtevana dolžina prispevka je za vabljen uvodnik od 250 do 1000 besed, za znanstveni članek (originalni, metodološki ali sistematični pregledni) pa od 2000 do 4500 besed s slikovnim gradivom in literaturo vred.

NASLOV IN AVTORSTVO

Naslov v angleškem in slovenskem jeziku naj bo kratek in natančen, opisen in ne trdilen (povedi v naslovih niso dopustne). Navedena naj bodo imena piscev z natančnimi akademskimi in strokovnimi naslovi ter popoln naslov ustanove, inštituta ali klinike, kjer je delo nastalo. Avtorji morajo izpolnjevati pogoje za avtorstvo. Prispevati morajo k zasnovi in oblikovanju oz. analizi in interpretaciji podatkov, rokopis morajo intelektualno zasnovati oz. ga kritično pregledati, strinjati se morajo s končno različico rokopisa. Samo zbiranje podatkov ne zadostuje za avtorstvo.

IZVLEČEK IN KLJUČNE BESEDE

Izvleček v angleškem in slovenskem jeziku naj bo pri znanstvenem in metodološkem članku strukturiran in naj ne bo daljši od 250 besed v angleščini in 400 besed v slovenščini, izvlečki ostalih člankov so lahko nestrukturirani. Izvleček naj vsebinsko povzema in ne le našteva bistvene vsebine dela. Izogibajte se kraticam in okrajšavam. Napisan naj bo v 3. osebi.

Izvleček znanstvenega članka naj povzema namen dela, osnovne metode, glavne izsledke in njihovo statistično pomembnost ter poglavitne sklepe (struktura IMRC - Introduction, Methods, Results, Conclusions).

Navedenih naj bo 3-10 ključnih besed, ki nam bodo v pomoč pri indeksiranju. Uporabljajte izraze iz MeSH - Medical Subject Headings, ki jih navaja Index Medicus.

KATEGORIJA PRISPEVKA

Kategorijo prispevka predlaga z vnosom v ustrezno polje avtor sam, končno odločitev pa sprejme urednik na osnovi predlogov recenzentov. Objavljamo izvirne znanstvene članke, metodološke članke, sistematične pregledne znanstvene članke in vabljene uvodnike.

REFERENCE

Avtorjem priporočamo, da pregledajo objavljene članke na temo svojega rokopisa v predhodnih številkah naše revije (za obdobje zadnjih pet let).

Vsako navajanje trditev ali dognanj drugih morate podpreti z referenco. Reference naj bodo v besedilu navedene po vrstnem redu, tako kot se pojavljajo. Referenca naj bo navedena na koncu citirane trditve. Reference v besedilu, slikah in tabelah navedite v oklepaju z arabskimi številkami ((1), (2, 3), (4-7)). Reference, ki se pojavljajo samo v tabelah ali slikah, naj bodo oštevilčene tako, kot se bodo pojavile v besedilu. Kot referenc ne navajajte izvlečkov in osebnih dogovorov (slednje je lahko navedeno v besedilu). Seznam citirane literature dodajte na koncu prispevka. Literaturo citirajte po priloženih navodilih, ki so v skladu s tistimi, ki jih uporablja ameriška National Library of Medicine v Index Medicus. Uporabljajte numerično citiranje. Imena revij krajšajte tako, kot določa Index Medicus (popoln seznam na naslovu URL: http://www.nlm.nih.gov).

Navedite imena vseh avtorjev, v primeru, da je avtorjev šest ali več, navedite prvih šest avtorjev in dodajte et al.

Če ima članek/knjiga DOI številko, jo mora avtor navesti na koncu reference.

PRIMERI ZA CITIRANJE LITERATURE

primer za knjigo:

1. Anderson P, Baumberg P. Alcohol in Europe. London: Institute of Alcohol Studies, 2006.
2. Mahy BWJ. A dictionary of virology. 2nd ed. San Diego: Academic Press, 1997.

primer za poglavje iz knjige:

3. Urlep F. Razvoj osnovnega zdravstva v Sloveniji zadnjih 130 let. In: Švab I, Rotar-Pavlič D, editors. Družinska medicina. Ljubljana: Združenje zdravnikov družinske medicine, 2002:18-27.
4. Goldberg BW. Population-based health care. In: Taylor RB, editor. Family medicine. 5th ed. New York: Springer, 1999:32-6.

primer za članek iz revije:

5. Florez H, Pan Q, Ackermann RT, Marrero DG, Barrett-Connor E, Delahanty L, et al. Impact of lifestyle intervention and metformin on health-related quality of life: the diabetes prevention program randomized trial. J Gen Intern Med. 2012;27:1594-601. doi: 10.1007/s11606-012-2122-5.

primer za članek iz revije, kjer avtor ni znan:

6. Anon. Early drinking said to increase alcoholism risk. Globe. 1998;2:8-10.

primer za članek iz revije, kjer je avtor organizacija:

7. Women's Concerns Study Group. Raising concerns about family history of breast cancer in primary care consultations: prospective, population based study. Br Med J. 2001;322:27-8.

primer za članek iz suplementa revije z volumnom in s številko:

8. Shen HM, Zhang QF. Risk assessment of nickel carcinogenicity and occupational lung cancer. Environ Health Perspect. 1994;102(Suppl 2):275-82.
9. de Villiers TJ. The role of menopausal hormone therapy in the management of osteoporosis. Climacteric. 2015; 18(Suppl 2):19-21. doi: 10.3109/13697137.2015.1099806.

primer za članek iz zbornika referatov:

10. Sugden K, Kirk R, Barry HC, Hickner J, Ebell MH, Ettenhofer T, et al. Suicides and non-suicidal deaths in Slovenia: molecular genetic investigation. In: 9th European Symposium on Suicide and Suicidal Behaviour. Warwick: University of Oxford, 2002:76.

primer za magistrske naloge, doktorske disertacije in Prešernove nagrade:

11. Shaw EH. An exploration of the process of recovery from heroin dependence: doctoral thesis. Hull: University of Hull, 2011.

primer za elektronske vire:

12. EQ-5D, an instrument to describe and value health. Accessed January 24th, 2017 at: https://euroqol.org/eq-5d-instruments/.

TABELE

Tabele v angleškem jeziku naj bodo v besedilu prispevka na mestu, kamor sodijo. Tabele naj sestavljajo vrstice in stolpci, ki se sekajo v poljih. Tabele oštevilčite po vrstnem redu, vsaka tabela mora biti citirana v besedilu. Tabela naj bo opremljena s kratkim angleškim naslovom. V legendi naj bodo pojasnjene vse kratice, okrajšave in nestandardne enote, ki se pojavljajo v tabeli.

SLIKE

Slike morajo biti profesionalno izdelane. Pri pripravi slik upoštevajte, da gre za črno-beli tisk. Slikovno gradivo naj bo pripravljeno:

- črno-belo (ne v barvah!);
- brez polnih površin, namesto tega je treba izbrati šrafure (če gre za stolpce, t. i. tortice ali zemljevide);
- v linijskih grafih naj se posamezne linije prav tako ločijo med samo z različnim črtkanjem ali različnim označevanjem (s trikotniki, z zvezdicami...), ne pa z barvo;
- v grafih naj bo ozadje belo (tj. brez ozadja).

Črke, številke ali simboli na sliki morajo biti jasni, enotni in dovolj veliki, da so berljivi tudi na pomanjšani sliki. Ročno ali na pisalni stroj izpisano besedilo v sliki je nedopustno.

Vsaka slika mora biti navedena v besedilu. Besedilo k sliki naj vsebuje naslov slike in potrebno razlago vsebine. Slika naj bo razumljiva tudi brez branja ostalega besedila. Pojasniti morate vse okrajšave v sliki. Uporaba okrajšav v besedilu k sliki je nedopustna. Besedila k slikam naj bodo napisana na mestu pojavljanja v besedilu.

Fotografijam, na katerih se lahko prepozna identiteta bolnika, priložite pisno dovoljenje bolnika.

MERSKE ENOTE

Naj bodo v skladu z mednarodnim sistemom enot (SI).

KRATICE IN OKRAJŠAVE

Kraticam in okrajšavam se izogibajte, izjema so mednarodno veljavne oznake merskih enot. V naslovih in izvlečku naj ne bo kratic. Na mestu, kjer se kratica prvič pojavi v besedilu, naj bo izraz, ki ga nadomešča, polno izpisan, v nadaljnjem besedilu uporabljano kratico navajajte v oklepaju.

UREDNIŠKO DELO

Prispelo gradivo z javnozdravstveno tematiko mednarodnega pomena posreduje uredništvo po tehnični brezhibnosti v strokovno recenzijo trem mednarodno priznanim strokovnjakom. Recenzijski postopek je dvojno slep. Po končanem uredniškem delu vrnemo prispevek korespondenčnemu avtorju, da popravke odobri in upošteva. Popravljen čistopis vrne v uredništvo po spletni aplikaciji Editorial Manager. Sledi jezikovna lektura, katere stroške krije založnik. Med redakcijskim postopkom je zagotovljena tajnost vsebine prispevka. Avtor dobi v pogled tudi prve, t. i. krtačne odtise, vendar na tej stopnji upoštevamo samo še popravke tiskarskih napak. Krtačne odtise je treba vrniti v treh dneh, sicer menimo, da avtor nima pripomb.

V uredništvu se trudimo za čim hitrejši uredniški postopek. Avtorji se morajo držati rokov, ki jih dobijo v dopisih, sicer se lahko zgodi, da bo članek odstranjen iz postopka.

Morebitne pritožbe avtorjev obravnava uredniški odbor revije.

Za objavo članka prenese avtor avtorske pravice na Nacionalni inštitut za javno zdravje kot založnika revije (podpiše Pogodbo o avtorstvu in avtorskih pravicah). Kršenje avtorskih in drugih sorodnih pravic je kaznivo.

Prispevkov ne honoriramo in tudi ne zaračunavamo stroškov uredniškega postopka.

Avtor dobi izvod tiskane revije, v kateri je objavljen njegov članek.