



50TH DAYS OF PREVENTIVE MEDICINE

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FACULTY OF MEDICINE NIŠ
МЕДИЦИНСКИ ФАКУЛТЕТ
УНИВЕРЗИТЕТ У НИШУ



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NIŠ, SERBIA



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KEYNOTE PRESENTATION

ENVIRONMENTAL RISKS AND CANCERS

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Objectives: To present an overview of environmental risk of cancer globally.

Methods: Comprehensive literature review of environmental causes of cancer.

Results: In 2012 it is estimated that estimated 14 million new cancer cases and 8.2 million cancer deaths occurred. Globally, a substantial proportion of all cancers are attributable to the environment, including work setting. More than 100 agents, mixtures, and exposure situations are identified as carcinogenic to humans. External environmental causes of cancer are factors in the environment such as pollutants that increase risk for cancer. Approximately every tenth lung cancer death is closely related to risks in the workplace. Lung cancer, mesothelioma, and bladder cancer are among the most common types of occupational cancers.

Conclusions: Cancer is a leading cause disease burden worldwide, and its important will increase in the next decades. Globally, a substantial proportion of all cancers are attributable to the environment, including work setting. Most of these cancer are preventable.

Key words: cancer, environment, occupation

SESSION: ENVIRONMENT AND HEALTH

INVITED LECTURES

ENVIRONMENTAL RISKS ON NEURODEGENERATIVE DISEASES

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Objectives: Neurological development as well as neurodegeneration is strongly influenced by environmental factors. Not only natural factors, but with increasing influence factors from drinking water, (polluted) air, and also from agricultural products. Many studies have investigated different factors of environmental exposure on their influence on neurodegenerative diseases like Parkinson's disease. Morbus Parkinson belongs to with Alzheimer's disease to the most often neurodegenerative diseases with strong therapeutic and financial burden on the health system in general. Some studies suggest an increase in the incidence within the recent years. Whereas some pesticides have been identified as cause for Parkinson's disease, the incidence for some metals are much lower and connected to higher variabilities.

Materials and methods: The relationship to occupational exposure to specific metals and Parkinson's disease has been investigated by a study on frequency mortality among individuals in Michigan countries of the United States of America (J. M. Gorell et al. 1997) with inconsistent varying results (J. A. Firestoner et al. 2010), but have been more or less confirmed on pesticides (L. S. Engel et al. 2001). In addition, the genetic variability of an genomw-wide gene-environment interaction analysiss of pesticides exposure and the risk of Parkinson's disease has been investigated (J. M. Biernacka et al. 2016).

Results: The effects of metal exposure and workplace factors were inconsistent in most cases, whereas a relationship to some pesticides, especially the ones that target autophagy, mitochondrial complexes and modify reactive oxygen species can be observed. Although a genetic cause of Parkinson's disease is well-known, the connection to environmental exposure was difficult. Some data suggest that genetic variation on the formation of toxic metabolites may be connected to larger evidence for genetic-environmental risks.

Conclusion: Toxicity of several environmental aspects may have negative influence on the incidence and the progression of Parkinson's disease. Whereas effects on different metal exposures have been inconsistent, the negative effects of many pesticides have been observed. In connection to some individual genetic aspects this may contribute to the pathological mechanism of Morbus Parkinson.

Key words: Neurodegenerative disease, Morbus Parkinson, Pesticides, Metals, Genetic aspects

HYGIENE IN THE NEW SERBIAN HEALTH SYSTEM – A NEED FOR FUNDAMENTAL CHANGES

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Abstract: The present Serbian health system (SHS) is not sustainable on the long run. There are two main reasons for this assumption: 1. The premise - „afford everything to everyone“ is utopian and it generates corruption due to a huge disparity between the public health needs and the possibilities of the system. 2. Preventive medicine can be the pillar of public health only as an integrated medical branch and not as a compilation of hygiene, social medicine, epidemiology, occupational hygiene and sanitary microbiology. In this paper an original view of a new SHS will be presented. Primary level is based on a private general practitioner (GP), working as a family doctor from his/her home. Each GP is paid by the state to take health care of a certain number of families on a walking distance from his/her home. Present health centers are turned into the primary diagnostic centers (PDC), with basic laboratories, ultrasound and X-ray, pediatric, gynaecology and preventive medicine. With a referral from a GP patients use the services of PDC-s and specialists in hospitals. Preventive medicine is practised on individual level by GP-s and on a population level by the specialists of preventive medicine and public health in PDC-s and in public health institutes.

Introduction: „All our efforts made so far toward the promotion of public health have been considered as charity, as acts of humanity, and that is why the budget allotted for these efforts has been so small, for the understanding of charity can be found only among the few... A turning point will occur only when health policy is looked upon as the most important part of national economy... Most of our physicians still look upon medicine from the point of view of individual, and not from the point of view of social, practice.“ These are the words of prof. Andrija Stampar from 1919¹, but they are very much relevant for the present situation with the Serbian health system (SHS). According to the Euro Health Consumer Index 2015², based on six sub-disciplines (patients' rights and information, accessibility, outcomes, range and reach of services provided, prevention, and pharmaceuticals) Serbia is ranked at the 30th place among 35 European countries with 554 points. It is an improvement as compared to the last place in 2012, but still significantly worse compared to former Yugoslav republics of Slovenia, Croatia and Macedonia (710, 717, and 704, respectively). In spite of the highest level of health spending as a percentage of GDP, at 10,4% in 2014, out-of-pocket spending exceeds 36% of total health expenditure, indicating the presence of corruption in the health system.³ By female life expectancy for 2015 (77.9 years) Serbia is ranked at 37th place out of 42 European countries with all ex Yugoslav republics having better results except for Macedonia.⁴ The Serbian mortality rate from breast cancer was the highest in Europe in 2008 (ASR-W 2008: 22.7/100,000), while incidence and mortality of cervical, lung and colorectal cancer were well above European estimates.⁵ This is the indicator of low efficacy of the SHS in early diagnosis of malignant diseases and timely treatment. In 2008 there were 59% of adult Serbian population with overweight and 25% were obese indicating low adoption of healthy life styles in the Serbian population.⁶ The smoking prevalence in Serbia is still very high, in spite of introduced laws on tobacco ban (37.9% for men and 31.6% for women).⁷ More than 75 percent of doctors have considered leaving the country and this percentage is 81 among doctors under 35 years of age.⁸

The presented data indicate that there is a need for fundamental changes of SHS and of hygiene and other branches of preventive medicine as the pillars of that system. The aim of this paper is to present the weaknesses of the present SHS and to propose a new concept of SHS which would be sustainable and more effective.

The present Serbian Health System

In the latest analysis of the sustainability of the SHS there is written:” SHS is not financially sustainable in the long run... More money is spent than it is provided by the compulsory health insurance. Inclusion of private sector is very low... There are long waiting lists for certain medical procedures. The access to healthcare is not regulated enough and the integration of the different levels of treatment is inexistent. Low level of preventive compared to curative services has a diverse effect on financial sustainability of the system. Low level of reimbursement for new innovative medicines, compared to other EU countries. Flow of information about patients throughout the system is poor. Public healthcare institutions almost do not cooperate at all, and data sharing is on an unsatisfactory level. Complete inexistence of cooperation and information sharing between private and public institutions.⁹

The present SHS is unsustainable because it is based on a utopian premise „afford everything to everyone“. This system is extremely expensive and is permanently emptying the Health Insurance Fund. It generates corruption due to a huge disparity between the public health needs and the possibilities of the system. Queuing for health services promotes the position of individuals who can decide which patients will have the advantage and that is a critical moment for corruption. Overloading with patients tires out the medical staff and increases the probability of medical errors. This is a suitable basis for anti-medical movements, fake doctors and quazi natural healers. GPs should fulfill the role of a family doctor. However, GPs in the present health system are freely chosen by patients and it is quite possible that each family member chooses another doctor. Another problem is that GP’s office is in the health center. Patients are looking for a doctor. Vice versa is impossible because the doctors are overloaded with outpatients, in spite of the appointment system. That means that the idea of a family doctor in the present SHS is unfeasible. A family doctor visits families in their homes. It is not the case in the present SHS because GP’s are not obliged to do that.

Hygiene, social medicine, epidemiology and sanitary microbiology act as independent preventive branches of medicine in spite of the fact that almost no public health problem can be solved without a holistic approach engaging all the branches. There is no compulsory position of the specialist of some branch of preventive medicine in health centers. Institutes of public health cover too large areas of population to fulfill the mission of health protection and promotion. A successful coordination between the branches of preventive medicine is often missing.

The new Serbian Health System

The new SHS is based on two premises: 1. “The community presents natural work setting for a physician, not the laboratories or surgeries. The physician is a community worker and a teacher” (Andrija Stampar) and 2. „Individual responsibility for health“.

The first premise may be fulfilled only through the engagement of a family doctor. In the new health system primary level is based on a private GP, working as a family doctor from his/her home. Each GP is paid by the state to take health care of a certain number of families on a walking distance from his/her home. Unemployment rate of young medical doctors would decrease dramatically as only a minimum demands would be set for opening a private practice of GP’s at their homes. Present health centers are turned into the primary diagnostic centers (PDC), with basic laboratories, ultrasound and X-ray, pediatric, gynaecology and preventive medicine. With a referral from a GP patients use the services of PDC-s and specialists in hospitals who form the tertiary level of health services.

The second premise is fulfilled through private health insurance. Compulsory health insurance should cover only a family doctor's treatment, the services of PDC and specialists in hospitals to a certain extent and surgery and other interventions in life threatening conditions. For all other health conditions, private health insurance makes an agreement with a hospital for each client. People would become aware of the price of health. Their interest in health preventive actions such as physical activities, non-smoking, moderate drinking, moderate eating and stress coping would dramatically increase. The financial position of public hospitals would be significantly improved, as an important part of incomes would come from agreements with private health insurance. The corruption in the health system would be repressed with better standard of medical staff and with the promotion of private medical insurance.

Instead of three specializations in preventive medicine (hygiene, social medicine, epidemiology) a new specialization „Preventive Medicine and Public Health“ is introduced. This is in accordance with the situation in the European Union where in each member state only one specialization exists that covers preventive medicine (Table 1). In further subspecialization medical doctors would be trained for health education, health management, nutrition and diet therapy, environmental medicine, epidemiology of communicable diseases and epidemiology of non-communicable diseases. Specialists in preventive medicine and public health would be positioned in PDCs. There they would tackle public health problems of the population living in the area covered by the PDC. Subspecialists would work in the Institutes of public health in specific areas of their expertise.

Table 1. Titles of training courses in Community Medicine: EU member states, EEA states, Switzerland. Community Medicine. Minimum length of training course: 4 years (European Commission 2016)

Country	Title of qualification (National)	Title of Qualification (English)
Czech Republic	Hygiena a epidemiologie	Hygiene and Epidemiology
Denmark	Samfundsmedicin	Community Medicine
Germany	Öffentliches Gesundheitswesen	Public Health Service
Greece	Κοινωνική Ιατρική	Social Medicine
Spain	Medicina preventiva y salud pública	Preventive Medicine and Public Health
France	Santé publique et médecine sociale	Public Health and Social Medicine
Ireland	Public health medicine	Public health medicine
Italy	Igiene e medicina preventiva	Hygiene and Preventive Medicine
Cyprus	Υγειονομία/Κοινοτική Ιατρική	Public Health and Community Medicine
Luxembourg	Santé publique	Public Health
Hungary	Megelőző orvostan és népegészségtan	Public Health Sciences
Malta	Mediċina tas-Saħħa Pubblika	Public Health Medicine
Netherlands	Maatschappij en gezondheid	Community Medicine
Austria	Sozialmedizin	Social Medicine
Poland	Zdrowie publiczne, epidemiologia	Public Health, Epidemiology
Portugal	Saúde pública	Public Health
Slovenia	Javno zdravlje	Public Health
Slovakia	Hygiena a epidemiológia	Hygiene and Epidemiology
Finland	Terveydenhuolto / hälsövärd	Health Service
Sweden	Socialmedicin	Social Medicine
United Kingdom	Public Health Medicine	Public Health Medicine
Island	Félagslækningar	Community Medicine
Liechtenstein	Prävention und Gesundheitswesen	Prevention and Health Service
Norway	Samfunnsmedisin	Community Medicine
Switzerland	Prävention und Gesundheitswesen / prévention et santé publique / prevenzione e salute pubblica	Prevention and Public Health

Conclusion

The present SHS is unsustainable on the long run. This system is too expensive. The idea of a family doctor is unfeasible. Objective indicators point out the low efficacy of SHS ranking it near the last place among the European health systems. There is a need for fundamental changes. This paper proposes new paradigms and concepts of the SHS both in clinical and preventive medicine.

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CLIMATE CHANGE- HOT TOPIC AND MORE THAN BIG CHALLENGE FOR PUBLIC HEALTH

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Introduction: Climate change malady, as the biggest global challenge of the 21st century, has united decision-makers, politicians, experts and diverse countries in their pursuit of preserving health and solving climate change process.

What about health care professionals? Are we united strongly enough in all the actions needed to combat climate change?

Climate change challenges are numerous, multi-layered, exceptionally complex, and they impact all elements of society. This text focuses on the significance and role of the healthcare sector within the healthcare system itself, as well as healthcare professionals and their influence on other sectors, individuals, and society as a whole.

What is the significance of the role of doctors and healthcare professionals in general when it comes to climate change as the greatest threat to global health in the 21st century? What is our capacity to tackle this challenge, here and now, in our country? We are facing numerous challenges within the healthcare system and there is a range of crucial efforts that are essential in order to improve the population's health. Has the climate change issue been given a suitable place within the framework of public health priorities?

Some Climate Change Facts

According to evidence-based-data, climate change leads to a rise of morbidity, mortality, absenteeism and healthcare costs, but also to migration and new circumstances.

The Lancet Commission stated that the future projections of climate change represent an unacceptably high and potentially catastrophic risk to human health. The global human population will soon be 9 billion people. Health risks due to climate change are increasing dramatically. As direct effects of climate change, we are confronting an increased frequency of storms, heat stress, floods, drought etc... Indirect effects include inundating the population with air pollution, increased disease vectors, food insecurity, undernutrition, mental illness, climate displacement and migration.

The WHO reports that nearly 7 million people die from air pollution annually. Much of this is due to the same unsustainable transportation, building and home energy production sources that contribute to climate change, directly or indirectly.

“The Factory of Climate Change”, therefore, works in its full capacity, producing direct and indirect “climate change byproducts”, that lead to numerous consequences for the individual, for the population as a whole, and for the environment. This is not only a challenge for public health, but also for healthcare systems, and as a result, for healthcare professionals.

Global health and quality of life are closely linked to urbanisation, the provision of infrastructure, and of course, essential energy. Sudden and uneven population growth

encourages migration which is additionally intensified due to climate change, wars, and economic factors. Human activities have significantly contributed to climate change, and the numerous consequences listed are, on one hand, a reflection of this. While on the other hand they create a need for increased resiliency, adaptation capability, and necessary measures for the mitigation of climate change.

It is also important to underline that environmental sustainability is a central concern of the Sustainable Development Goals and it is addressed by goals for water and sanitation, energy, cities and climate change.

Health and climate change are in a state of symbiosis with macro-economics, energy policy, urbanisation. There is also a significant demographic factor involved.

The health burden of the current energy system is caused by particulate and solid waste emissions (coal, oil, gas, and biomass), flood risk, accidents and injures (coal, nuclear). The fossil fuel energy system is one of the most important anthropogenic factors of climate change (increase in temperature, extreme weather, heat-waves and variable precipitation).

The macroeconomic aspects of climate change are also very important for the health of the population as a whole. According the Lancet Commission, the macro-economic impacts of reducing CO₂ emissions come from several sources, all of which need to be taken into account if the overall impact is to be properly evaluated. Also, low-carbon investments that reduce the need to import fossil fuels are macro-economically beneficial, but the future value of these trade effects will depend on the price of oil and other fossil fuels.

From the micro-economic point of view, the balance to be struck between mitigation and adaptation is clear—there should be investment in mitigation up to the point where the marginal cost of further investment is higher than the marginal cost of adaptation plus that of remaining climate damages.

The number of people exposed to the risks of climate change is intensified by social factors: the distribution of population density caused by urbanisation, and changes in population demographics linked to ageing.

Human populations are expected to be growing, ageing and migrating due to greater vulnerability to climate risks. Urbanisation trends, population growth and migration mean that the numbers exposed to high temperature extremes will increase. This has major implications for public health planning. Urban areas will expand: urban land cover is projected to triple from year 2000 levels by 2030. The Lancet Commission warns that many assessments of climate risks, including those for heat, do not consider demographic shifts, and in effect, overlook the location of vulnerable populations as a part of their calculations.

Investment required in two directions - mitigation and adaptation

Health implications could and should be more effectively attached to efforts to build support for a stronger response to climate change. The health impacts of climate change are not sufficiently represented in the global approach, although they are a critical factor to be considered in mitigation and adaptation activities.

Specific local health benefits could be key drivers of adaptation and mitigation activities. Examples of the latter include reduced health risks and costs when populations live in well-insulated buildings, and the reduction in air pollution (and other health) damage associated with fossil fuel use. With the direct costs of deep cuts in emissions estimated at around 10% of the global expenditure on health, both the direct and indirect health dimensions should be a major driver for mitigation efforts. Responding to climate change from a public health perspective brings together both mitigation and adaptation interventions, yielding powerful synergies.

Using analogies in health strategies can also help to underline that there is rarely a single solution to complex problems. Different and complementary measures are required to tackle different dimensions of a challenge, and pursuing both prevention (mitigation) and treatment (adaptation) is crucial. Also, supporting poor countries to adapt to the impacts of climate change is an important priority (mitigation of migration).

Options here and now in combating climate change

At the Climate Summit in Paris in 2015, which brought together over 25,000 delegates, an agreement to keep global warming below 2°C above pre-industrial levels was achieved. The agreement is of political, economic, and public health importance. On a global level, the agreement encourages:

- Actions and measures that will limit climate change and decrease unacceptable risk to global health to the smallest possible level.
- Supportive financing measures for the adjustment of climate change and public health measures for the decrease of risks from extreme weather. Such risks carry the consequences of infectious diseases, lessening of food and water supplies, as well as an increase in insecurity.
- Actions by which health is improved alongside a decrease of climate change, which decreases the incidence of individual malignant diseases, respiratory and cardiovascular diseases which are caused by air pollution.
- Increasing awareness about the health effects of climate change, and about decarbonisation, among health care professionals and within the general population.
- The development and implementation of measures for limiting climate change, and for the protection of health at a national level, at the workplace, and within society.
- Actions for decreasing the environmental and climate footprint of health care institutions and the health care system itself, alongside the improvement of health care services.

The importance of the health sector and health facilities

Climate change also results in changes to human resource needs in the health sector. More equipment and consumables, better preparedness, smart organization and work on the future resiliency of the health sector are necessary steps in dealing with climate change. One of the most important steps in that process is rethinking our priorities and needs at individual and professional levels. Patient safety and care must stay the main goal, but we must also include advocacy for environmental health, sustainable healthcare, and high standards in energy efficiency.

The health sector can contribute to improving the health and living conditions of populations in polluted areas, by reducing its climate footprint. Co-benefits of climate-friendly strategies are represented by three categories – health, economic, and social.



B. SESSION: ENVIRONMENT AND HEALTH

Due to the diversity of healthcare systems worldwide, reducing the health sector's climate impact is a complex and broad goal. Some healthcare systems have begun to develop comprehensive strategies to reduce their climate footprint and move toward climate-neutrality. Other health systems are taking steps to address a particular aspect of the issue.

According to the WHO, there are several elements of a climate-friendly hospital: energy efficiency, green building design, alternative energy generation, alternative transportation, adequate food, waste and water policy.

It is also important to emphasise that urgent and comprehensive actions from all sectors of society are needed to mitigate the impacts of climate change. International public health authorities recommend that policy-makers and health professionals consider the opportunities for action to place the health sector at the forefront of the global climate change mitigation process. Binding international agreements and adopted national policies should influence the mitigation of climate change by the health sector.

Different multilateral and bilateral aid agencies, international institutions, national ministries of health, health systems and health professionals all have important roles in those activities.

Recommended actions by hospitals and health systems include: educating hospital staff about climate change issues; reviewing facility procurement practices, and following sustainable practices whenever possible; auditing, measuring, monitoring, and reducing the climate footprint of healthcare facilities; recognising potential co-benefits of climate mitigation activities; identifying ways that sustainability practices can be incorporated into accreditation standards.

It is important that health professionals take a leading role, and aspects of doing so include: to ask themselves if they understand how to minimize their own climate footprint; to encourage health facilities to lead by example and adopt measures to reduce their climate footprint; to work in strengthening the climate literacy education process; to inspire professional associations to explore and address the climate change issue and the role the health sector plays in the mitigation process; to advocate for climate mitigation and adaptation efforts.

There is great opportunity for health professionals to lead the world in addressing climate change. The education process is essential for changing the mind-set of the whole population, but especially that of health professionals. All teaching institutions should include in different curricula topics related to environmental health, climate change and climate change mitigation.

The proper support of healthcare professional associations is essential to make climate literacy a mandatory requirement for all medical education programs. It is important to educate national accreditation bodies and policy makers about the relationship between environmental sustainability, human health and healthcare standards.

By raising our voice for healthy green energy, combating climate change and participating in activities that move us toward low carbon health systems, we can lead by example. Mitigating our own climate impact is an essential part of this process.

Rethinking and “reinventing” healthcare due to climate change is a significant challenge and process. All health professionals should work together and provide examples within the sector through their own endeavors and behaviour to show that GHG footprint reduction is possible. We should also strive for better preparedness for the impact of climate on health and lead the way to a low-carbon future. The process requires support from other professions; however, we must persist in raising our voices and combining our efforts in combating climate change. In order to gain more momentum in effectively addressing climate change, we can include this topic more intensively into the education of all health professionals.

At the UN Climate Change Conference in Paris, in December 2015, the most important agreement of significance for global health was achieved. The Paris Agreement is not only an opportunity to reduce climate change and its consequences, but it also promotes activities that can be of great and immediate significance for health, thereby reducing health care system costs for individual countries. The signing of this binding Agreement, at the headquarters of the UN in New York on April 22nd of this year, represents a serious task for Serbia as well as other signatory countries.

The Agreement, according to the WHO, enshrines the right to health as central to climate actions. The health sector has a role in implementing the Paris Agreement by reducing its climate footprint, building its resilience to Climate risks and advocating for health co-benefits of climate action.

Climate change is a challenge for the educational system in general, but also for the education of health care professionals. Needs for better preparedness, the development of individual personal responsibility, as well as awareness related to taking action to decrease climate change are all increasing. Serbia has, as a World Health Organization partner, accepted obligations to, among others, conduct activities that lead to the mitigation of climate change through the Parma declaration.

Serbia has, in the recent past, independently or due to cooperation with the World Bank and other international institutions, realised a number of projects of significance for the reduction of climate change. In order for these important investments not to lose their effectiveness, it is necessary to ensure sustainability, a change in the thinking process, the diversification of energy resources, and by those means also a reduction in climate change. As a result, it is important that the National strategy for combating climate change that is being planned also includes health care as a factor in reaching decisions for the future. Some decisions will certainly be unpopular, but they will be easier to accept and implement alongside explanations regarding long-term health preservation and a decrease in health care costs.

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Key words: Climate change, healthcare, health professionals, public health, sustainability

HEALTH-RELATED QUALITY OF LIFE IN CHRONICALLY ILL PATIENTS

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Abstract: Health-related quality of life (HRQoL) is important instrument in populations with chronic diseases, for it may serve as predictor of outcome. The aim of this study is to assess health-related quality of life in patients with hypertension (HTA), and in normal controls of the same age and gender (C). **Methods:** The study enrolled 157 males and females older than 18 years: 78 in HTA group, and 79 in C group. HRQoL is assessed in both groups using 15-D questionnaire. **Results:** Significantly higher level of education was recorded in C group compared to HTA group. Both groups were similar regarding average monthly income, employment and marital status. In patients with hypertension, compared to normal controls, we found significantly lower total HRQoL score ($0,89\pm 0,10$ vs. $0,95\pm 0,06$) as well as specific scores in almost all domains of mental health, except in depression. On the other hand, patients in both groups had similar scores in 7 of 10 domains of physical health, with exception of hearing, elimination and usual activities, where significantly lower scores were recorded in HTA group. **Conclusions:** We may conclude that hypertension, as chronic disease leads to impairment of HRQoL, compared to normal controls of the same age.

Introduction: Health-related quality of life (HRQoL) refers to physical, psychological and social domains of health, influenced by one's personal experience, beliefs, expectations and perceptions of health¹. Because of these aspects, it is possible that two persons with similar health conditions, report different quality of life^{2,3}. However, transfer of various aspects and domains of health into particular quantitative value is not simple⁴. In past twenty years, several methods were used for measurements of HRQoL in healthy population⁵, as well as in various categories of chronic diseases⁶⁻⁸.

The estimation of HRQoL is very important in population of chronically ill people, since it is possible to evaluate the burden of chronic disease, as well as the effect of specific treatment, simply by comparison with healthy population⁹. HRQoL in chronically ill patients may be estimated by various questionnaires^{4,10-13}. 15-D instrument is generic, self-reported, standardized questionnaire with 15 domains, which gives data of quality of life through scores¹³. It is simple and multidimensional, hence suitable to usage in population of chronically ill people.

Objectives: The aim of our study was to evaluate the HRQoL in population with hypertension, and to compare it to healthy controls of the same age.

Materials and methods: The study enrolled 157 subjects older than 18 years, males and females: 78 with chronic hypertension on regular medicament treatment (HTA), recruited from Outpatient Clinic of the Military Medical Academy, Belgrade, and 79 apparently healthy normal controls, without any chronic disease (C). Normal controls were, healthy blood donors and people on regular preventive examinations in Health Centers in Belgrad. Subjects in C group were matched for age and gender to HTA group. Patients with active systemic disease, inflammatory bowel disease, malignant diseases, pregnancy, any acute disease at the moment of investigation, psychiatric or neurological disorder that might influence the usual activities were not included. The health-related quality of life (HRQoL) was measured by self-reported generic instrument 15-D¹³. It is a fifteen-item questionnaire that measures functions in domains as followed: mobility, vision, hearing, breathing, sleeping, eating, speech, excrete elimination, usual activities, mental functions, discomfort, depression, distress, vitality, and sexual functions. It is rated on a 5-point scale, with total

scores range between 0 and 1 (higher score indicates better HRQoL). Demographic and socio-economic characteristics were investigated by structured self-reported questionnaire. Obtained data were presented as means \pm SD or proportions (%). Normality of distribution was tested by Kolmogorov-Smirnov test. Differences between groups were analyzed by Kruskal-Wallis test and χ^2 test for categories, with post hoc Mann-Whitney test. Relationships between parameters were tested by Spearman's rank correlation (r). Statistical significance was accepted at $p < 0,05$.

Results: Demographic and socio-economic characteristics of participants in both groups are presented in Table 1. There were no significant differences between groups in age and gender ($p=0,61$ and $0,577$, respectively). Significantly higher level of education was recorded in C group ($p < 0,001$). All groups were similar regarding average monthly income per person ($p=0,208$), as well as marital status ($p=0,298$). Average duration of hypertension in HTA group was $15,08 \pm 13,90$ years.

Table 1. Demographic and socio-economic characteristics of participants

		HTA	C
N (%)	Total	78 (100%)	79 (100%)
	M	44 (56,41%)	51 (64,56%)
	F	34 (43,59%)	28 (33,44%)
Age (yrs)	Mean \pm SD	60,64 \pm 13,71	50,18 \pm 14,93
	Range	21 – 82	22 – 86
Education	Elementary school or less	14 (17,95%)	10 (12,66%)
	High school degree	44 (56,41%)	51 (54,56%)
	College/University degree	20 (25,64%)	28 (35,44%)
Employment	Employed	43 (55,14%)	51 (64,56%)
	Unemployed	2 (2,56%)	4 (5,06%)
	Retired	27 (34,61%)	19 (24,05%)
	Other	6 (7,69%)	5 (6,33%)
Income (per person, monthly)	< 10 000 RSD	7 (9%)	4 (5,1%)
	11-20 000 RSD	14 (17,9%)	7 (8,9%)
	21-30 000 RSD	17 (21,8%)	22 (27,8%)
	31-40 000 RSD	16 (20,5%)	25 (31,6%)
	> 40 000 RSD	24 (30,8%)	21 (26,6%)
Marital status	Married/with partner	66 (84,62%)	57 (72,16%)
	Single	10 (12,82%)	16 (20,25%)
	Widowed	1 (1,28%)	6 (7,59%)
	Divorced	1 (1,28%)	0 (0%)

Average scores of particular domains obtained from 15-D questionnaire are presented in Table 2, together with statistical analysis of differences between groups. These results are presented in Figure 1.

Table 2. Average scores of 15-D questionnaire domains in both groups

	HTA	C	<i>p</i>
Mobility	0,95±0,12	0,97±0,08	0,284
Vision	0,91±0,17	0,94±0,11	0,446
Hearing	0,92±0,13	0,98±0,08	0,001
Breathing	0,86±0,19	0,92±0,14	0,058
Sleeping	0,81±0,22	0,93±0,13	<0,001
Eating	0,99±0,04	1,00±0,00	0,058
Speech	0,98±0,08	0,99±0,06	0,062
Elimination	0,86±0,19	0,95±0,12	0,023
Usual activities	0,87±0,19	0,95±0,14	0,002
Mental functions	0,91±0,17	0,96±0,11	0,001
Discomfort	0,90±0,16	0,96±0,10	<0,001
Depression	0,89±0,19	0,92±0,14	0,082
Distress	0,83±0,22	0,93±0,14	<0,001
Vitality	0,83±0,18	0,93±0,13	0,284
Sexual activity	0,83±0,18	0,91±0,18	0,446
Total 15-D score	0,89±0,10	0,95±0,06	0,001

Patients in HTA group had significantly lower scores than normal controls in 7 domains and total 15-D score, while in domains of mobility, vision, breathing, eating, speech, depression, vitality and sexual activity there was no significant difference between HTA and apparently healthy persons of the same age.

When we analyzed distribution of particular categories in each domain separately, we found further differences. 92,4% of normal controls had normal hearing functions, which is significantly higher percentage compared to HTA group (71,8%; $p=0,001$). Only 48,7% of patients in HTA group were able to sleep normally, compared to 73,4% in C group ($p<0,001$). 64,1% patients in HTA group reported normal functions of bladder and bowel, which is significantly lower ($p<0,023$) than in C group (83,5%). Only 66,7% patients in HTA group were able to perform usual activities, compared to 87,3% in C ($p=0,002$).

In HTA group 71,8% patients were free of discomfort compared to 86,1% in C group ($p<0,001$). 55,1% patients in HTA group have not had symptoms of distress, which was significantly lower than 78,5% in C group ($p<0,001$). 55,1% patients in HTA group had not symptoms of distress, which was significantly lower than 78,5% in C group ($p<0,001$). Finally, 65,4% patients in HTA group and 75,9% in C group stated that their health has no adverse effect on sexual life, which was without statistically significant difference.

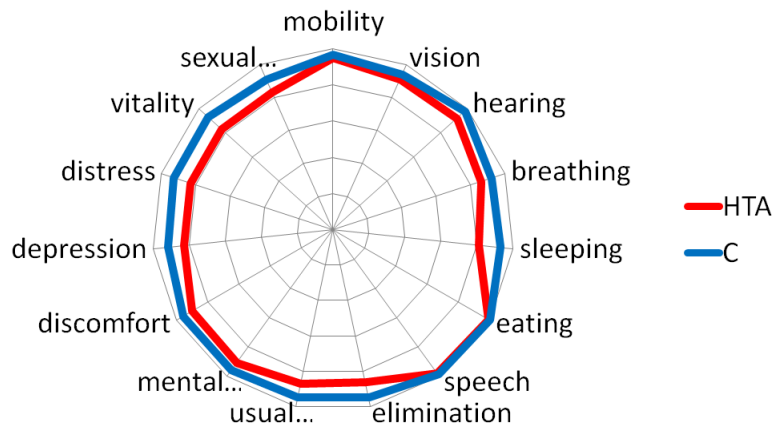


Figure 1. Differences between groups in all 15 domains

Figure 1. depicts the overall differences in HRQoL between groups in all domains. In 8 domains, there were no differences between groups, while in remaining 7 we found significantly lower scores in HTA group.

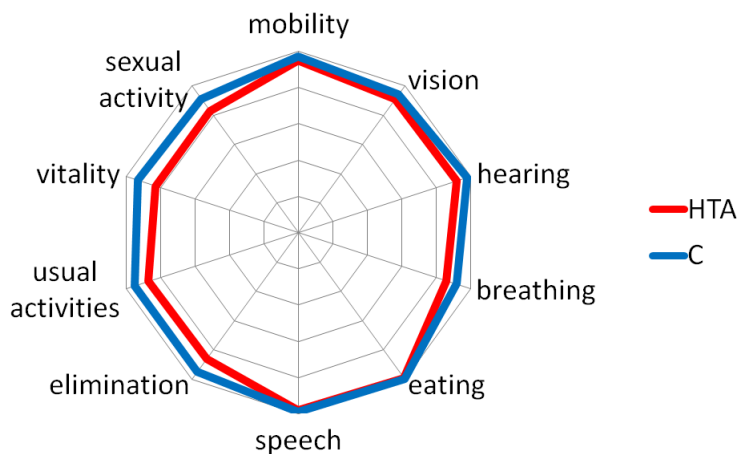


Figure 2. Differences between groups in domains of physical health

Of 10 domains which refer to physical health mainly, in 7 domains there were no significant differences between groups: in mobility, vision, breathing, speech, sexual activity, vitality and eating. In remaining 3 domains of physical health (hearing, elimination and usual activities), HTA group had significantly lower scores.

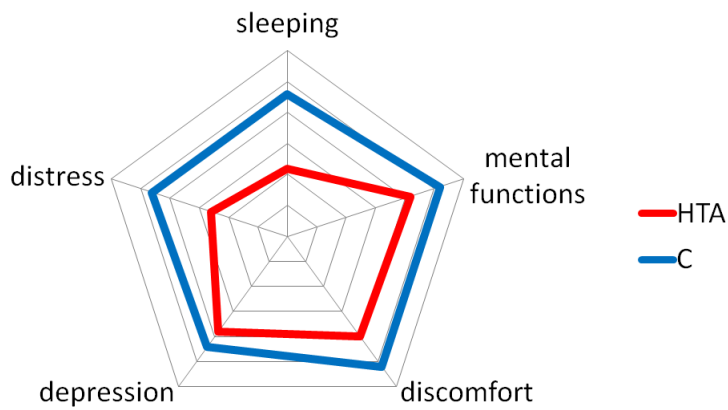


Figure 3. Differences between groups in domains of mental health

Of 5 mental health domains, only in depression we found the similar scores in both investigated groups. In other 4 domains (sleeping, distress, mental functions and discomfort) patients in HTA group reported significantly lower scores compared to apparently healthy controls.

Total 15-D scores in both investigated groups are presented in Figure 4. There was statistically significant difference between groups, with significantly lower scores in HTA group compared to healthy controls ($0,89 \pm 0,10$ in HTA group vs. $0,95 \pm 0,06$ in C group; $p=0,001$).

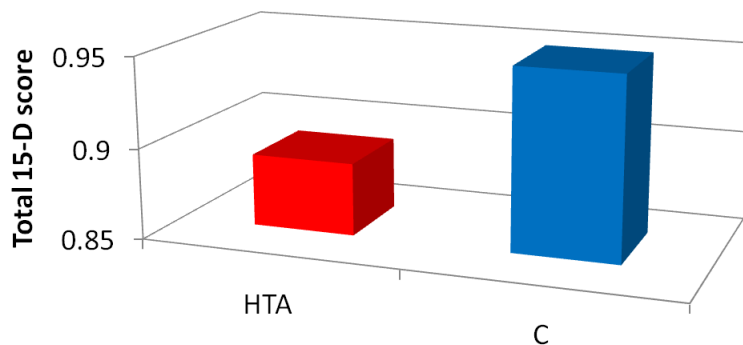


Figure 4. Total 15-D scores in both groups

Discussion: The health-related quality of life assessment is very important in patients with chronic diseases, because it provides a unique subjective measure of patient's perception of own well-being. Although subjective in nature, this perception may strongly influence the severity of disease, as well as the overall outcome. Increasing proportion of elderly people in general population leads to increased incidence and prolonged duration of chronic diseases.

Decrease in HRQoL in patients with chronic diseases is related to higher death rate^{14,15}, depression and cognitive impairments¹⁶⁻¹⁸ and malnutrition¹⁹.

Socio-economic status in patients with hypertension in our study was relatively maintained: their marital status, employment, and income did not differ from subjects in control group of the same age and gender. The only significant difference was found in education: in control group there were more persons with high school and university degree compared to HTA group. This findings may be explained by fact that subjects in control group were partly recruited from population underwent preventive examinations, hence were more aware of the importance maintenance of overall health and wellbeing. More educated people are usually engaged in this type of preventive examinations.

Chronic illnesses are related to impairments in physical health, which drastically influence HRQoL. When we analyzed specific scores, we found that most of the physical health domains were not influenced by hypertension: HTA and C groups had similar scores in 7 of 10 domains. In both groups we recorded very high scores in these domains. Patients in HTA group showed lower scores in other 3 domains of physical health: hearing, elimination, and usual activity. However, although statistically significant, these differences do not indicate major physical health impairment in patients with hypertension: no one in HTA group reported severe difficulties with hearing. The difficulties were mild and bearable. Hypertensive patients are significantly less successful in maintenance of usual activities than normal controls of the same age, however, most of them manage to keep their jobs, or to study, perform usual housework and participate in free-time activities.

On the other hand, scores in domains of mental health were more influenced by hypertension compared to physical health domains. In only one domain of mental health (depression) patients in HTA group reported similar scores. Although the average scores were lower in HTA group compared to controls ($0,89\pm 0,19$ vs. $0,92\pm 0,14$), the difference was not significant ($p=0,082$). These findings may be explained by similar age of the participants in both groups, since rate of depression is growing with age.

In all 4 remaining domains of mental health, average scores were significantly lower in patients with hypertension, with the lowest scores reported in domain of sleeping ($0,81\pm 0,22$). However, there was no one who suffers severe sleeplessness, the impairments of sleeping were rather mild in nature. Symptoms of distress, such as nervousness and anxiety were significantly more present in hypertensive group, but again the most severe symptoms were not reported.

Health-related quality of life in chronically ill patients is markedly lower than in healthy population of the same age and socio-demographic characteristics, which was proved in several studies^{20,21}. Our results may be compared to a study conducted on 121 hypertensive patients in Serbia²². Author evaluated their HRQoL using the same 15-D instrument and reported lower average 15-D score ($0,76\pm 0,15$) than in our study ($0,89\pm 0,10$). The differences may be explained by older age in later study (69,3 years compared to 58,1 in our study), since the same author observed that quality of life in all domains decreased with age. Similar to our study, speech and eating were not affected by hypertension (the results were in the range of basal levels).

Conclusion: Compared to normal controls of the same age and gender, hypertensive patients were significantly less educated, but did not differ regarding employment, average monthly income, and marital status. In patients with hypertension, compared to normal controls, we found significantly lower total HRQoL score as well as the most specific scores in mental health domains, except depression. On the other hand, aspects of physical health were relatively preserved, since the lower scores were reported only in domains of hearing, elimination and usual activities. We may conclude that hypertension, as chronic disease,

leads to impairment of HRQoL, which is substantially stronger in domains of mental health compared to physical health.

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Key words: hypertension, health-related quality of life, 15-D

USING THE INTERNET AS A NEW HYGIENIC CHALLENGEĆorac Aleksandar¹, Jović J.¹, Ilić D.¹, Ignjatović Ristić D.^{2,3}¹Faculty of Medicine, University of Prishtina-Kosovska Mitrovica, Serbia²Faculty of Medical Sciences, University of Kragujevac, Serbia³Psychiatric clinic, Clinical Center “Kragujevac”, Serbia**Abstract**

Due to its incredible development and breakthrough into every part of society of modern people, Internet is no longer just a means of communication.

Research shows that the Internet is mostly used by the people until the age of 35, and it is especially used by those under the age of 18. It is an essential part of the school system. Furthermore, it is essential to almost every workplace. More and more time is spent on the Internet, often at the expense of the quality time spent doing sports or preparing meals. Time spent in front of a computer is becoming longer, which is reflected on the time when you go to sleep. Studies have shown that the Internet use disorder has almost all the characteristics of addiction that lead to serious health consequences. Internet is a place of useful information exchange, the possibility to get help from experts in a fast and efficient way but also the opportunity to participate in a number of charitable activities.

We can say that the Internet has become a part of school hygiene, work hygiene, nutrition hygiene, hygiene of sleep and rest and mental hygiene. Due to all this, the Internet is becoming an increasing challenge for scientific research.

Key words: Internet, mental hygiene, Internet use disorder

Hygiene essentially deals with environment factors (physical, chemical, biological and sociological), aiming to recognize and attempt to minimize or eliminate their negative influence, as well as to favor the positive influence of the environment on health. In 1960, World Health Organization presented a task for mental hygiene to present theoretical and practical recommendations for better adaptation of environment demands, recognizing not only the social sphere, but also the communal and residential problems, as well as nutrition problems. Today, mental hygiene uses the experience of many other scientific disciplines: anthropology, sociology, psychology, medical ecology and psychiatry, in order to apply measures, methods and techniques that protect and improve mental health (1). Since the role of internet in the development and modification of communication in modern society is conclusive, and the internet itself proved to be a significant influence on the change of human behavior in the recent years of the new technological era, studying the world wide web is certainly one of the most important tasks that are presented to mental hygiene. Internet has, unlike other forms of informational technologies, significantly improved in both combining interpersonal and mass communication, as well as in one and two way impact of communication participants (2).

Internet is a place where useful information can be exchanged and is a place of technological advancement where you can receive expert help quickly and efficiently, but also a place that offers a possibility to be a part of various voluntary activities. It has also become an important part of education in school systems, but also outside of them. It is a regular part of some workplaces, sometimes even irreplaceable. People spend more and more time on the internet, often reducing the quality time spent doing other everyday activities (work, sport or family, making food and having meals, sleeping, etc.). Internet is also being increasingly used in late evening and night hours, which reflects itself on the time at which people go to sleep.

Research has shown that internet use disorder (which has nearly all the characteristics of addiction) leads to serious consequences for health.

Nowadays, internet is available to everyone and research shows that it is mostly used by people under 35, and especially by those under 18. Over 60% of adolescents spend between 1 and 3 hours on the internet during the day and 77% of them say that they increased their time spent on the internet (3). These results show that young people today probably spend most of their free time “surfing internet”. If we take into consideration the fact that adolescents are a vulnerable group, we can conclude that research about adolescent behavior on the internet is not only needed, but also necessary. Adolescence is a period of emotive upsets and distress which is caused by a myriad of changes in the endocrine system (4). However, even though this period of life is important for psychosocial development, it remains a fact that there is still no reliable epidemiological data about the incidence and prevalence, or course and outcome of mental disorders for this age group (5). Furthermore, the thing that can be taken as a conclusion of research conducted thus far is that addiction most commonly develops in adolescent period, which, coupled with the fact that adolescents are a vulnerable group, makes it more likely for them to develop addiction to, for example, video games. However, internet video games are only a part of the content which is available online and can lead to excessive time spent on the internet and even real symptoms of addiction.

Problems occur when it is recognized that it is impossible to include all elements and processes related to internet and its usage because that would require very complex methodological and epidemiological means of multiple humanistic, social and informational sciences (6).

Despite the presence of several positive health care measures and activities, mental health disorders in children are very much present in modern society (7). Mental health problems of children and adolescents represent some of the most dominant problems of the public health (8). In accord with the goals of WHO, prevalence of mental health problems of children and youth should be dramatically reduced by 2020. Young people in Europe should be healthier with more possibilities to achieve their role in society (9). If we look at total morbidity, young people of school and university age represent the healthiest part of society, but their specific characteristics make this population very sensitive towards an array of negative influences of social and everyday surroundings, including the overuse of internet with all the risks that it brings. (10) It is known that young people are the most frequent internet users and are also most likely to develop internet use disorders (11) Therefore, research that would study adolescents and their behavior on internet is necessary, because problem recognition, definition and knowledge from multiple points of view is a basis for dealing with this problem, as well as preventing it from happening in the future or becoming even more difficult to resolve.

Mental hygiene has an emphasis towards children and adolescents, because an adequate preventive medical approach to these population groups is the most important thing for healthy character development. One of the tasks of mental hygiene is also early and opportunely discovery of inadequate behavior and different types of mental disorders (ranging from addiction to psychotic episodes). It is also tasked with gathering epidemiological data about mental disorder statistics and distribution, as well as improvement of health culture and habits. This of course comes from the definition of WHO which states that mental hygiene includes all activities that hygiene deals with – attempts, techniques and activities that have the goal to prevent disease and maintain health in order to develop optimal ways of personal and social behavior so that innate traits and capacities can be best achieved, as well as to prevent mental disorders (12).

In line with all above mentioned, there is one important aspect that mental hygiene deals with – human personality (13). There are many definitions of personality that shed light on certain

aspects of this complex notion. Personality can be defined as an aggregate of psychological systems that benefit continuity and cohesion in behavior, as well as individuality. Personality – permanent organization of a person’s character that includes moral and voluntary elements, intelligence and temperament. (14) Temperament is related to innate and deeply set parts of personality that are, by definition, a firmly and biologically determined basis of personality, that are exhibited from a relatively early age and stay stable for most of the life, determining that person’s emotional range and the level of activity, as well as the area of cognition with which it is linked. (15) Akiskal explained the basics of affective temperaments based on ancient, as well as modern concepts of temperament, ranging from Aristotel to Kretschmer and Krepelinian. This model was made thanks to clinical observations of affective patients and their relatives, extrapolating temperaments in order to also include normal personalities. This is how the final version of TEMPS-A scale, a questionnaire for self-evaluation that determines which of the five temperament types that person belongs to, was made. (16) Considering that personality traits have a strong influence on our social behavior, including how we act on the internet, and also considering that adolescents are a group that extensively uses internet, adolescent population research which would develop a TEMPS-A scale for adolescents and that would discover internet use disorders and would study adolescent behavior and habits on the internet, presents a real challenge for hygiene. The study that we conducted included 2113 subjects from 48 high schools (10% of all high schools) throughout Serbia. The study included all statistical regions, in other words, the whole territory of Serbia. There was a total of 56% girls and 44% boys, with a mean age of $M=16.73$; $SD=0.47$.

Table 1. Subject distribution by school and town

School	n (%)	School	n (%)
Technical, Beograd	102 (4.8)	Grammar, Laplje Selo	25 (1.2)
Medical, Subotica	93 (4.4)	Economics, Laplje Selo	28 (1.3)
Economics, Gornji Milanovac	133 (6.3)	Grammar Bora Stanković, Niš	58 (2.7)
Grammar, Kraljevo	56 (2.7)	Economics, Doljevac	43 (2.0)
Medical, Kraljevo	54 (2.6)	Grammar, Kosovska Mitrovica	53 (2.5)
Grammar, Sremski Karlovci	58 (2.7)	Technical, Kosovska Mitrovica	43 (2.0)
Technical, Tutin	43 (2.0)	Grammar, Pančevo	55 (2.6)
Grammar Svetozar Marković, N.Sad	52 (2.5)	Medical, Pančevo	18 (0.9)
Medical, S.Mitrovica	60 (2.8)	Mechanical, Pančevo	25 (1.2)
Chemical, Leskovac	20 (0.9)	Second Economics, Beograd	49 (2.3)
Textile, Leskovac	31 (1.5)	Building, Beograd	28 (1.3)
Textile, Sombor	75 (3.5)	Chemical, Beograd	31 (1.5)
Economics, Zaječar	33 (1.6)	X Grammar, Beograd	49 (2.3)
Technical, Zaječar	41 (1.9)	Grammar, Negotin	32 (1.5)
Grammar, Vranje	146 (6.9)	V Grammar, Beograd	44 (2.1)
Art, Kragujevac	19 (0.9)	Food technical, Niš	50 (2.4)
First Grammar, Kragujevac	63 (3.0)	Grammar Sremac, Niš	48 (2.3)
Second Grammar, Kragujevac	21 (1.0)	Technical, Bor	27 (1.3)
Economics, Šabac	28 (1.3)	Grammar, Užice	26 (1.2)
Medical, Šabac	29 (1.4)	Economics, Užice	21 (1.0)
Technical, Tesla, Niš	33 (1.6)	Grammar, Vlasotince	26 (1.2)
Technical 15.maj, Niš	43 (2.0)	Technical, Vlasotince	24 (1.1)
Medical, Zvečan	50 (2.4)	Economics, Vlasotince	27 (1.3)

Subject distribution by school and town with school names was given in Table 1. It also lists the type of school in which the questionnaire was done.

Table 2. Subject distribution by internet use disorder and temperament type

Problematic Internet use presence	Temperament		All subjects	
	Hyperthymic	Other		
No problematic internet use	n	818	355	1173
	%	65,3	36,9	58,4
Yes problematic internet use	n	434	402	836
	%	34,7	53,1	41,6
Total	n	1252	757	2009
	%	100,0	100,0	100,0

The study found a significant number of adolescents that have an internet use disorder (Table 2), as well as a significant difference in internet use between persons with different temperaments.

In the end, we can easily say that internet, as an everyday occurrence, has become a part of many different branches of hygiene – school, work, nutrition, sport, rest and sleep and communal hygiene, and certainly an inseparable part of mental hygiene. All of the aforementioned implies that internet use research and its consequences for human health is turning into an increasing challenge for scientists in many different scientific fields, especially in the field of hygiene.

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ACTUAL PROBLEMS OF MENTAL HYGIENE IN THE SCHOOL ENVIRONMENT

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Abstract:The aim and task of mental hygiene in the school environment is to remove harmful factors and assisting in the formation of mature personalities that will have good mechanisms for adaptation, and that this adaptability will not undermine its own psychosomatic, nor interfere with the broader interpersonal relationships. School is a tank or reservoir of health hazards to health. Problems which today stand out in the field of mental hygiene in the school environment are violence, present smoking habits, risk behaviors, drug and alcohol use. Improving the mental hygiene in the school environment should start with our efforts in the area of active involvement of students in the running of the school, the development of partnerships between students and teachers contributed to the transformation of our schools, "school student friends."

In considering the mental health of school children is often overlooked socio-economic inequality, which can have a very strong influence. There are two fundamental principles that socio-economic status can affect health. One is the direct impacts because of lower material standard, while other indirect impacts deficiencies arising from the circumstances that the person feels poorer than others, as well as exposure to high-risk behaviors work arising from the frustration of failing to sufficient social affirmation, especially in adolescence. Also the influence of the family is very important and does not stop with childhood, and lasts for a period of adolescence and lasts, in many ways, and throughout life.

The influence of peer groups in school may be a risk or protective factor for the behavior, habits and attitudes of young people. It is believed that a sense of close friendly relations is crucial for the realization of social and other relationships both within the family and in the community. On the other hand, the friends that risky behavior can have a crucial influence on the development of risk behavior in young people. This refers to the acquisition of habits and smoking, use of alcohol and psychoactive drugs. Still not enough explored whether decisive influence group or person asking a group that will confirm and encourage behavior that is prone to or has already adopted. The possibility of spending time with friends after school depends on the school timetable, the teaching load, distance home and school, and the cultural environment. A great impact on socializing have developed information technology. High frequency of communication young people using mobile phones, where it replaces the conversation or SMS e-mail messages, has the effect of partially disposal.

Adolescence is a period of life in which to acquire key skills for the implementation of just such a healthy life. The child turns into an adult through a very demanding process of building a personal identity, sexual identity, academic advancement and physical change, and on how the process will be successful depends on the whole of his future life. Therefore, the health of adolescents prerequisite healthy life of individuals and society as a whole. The intensive growth and development of secondary sexual characteristics leading to significant changes in the physical appearance of a young person. There is a need to socialize with peers of the same and opposite sex, first love experiences, conflicts with parents. Depending on how you will cope in these changes, and with what success will perform developmental tasks of adolescence, the student will be more or less satisfied with his life, which then becomes an important indicator of its health.

Violence in school is a problem in many countries around the world. Until recently, the children's harshness did not consider social problems or medical problem worthy of attention. By changing the social norms are changing and the notion of aggressive, violent and

unacceptable behavior among children. In the English-speaking world used hard to translate the term "bullying." Bullying is any deliberate, repeated, unprovoked use of power for the purpose of inflicting pain or stress to another person. Joint backing these behaviors is the realization of their own superiority through aggression. Domestic violence (bullying) includes negative physical or verbal action that has hostile intentions, troubled victim, repeated over time and is based on the disproportionate power between victim and aggressor. By repeating this behavior differences become larger, bullies are stronger and weaker victims. In this respect, Children victims of violence are becoming less able to defend themselves. the school bully may have power, not only because it is stronger and stronger, but also because he is joined by other children, often in order to protect themselves. This behavior leaves a long-lasting negative implications for all bullies, victims, but also for those children who are just observers. victims of violence among children are at greater risk for a variety of negative outcomes: these children are more anxious and insecure, have lower self-esteem and are lonelier, more often rejected by their peers and more depressed. There are many complex reasons why some children are violent towards others. Bullying behavior can be attempted acquiring popularity. Could this be an attempt to prove decisive, "Hard" and fit, or draw attention to yourself. Could this be an attempt to overcome their own problems or frustration that the child does not know any other way to solve. A child exposed to domestic violence may be the same way prenetieti behavior and their school environment. Damages for participating in violence against peers for the individual, family, school and society are great. Cruelty in the school environment is not only a characteristic of some school or age, is present in primary and secondary schools of all types and orientations. Retrospective studies have shown that children who abuse others have great prospects continue such behavior in adulthood, and that their children exhibit similar behavioral patterns.

Smoking is one of the leading public health problems in developed countries, causing premature morbidity and mortality. Young people experiment with cigarettes and over all the frequent consumption can become addicted to smoking but also at earlier age. To acquire the habits of smoking affects the behavior of friends and peers to where young people meet, and smoking habits and attitudes and expectations of parents and relatives. Peer group pressure, the availability of cigarettes, and low self-esteem and an inability to resist and making the right decisions also have a share in the first smoking experiences. Smoking as a part of social life of young people, and often associated with other risk and / or undesirable behaviors such as using alcohol, taking drugs, delinquent and antisocial behavior. Smoking, despite anti-smoking campaigns, in most countries among young people who are considered the reflection of maturity, socially desirable and acceptable.

For young people drinking alcohol can be the behavior habits and behaviors of older, another step toward independence and maturity. Among peers alcohol can stimulate relaxation, a sense of openness and open communication and to be seen as a good adjuvant for acquiring acquaintances and popularity, especially in the group drinking accepted as the norm. Adverse effects of alcohol among young people are primarily associated with traffic accidents under the influence of alcohol, and delinquent behavior and minor offenses or criminal activities. No excessive and frequent use of alcohol can lead to other forms of undesirable behavior as absenteeism from school and falling behind in school, involvement in fights, problems with the police, the use of weapons etc.

After smoking and drinking alcohol, even belonging to the illegal drugs and is subject to legal sanctions, marihuana is the most widely used means of European countries, which can cause addiction among young people. Taking cannabis can also be seen as a step forward to maturity and a clear separation from the world and influence adults. Thus comes to the appearance of increasingly common risky behavior which can result in adolescent pregnancy and / or sexually transmitted diseases, and the possible long-term psychological, medical and

social consequences. Experimentation and recreational marijuana use, according to many authors do not necessarily lead to disturbance of health or social functioning, or frequent long-term use may be an indicator and encourage mental health problems such as depression, deviant and antisocial behavior, and pave the way towards the use of hard drugs.

Conclusion: Prevention should be implemented in terms of content and adapt it to every young person in particular. Some of the tasks of expert teams were: the early and timely reveal young people who exhibit inappropriate behavior and mental disorders; to study and improve interpersonal relationships within the teachers, especially student collectives, organizations, associations, groups; to study and improve the relationship of teachers and students, teachers, and students' parents, and the role of parents in the organization and implementation of school education; to conduct training of trainers to work independently in the exercise program in the field of mental hygiene in schools; to carry out training of health culture and habits.

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Key words: school, school children, mental hygiene, smoking, bullying.

POSTER PRESENTATIONS**1. MONITORING THE CONCENTRATION OF SUSPENDED PARTICLES PM₁₀ AND HEAVY METALS IN THE PM₁₀ FRACTION IN THE CITY OF NIS IN THE PERIOD 2011-2015**

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Objectives: PM with particle sizes less than 10 microns, which are known as respirable suspended particulates or PM₁₀, can get deep into the lungs and cause a broad range of health effects, in particular, respiratory and cardiovascular illnesses. People with heart or lung disease, children and the elderly are most likely to be affected by particulate pollution. Serbian regulations have predicted monitoring two fractions of suspended particles in outdoor air since 2010. The aim of this study was to present the results of monitoring the concentration of suspended particles PM₁₀ and heavy metals in the PM₁₀ fraction of the City of Nis in the period 2011-2015, as well as to identify possible seasonal variations of concentrations PM₁₀ in the same period.

Materials and methods: Monitoring was carried out at one measuring point in the city, once a week, during a year.

Results: It was found that the average annual concentration of PM₁₀ was more than the threshold and tolerant values. Also, a high percentage of measurements with the values which were more than the threshold and tolerant values, was found in the winter months. The lead concentration in the PM₁₀ fraction of suspended particles in the period of examination were below the threshold and tolerant values. The test period is not long enough to provide a true picture of the state of air quality in Nis, based on the concentration of suspended particles in ambient air. For an incomplete picture are certainly responsible and number of measuring points, as well as the dynamics of sampling.

Conclusion: Implementation of monitoring is extremely important for improving knowledge about particles in the air, which can certainly affect a redefinition of regulations including limit values for respirable particles in ambient air. In determining the increased values required urgent measures to ensure better planning process that will lead to improvements in air quality at the local level. For all these reasons it is important to continue with further monitoring of concentration of these pollutants in accordance with the material possibilities to increase the number of measuring points and the dynamics of sampling.

Key words: suspended particles PM₁₀, heavy metals in the PM₁₀, outdoor air

2. INITIAL STEPS IN MONITORING OF ENDOCRINE DISRUPTING CHEMICALS WITHIN PUBLIC HEALTH NETWORK IN SERBIA

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Background: As the WHO defines, “An endocrine disruptor is an exogenous substance or mixture that alters function(s) of the endocrine system and consequently causes adverse health effects in an intact organism, or its progeny, or (sub) populations.”. Negative impact on health of the endocrine disrupting chemicals (EDCs) proved through different studies, necessitates implementation of all available public health measures in curbing EDCs exposure in particularly vulnerable life periods (childhood, pregnancy). There is no systemic continuous EDCs monitoring in Serbia.

Objectives: objective was to give an overview on the scope and results of particular EDCs contents monitoring, within the overall control on the health safety of items of general use, implemented through network of public health institutions in Serbia during 2011-2015 period.

Materials and methods: Focusing on the contents of lead, arsenic, preservatives and emollients in the 5-year analysis on chemical safety results of items of general use, samples of dishes and food staff accessories and packaging, cosmetic products, home cleaning products and toys were analysed.

Results: Samples for all groups of items of general use were controlled in small number within the network of public health institutions during 2011-2015 period. Scale of analysis of lead, arsenic, preservatives' and emollients' contents was unexpectedly low. Lead concentration was increased in 1.34% of dishes and food staff accessories and packaging samples, and arsenic in 1.22% of cases. Preservatives were increased in 2.74% of home cleaning products samples, while testing toys on the contents of emollients showed their values' increase in 3.71% of samples.

Conclusions: Increasing the volume control, comprehensive data collection, systematic monitoring of EDCs and human biomonitoring are necessary public health measures in controlling potential environmental health risks.

Keywords: *EDCs, monitoring, public health measures*

3. GEOGRAPHIC INFORMATION SYSTEMS FOR AIR POLLUTION

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Objective: The air quality affects health, the environment and the economy. Geographic information systems (GIS), enabling the integration and analysis of large number of environmental data from different sources to mapping, analysing and modeling the overall impact of air pollutants on the environment and public health.

Materials and methods: Understanding the complex spatial-temporal relationship between environmental pollution and disease and identify exposure to hazards from the environment are the basic elements of an effective environmental management and public health. Air pollution contributes to cardiovascular disorders and the respiratory system. GIS in the Republic of Serbia, in Institute of Public Health of Serbia, in the last three years, used to represent the number of patients suffering from respiratory diseases and air pollution particles PM_{10} and $PM_{2.5}$.

Results: The paper presents a GIS mapping of the number of patients suffering from COPD, or chronic obstructive pulmonary disease, bronchitis and acute asthma bronchial and the incidence of heart disease (as a percentage) in the cities of Serbia, with the presentation of air pollution particulate matter

Conclusion: GIS helps in better decision-making. Maps provide a distinctive, engaged, flexible and universal means of communication expert and the public at large.

Keywords: Geographic information systems (GIS), air quality, public health

4. AIR POLLUTION AND RESPIRATORY DISEASES IN NORTHERN KOSOVSKA MITROVICA

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Objectives: Many studies have shown the adverse effects of air pollution on respiratory health, but few have examined the effects of air pollution on service utilisation in the primary care setting.

The aim of this study was to examine the association between air pollution and the daily number of examinations due to respiratory diseases in primary health facility in northern Kosovska Mitrovica.

Materials and methods: In the period since 2009 to 2013., the immission of SO₂, NO₂ and soot was monitored at Kosovska Mitrovica. The concentration of SO₂ and NO₂ was determined by spectrophotometry - pararosylin method, while the concentration of soot determined by reflectometric method. The number of reporting respiratory diseases (ICD-10: J00-J99) examinations was collected to primary health care. The ratio of the number of reporting in primary health facility due to respiratory problems and air pollution was analyzed with nonlinear models with distributed delay DLNM by Gasparini.

Results: Deferred soot concentrations of effects on increasing the number of examinations of patients with respiratory diseases was the highest since the sixth to eleventh days was 0.7% for increasing soot for 10 µg/m³ (RR = 1.00655-1.00709) only for patient patients under the age of 18 years. There was no correlation between the concentration of soot, and number of examinations of patients with diseases of the respiratory system, in people aged 19 to 64 years, and those older than 65 years. There was no correlation between the concentration of NO₂ and SO₂ and number of examinations of patients with diseases of the respiratory system in people of all ages examined.

Conclusion: This study shows a significant positive association between consultations due to respiratory problems and soot concentrations in the area Kosovska Mitrovica.

Key words: air pollutions, respiratory diseases.

5. OUTDOOR AIR POLLUTION AND ACUTE RESPIRATORY INFECTION AMONG POPULATION OF THE CITY OF NOVI SAD

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Objectives: Analyze the contribution of outdoor air pollution, in term of particulate matter less than 10 μ m in diameter (PM₁₀), sulfur dioxide (SO₂) and nitrogen dioxide (NO₂) to incidence of total and age specific acute respiratory infection (ARI) among population of City of Novi Sad.

Materials and methods: In the City of Novi Sad during the period from October to March in 2013 and 2014 the sentinel date about ARI for the whole population as well as outdoor air pollution data was routinely collected and analyzed in the Institution of Public health of Vojvodina. Time series multiple linear regression, adjusted with air temperature and relative humidity, was used. Analysis was stratified by total ARI number and by age (between 0 to 4, 5 to 14, 15 to 29, 30 to 64 and older than 64 years old). While the dependent variable (ARI) was collected as weekly date, all independent variables (PM₁₀, SO₂, NO₂ and meteorological data) were expressed in terms of seven days mean values.

Results: Significant contribution (F=5.431, p<0.00) of multi-air pollutants, adjusted with meteorological data, to observed ARI (total and age specific), was found only among the youngest age group (0-4 years). Among the air pollutants only regression coefficient for SO₂ was statistically significant (β =2.679, p<0.00).

Conclusions: In the City of Novi Sad outdoor air pollutants exposure in general, and SO₂ in special, contributes to the increase the weakly frequency of ARI among the youngest population (between 0 to 4 years), which represent the great public health risk.

Key words: Air pollution, Respiratory Infection, Child, Urban Population, Association

6. ENVIRONMENTAL NOISE MONITORING IN "CITY CENTER AND CITY STREET ZONES" IN NOVI SAD

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Objectives: During June 2015 - May 2016, using standardized methodology, IPHV performed environmental noise monitoring in Novi Sad, using monitoring spots due to urban space purpose and Urban Plan.

Materials and methods: There were performed 36 24-hour measurements in "city center and city street zones" on three monitoring spots. Two of them are road traffic spots - area in front of the Government building (Bulevar Mihajla Pupina) and settlement of Telep (Vršačka ulica). Third spot is car-free zone in City center (Zmaj Jovina ulica).

Results: The results show that in car-free zone night-time noise indicator (L_{night}) is higher than day-noise indicator (L_{day}) in 67%, evening-noise indicator (L_{evening}) is higher than L_{day} in 42%, while L_{night} is higher than L_{evening} in 58% measurements. In road traffic spots results are different. In Telep, in none of 12 measurements L_{night} is lower than L_{evening} , also L_{evening} is lower than L_{day} . In Bulevar Mihajla Pupina, in 1 (8%) measurement L_{night} is higher than L_{evening} , and in 2 (17%) measurements L_{evening} is higher than L_{day} . Using frequency analysis, it was found that frequency value for maximum equivalent noise level was 630Hz in car-free zone in 100%, and 1000Hz in city street zones in 96% measurements.

Conclusion: In car-free zone environmental noise is higher during the evening and night, compare to day. In city street zones daily noise is higher. Frequency analysis of noise are different referred to city zones. There is need to consider national regulation that in same manner treats the noise level in city center and car-free zones.

Key words: Noise, health, monitoring, indicator

7. ATTITUDES AND HABITS OF HIGH SCHOOL STUDENTS ON THE IMPACT ON THE HEALTH OF MOBILE PHONES AND COMPUTERS

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Objectives: The aim of the research was to examine what is the level of students' knowledge about the impact of mobile phones and computers to health.

Materials and methods: We have designed a questionnaire and conducted a survey among students Electro traffic secondary school in Kraljevo. On the issues that are included habits and frequency of use of mobile phones and computers in everyday life corresponds to 72 students. The study data was used descriptive statistical method processed by SPSS.

Results: The average age of respondents was 15 and a half years. Over 62% of respondents use a mobile phone over 1 hour a day and the computer is used by more than 1 hour a day 50% of the surveyed students. About negative impact on the health of mobile phone has the information 70% of students, but 65,2% ignoring the negative impact. The negative impact on the health of the computer recognizes 62,9 % of students, but 63,2% ignoring the negative impact. Unfortunately 76% do not want to take anything about it, nor do they want to change the habit of using these devices.

Conclusion: Although young people are aware of the harmful effects on health of mobile phones and computers to health they don't want the help to change habits.

Key words: Mobile phones, computers, health, attitudes, students

8. QUALITY OF LIFE RELATED TO HEALTH IN CELIAC DISEASE

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Objectives: Celiac disease is an immune-mediated lifelong enteropathy induced by gluten. Health-related quality of life (HRQoL) in most studies carried out so far have shown decreased quality of life due to present celiac disease and adherence to strict gluten-free diet.

Materials and methods: HRQoL was assessed by disease specific HRQoL questionnaire (modified CDQ, Hauser et al., 2007). Questionnaire was administered in June 2016, through online support group, and responses of celiac patients who were ≥ 15 years old were analysed.

Results: 76 usable questionnaires were returned (84% female, mean age 31,8 years old), with mean period on gluten-free diet 9.5 years. Full adherence to gluten free diet is present in 72.4% of respondents. Health status is considered as excellent in 23.8% respondents. 35.4% of patients have a problem with organizing meals outside the home and when traveling. Even 61.2% of respondents believe that their gluten-free diet always or often leads to financial problems, while 54.8% believes that the gluten free diet is time demanding. 76.8% encountered the problem of insufficient knowledge of the medical staff related to celiac disease and gluten-free diet.

Conclusion: Adherence to gluten free diet and extraintestinal symptoms present in celiac patients influence lowering health related quality of life, causing social restrictions and increased financial and time requirements.

Key words: HRQoL, celiac disease, gluten-free diet

9. DEPRESSION IN THE ELDERLY – THE RELATION WITH ACTIVITIES OF DAILY LIFE, COGNITIVE STATE AND DISEASE SEVERITY

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Objectives: The purpose of the study was to assess differences in activities of daily living, cognitive state and disease severity between subjects with or without major depression (MD).

Materials and methods: The study sample was composed of 237 subjects aged ≥ 65 , who signed an informed consent. Subjects who scored ≥ 6 on Geriatric Depression Scale -15 (GDS -15) were included in the MD group. Subjects were assessed by: Katz index (KI) for measuring independence in activities of daily living (lower score indicated lower independence), Mini-mental State Examination (MMSE) for cognitive decline and Index of Coexistent Disease (ICED) for disease severity.

Results: This study included 237 subjects. The average age was 80.93 ± 6.63 . 57.7% (136) participants presented symptoms of depression and mean GDS score in the sample was 6.79 ± 3.76 . KI score and MMSE score were significantly lower in MD group. On the other hand, MD group presented significantly higher rates ICED scores.

Conclusions: A high index of depression in the total sample of people older than 65 along with worse indicators of independence, associated diseases and cognitive status in the MD group, suggested the significantly violated life quality in this population. Because of all the previously mentioned, it is necessary to plan and realize concrete programs in the field of mental hygiene.

Key words: GDS, KI, ICED

10. SAFETY OF WATER FOR DIALYSIS IN THE TERRITORY OF THE SOUTH BACKA DISTRIKT IN THE PERIOD 2014-2015

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In health Institutions water is used as drinking water, water for food preparation, for general and personal hygiene, for diagnosis and therapy procedures. In terms of different types of water usage, it is necessary to use different varieties of control which are established by present procedures for physical, chemical and microbiological analyses.

Special analyses are necessary for establishment the quality and safety of water for dialysis, precisely hemodialysis. Tests are administered by terms of Pharmacopoeia 2000, the 5th edition, which unifies the control of the water for dialysis named as "Refined water" (Aqua purificata). An additional parameter which is controlled for purposes of the refined water, if it is used for dialysis, is aluminum.

The aim of the work is to represent the results of the control of the water for dialysis in period 2014-2015.

There were controlled 39 samples of refined water. During 2014 and 2015 there were 4 (10.25 %) samples which were not in compliance with chemical and physical norms. The reason was the high level of the rest of the content after evaporation. In terms of microbiological safety during 2015 in five (35 %) of 14 controlled samples there were present microbiological hazards recognized as *Pseudomonas* species (in 21% samples), *Burkholderia* species (in 7 % samples) and *Ralstonia pickettii* (in 7 % samples).

Isolated species of microorganisms are known as the hazards for human population, especially for sensitive one who are undergoing dialysis. In order to decrease the risk for humans, it is advisable to define the procedures and action plans concerning the obligatory and more common monitoring of water in health institutes, especially the water used for diagnosis and therapy procedures.

Key words: Water, Dialysis, Health, Hazardous Substances, Quality of Health Care

11. DETECTION OF *E. COLI* IN A RURAL WATER SUPPLY SYSTEMS OF NIS AND TOPLICA DISTRICT

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Objectives: The presence of *E.Coli* in water is the most specific indicator of fresh fecal contamination and it directly highlights the risks this water will have on public health. Within the SZO project in the period between April and July of 2016, a total of 117 water samples from local water supplies were examined. All water samples were taken from the Juznomoravski region. Each sample was tested for the presence of *E.Coli*.

Materials and methods: *E.Coli* presence in water samples was studied using the membrane filtration method (MF). In addition, a parallel study using MF and Most Probable Number (MPN) method was conducted on seventy-six (76) water samples.

Results: In 10 purified water sources the *E.Coli* was not found, while in 107 examined water sources from closed water springs, the *E.Coli* was observed in 35 samples which accounts for 32.7% of all samples. Using the MF method, *E.Coli* was found in 21 samples from closed water springs while MPN method showed *E.Coli* presence in 11 water samples, which account for 27.6% and 14.4% of all samples, respectively.

Conclusion: *E.Coli*, in other words the fecal contamination of water, was highly present in drinking water in the tested region. Results indicate that the MF method is more sensitive in *E.Coli* detection compared to the MPN method.

Key words: drinking water, *E.coli*, detection.

12. INFLUENCE OF HEALTHCARE IN PREVENTING MEDICATION ERRORS

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Objectives: The pharmacy profession is currently exploring expanded roles in primary care. Pharmacists can improve prescribing practices, reduce health-care utilization and medication costs, and contribute to clinical improvements in many chronic medical conditions, such as cardiovascular disease, endocrinological disorders, and psychiatric illness. Medication error is one relevant example of a risk, which threatens healthcare system, and very often results from polypharmacy or improper use of drugs. The aim of this study was to evaluate the frequency of medical prescriptions with dosage regimen including half tablets.

Materials and methods: The research in the form of an analytic cross sectional study was conducted in Remedia and Nevenpharm Pharmacy Health Facilities on the territory of Niš during March and April 2016. The criterion set for the study was to include all medical prescription with prescribed drug with half tablets dosage regimen. The database was created in an Excel statistical program.

Results: Conducted research shows a high percentage of prescription of drugs for oral administration by a doctor in a divided dose form (21.10%). The most common prescribed drugs with dosage regimen including half tablets are used in the treatment of cardiovascular diseases (75%), CNS diseases (14.53%) and endocrinological disorders (3.74%).

Conclusion: Today, patient safety is a key concept in healthcare system. The professional cooperation between healthcare professionals as well as doctors and pharmacists are important in many services such as patient counseling, use of pill organizers and tablets splitters in polytherapy, drug therapy monitoring and adverse drug reactions reporting.

Key words: healthcare professionals, doctors, pharmacist, half tablets, medication error

13. EFFECT OF CHEMICAL AGENTS ON CORRECTION OF QUALITY POOL WATER

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Objectives: Pool water must be clean, colorless and hygienic flawless, as close to the quality of drinking water, regardless of the different influences from the environment, water hardness, the number of bathers. Aims of this paper is to show how inadequately treated water that used as a swimming pool water-can create multiple problems

Materials and methods:. Adding disinfection agents without correction of pH values, led to conversion the water into a green gelatinous mass, which overloaded sewage installation, gives water an unpleasant smell and it is not for swimming. Swimming pool water has been tested in accordance with the Regulations on Hygienic Safety of Drinking Water (Official Gazette of FRY No.42 / 98, 44/99)

Results:. Physical and chemical analysis in 90% of samples showed an increase in consumption of potassium permanganate, ammonia and chlorine residue, the presence of color and odor, and inadequate pH values.

Conclusion:During the last ten years there is a trend of building individual pools and it was observed that the use of resources without adequate disinfection mode and control does not give the right effect.

Key words: swimming pools, disinfection, physical-chemical analysis

14. DETERMINATION OF CYANIDE CONTENT IN GROUNDWATER AND SURFACE WATER

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Objectives: under the name "cyanide" means compounds in its structure contain cyanide ions, CN^- , in the form of free or complex ions. Their appearance in the natural water points to the possible source of contamination in natural water due to cyanides from waste water industry engaged in the manufacture of plastic and steel, after the galvanizing. Due to wastewater metallurgical industry, the maximum permissible concentration (MPC) of cyanide in surface water were 0.01 mg / l (for class I-II) to 0.1 mg / l (for class III-IV).

Cyanide ions contained in water in the form of weakly dissociated and highly toxic hydrogen cyanide, HCN, in the form of free ions, CN^- , and in the form of a complex of different compounds.

Materials and methods: for determination of cyanide in the water is used spectrophotometric method with pyridine barbituric acid. The method is based on decomposition of almost all metal-cyanide complexes, as well as the free base or a cyanide in a highly acidified sample during a one-hour of distillation. Cyanides are located in the absorption solution, and is determined spectrophotometrically at 578 nm

Results: levels of cyanide found in groundwater were 3,3;3,2 and 3,0 mg/L, in surface water <0,03 and 0,16 mg/L and in waste water <0,03 ;0,26;1,14;0,72;0,032 and 1,36 mg/L.

Conclusion: By monitoring the concentration of cyanide in surface, ground water and waste water in certain locations can be concluded that there was contamination of surface waters. Cyanides after the galvanizing reach the water and contaminate it. It is necessary to control waste water of certain industrial facilities, installation of specific filters for water and regular control of cyanide concentrations in surface waters.

Key words: cyanide, surface, ground water, waste water

15. DETERMINATION OF THE THRESHOLD ODOUR NUMBER (TON)

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Objectives: Determination of threshold odor number (TON) in samples of water that have odor on alcohol, acid and orange because of determination homogeneity selected assessors.

Materials and methods: Determination of threshold odor number (TON) by method of successively dilution of samples.

Results: Threshold odor number (TON) determined in laboratory IZJZ for 20 selected assessors in samples of water that have odor on alcohol, acid and orange. Results show that threshold odor numbers for each selected assessors were in one interval of dilution.

Conclusion: Results confirmed of homogeneity selected assessors.

Key words: threshold, odor, threshold odor number (TON)

16. OUR CONTRIBUTION TO THE EXAMINATIONS OF SOME SPRINGS OF SPA OF NISH

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Water is one of the most important indicator of the health of the population. Aim of paper is to present the results of purposely done examinations of some of springs of Spa of Nish which are using in balneotherapy.

Materials and methods as a material of research were used: water from "Main Source" Of Spa of Nish, and the mud used for therapy in the Spa. In period (09.11. 2007-24.09.2008.) we have 4 (four samplings. In each sampling were sampled : a water sample, and two samples of mud. In fact, one sample was prepared for bigar mud; a second sample to understand mud therapy. Basis and scope of tests were parameters of retrospective tests.

Results and Conclusion for water samples Literature data presents : " balneal potential of water of, 'Main spring,, of the Spa of Nish' is summa of its radioactivity, and oligomineralit,, with predominance of calcium and bicarbonate ions.,... our results improved : in water: total alpha activity was $311 + 47 \text{ MBq} / \text{l}$ - $314.47 \text{ MBq} / \text{l}$;]. Also, Beta activity of $802 \pm 120 \text{ (mBq} / \text{l)}$ - $804 \pm 120 \text{ (mBq} / \text{l)}$ was determined.

Chemical parameters: dry residue unfiltered water samples were determined at 180 °C values from 308.0;] mg per liter. As in previous patterns of retrospective testing stages of cationic elements dominated the calcium value of 71.3 mg per liter.]) Since anionic elements, also according to previous patterns of retrospective testing stages, dominated by bicarbonates proven the value of 28.3 mg per liter.]) In summary, the water: trace, alkaline, with a predominance of calcium and bicarbonate ions. In the sample has not been proven carbon dioxide - also by analogy with the results of previous samples of retrospective testing stages.]) $26.4 \text{ mg} / \text{l}$ - $39.0 \text{ mg} / \text{l}$ - $28.3 \text{ mg} / \text{l}$ - $27.9 \text{ mg} / \text{l}$ $27.3 \text{ mg} / \text{l}$ - $38.0 \text{ mg} / \text{l}$) $\text{Ca}^{++} 70.8 \text{ mg} / \text{l}$ - $69.3 \text{ mg} / \text{l}$ - $71.3 \text{ mg} / \text{l}$ - $119, 4 \text{ mg} / \text{l}$ - $71.7 \text{ mg} / \text{l}$ - $64.7 \text{ mg} / \text{l}$ HCO_3^-) Ph 7,45-7,4-7,2-7,4-7,4-7,2 dry residue at 180 °C $283,6 \text{ mg} / \text{l}$ - $309,8 \text{ mg} / \text{l}$ - 308 and $0 \text{ mg} / \text{l}$ - $311.0 \text{ mg} / \text{l}$ - $297.0 \text{ mg} / \text{l}$ - $309.8 \text{ mg} / \text{l}$)) temperature of 41.4 °C-0C-20 37.4 °C-0C-21 38.3 37.4 °C-0C) If we look at the reference year retrospective research: in 2002 and 2004, and compare them with 2007 and 2008. The notice of the most typical parameters of the following: The temperature of the samples was slightly lower than in previous tests. Conclusion of samples of mud: as in analogue only retrospective study from 1977. predominant were salt of calcium- hydrocarbons.

Key words: water, mud, composition, continuity of composition, Spa of Nish

17. EXPOSURE TO THE SUN AND SKIN AGING

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Introduction: Skin aging is a slow but progressive, degenerative process predictive flow. The literature defines two variants of the biological process of aging - the intrinsic and extrinsic. The intrinsic is natural, chronological aging, on genetic basis which is function of time. Extrinsic or external aging is determinate with influence of environmental factors, especially the influence of solar radiation.

Objectives: Presentation of the latest professional and scientific knowledge about the exposure and the impact of solar radiation on skin aging and the possibility of preventive activities.

Materials and methods: In the abstract the latest technical and scientific literature was used, which deals with the operation of solar radiation on skin aging.

Results: Today it is considered that 90% of the visible signs of aging and changes on the skin is a result of the sun rays. Sunlight is composed of three different types of radiation: UVA, UVB and UVC. Numerous studies suggest that UVA is primarily responsible for the brightness of chronic damage to the skin. Changes in the skin that have undoubtedly confirmed previous studies are as follows: gene mutations and carcinogenesis, photo immune depression disorder melanogenesis the production of free radicals, activation of metalloproteinase and accelerated degradation of collagen and elastin. As a result of the changes the skin pigmentations uneven, rough surface, varicose veins, wrinkled, with the appearance of benign as well as malignant lesions.

Conclusion: As the length of human life is increased, the task of the doctor is to shift, with the aesthetic mitigate the effects of aging on preventing the development of diseases associated with aging skin. The ultimate goal of this research is to point out that with the aging of the skin, we must accept the risk factors that we can't change, influence the factors that can be changed and the wisdom to distinguish between them.

Key words: Exposure, sunlight, aging, skin, prevention.

18.SAFETY PLAYGROUNDS

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Playing is extremely important for physical and mental health of children. As the outdoors playing is especially important, playgrounds, as the most favorable form of open spaces for children's playing, are of immense significance and they are necessary in urban areas of housing. Children need safety playground. Serbia doesn't got public playgrounds guidelines or handbook although Institute for standardisation published 14 standards for playgrounds equipment and surfacing (four SRPS CEN/TR and ten SRPS EN 1176).

Institute for public health Niš has received written application to verify the safety of children's playground. It is placed near railway and set on area where are discharges fecal wastewater after every rain. Expert team from Institute is detected many health risks for children' health and proposed to the authorities special programme for safety survey all public playgrounds in the city Niš. Through his survey, Institute for public health Niš will detect and publishproposal for eliminating health risks from unsafety playgrounds.

Key words: playgrounds, safety, health risk, children

19. IMPLEMENTATION OF PREVENTIVE PROGRAMMES IN THE PROCESS OF IMPROVEMENT OF STUDENTS' HEALTH CARE

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Objectives: The aim of this paper is to present a strategy for the development and improvement of students' health care through the transformation of a university out-patient clinic and implementation of preventive actions among the student population.

Materials and methods: SWOT analysis has been done of the main challenges and threats in the students' health care and prevention programmes have been discussed.

Results: The overall number of students in the Republic of Macedonia is 59865 (86.8% are students at the one of five public universities). The students are a young and healthy population; however, in addition to regular check-ups, other forms of health services are needed as many public health and social challenges appeared at that age (suicides, traffic accidents, drug abuse, tobacco use, sexually transmitted infections, unplanned pregnancies and abortions). The main weaknesses are a lack of staff, and a lack of family doctors who have the knowledge and skills necessary for the young population. The opportunity to engage different specialties from medical faculty academic staff (gynecologists, dermatovenerologists, neurologists, psychiatrists etc...) will be helpful, especially for the students from other cities.

Conclusion: Inclusion of the university out-patient clinic at the Faculty of Medicine will improve students' health care and will improve education in family medicine. Inclusion of different preventative programmes will decrease many public health problems.

Keywords: students' health care, regular check-ups, prevention programmes

20. HEALTH WORKFORCE MIGRATION IN REPUBLIC OF MACEDONIA - CHALLENGE OR TREAT?

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Objectives: The aim of this paper is to analyze the main challenges and treats of migration of health workforce in Republic of Macedonia and to compare with other countries in the Region and Europe.

Material and methods: SWOT analysis has been done.

Results: Challenges for Macedonian health workers migration are similar to other countries in the Region: lack of qualified health workers in rural, remote areas and underserved communities, relatively low status of general practice, relatively low salaries, limited career opportunities, impaired motivation, encouraging their movement to the private sector and abroad, ducational harmonization and mutual recognition of professional qualifications in the European Union. **Treats:** Decreasing number of health workers in the public sector, with simultaneous increasing demand due to ageing; private and dual practice is increasing, data less dependable, hampering effective planning, increasing migration of young health professionals (120 medical doctors annually in the last five years). Most popular destinations are Germany, Australia, Switzerland Italy, USA and Canada.

Conclusion: Effective retention strategy should be developed as a combination of different retention interventions based on thorough situational analysis and good health workforce data, gender-sensitive, costed and sustainable, with adequate capacity to implement.

Keywords: health workforce, migration, challenges, treats, retention strategy

21. INTERPROFESSIONAL COLLABORATION AND CONTEMPORARY CHALLENGES IN THE HEALTHCARE SYSTEM

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Objectives: The healthcare system should function in such way that effectively meets its three main objectives: enhance the health of the population, improve patient outcomes, and reduce the cost of healthcare. Long ago, in developed countries, it has been observed that the interprofessional collaboration between healthcare professionals (primarily physicians, pharmacists and medical technicians) can provide more efficient and better functioning health system. Interprofessional collaboration has been identified by the Institute of Medicine (USA) as a crucial component for healthcare professionals. It is necessary that we are working on the development of the interprofessional collaboration in healthcare in our country using the experience of countries in which healthcare workers interprofessional collaboration is a reality that works in practice, and its institutionalization was contributed through the education of medical professionals during their studies (the possibility that students in different programs attend the joint elective courses and/or have a common professional practice) and after graduation (joint medical education of healthcare workers).

Conclusion: Taking successful models of improving the healthcare system is a way for rapidly achieving results. One of the ways is the realization of international projects who seek permanent establishment of interprofessional cooperation by creating preconditions for its implementation in education and training as well as in a real working environment. One such project is the ReFEEHS- Reinforcement of the Framework for Experiential Education in Healthcare in Serbia, which was approved by the European Commission Agency- Education, Audiovisual and Culture Executive Agency and is implemented in the frame of CBHE project (Capacity Building Projects in the field of Higher Education) under ERASMUS⁺ program for the period from 2015 to 2018.

Acknowledgement: The authors are grateful to the EACE Agency for the grant awarded to CBHE projects.

Keywords: interprofessional collaboration, healthcare professionals

SESSION: NUTRITION AND HEALTH

INVITED LECTURE

DISORDERS OF SPORTS NUTRITION

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A proper diet is one of the most important prerequisites for achieving good health, the best sport results and for postpone of fatigue. Sports nutrition is not the same as proper nutrition, although the main principles are unique. The daily diet of athletes must be such as to enable them to achieve maximum results and prepare them for the competition or match. In addition to postulates of correct nutrition, there is a number of specificities of sports nutrition that involve the use of functional foods, dietary supplements, increased energy needs, increased building needs and high level of daily physical activity. Therefore, some parameters of nutritional status are limited in application: body mass index, body fat percent, body composition and others.

The main role of sports nutrition is to provide enough energy and all macro and micro nutrients that are necessary for the fast recovery of the body after the competition or training through the food intake. Due to the specific energy requirements and higher energy consumption, energy density of meals is increased, as well as the daily requirement for vitamin and mineral intake. A particular problem is inadequate daily intake of water. Beside the individual athletes nutrition requirements, there are many factors of the sports in which athletes are engaged.

Regardless the fact that athletes should be directed towards professionally prescribed adequate nutrition from the very beginning of training process, they often have health problems related to eating disorders because their nutrition is incomplete, insufficient or overabundant. Therefore, eating disorders occur in a population of athletes. A sports triad at females is well known: menstrual cycle disorders, nutritional anemia and osteoporosis. Dyslipidemia, nutritional anemia, problems with cardiovascular system appear in males. Athletes of both sexes who are engaged in so-called aesthetic sports like gymnastics for example, are often at increased risk of developing anorexia or bulimia, while athletes who are expected to perform increased strength and mass, are at risk of obesity and other metabolic disorders. A particular problem are disorders that occur after the cessation of active active training and competing.

In addition to the postulates of proper nutrition, athletes have different modes of training and physical activity, so the goals of nutrition are different during training and during competition.

During the training process, in addition to meeting the energy needs necessary for training, further goals are:

- to achieve and maintain adequate physical constitution needed to compete in certain sports,
- to achieve satisfactory weight gain for certain sports and muscle mass to achieve good results and good health,
- reduction of the recovery time
- boost of the adaptation of organism by intake of all the necessary nutrients, sufficient quantities of liquids,
- maintaining and improving health, reducing the risk of illness and injury of athletes and
- controlled use of dietary supplements and functional foods along with the individual diets and nutrition programs.

During the competition, when it is necessary to achieve the best results with no possibility of corrections, objectives are completed with:

- achieving a certain weight necessary for participation in the desired category of martial arts,
- to store energy before the competition for sports that last for 1.5-2 hours,
- to reduce exercise and to balance nutrition in the days immediately before the competition,
- to fill up the pool of carbohydrates 1-4 hours before the competition,
- to control fluid intake and maintain a satisfactory level of water,
- to plan carbohydrates intake during the competition when it is needed,
- to intake enough food and water so it does not burden the digestive system,
- to insist on the recovery of athletes after the competition,
- to pay special attention to nutrition with the sports that have long-term regime of the competition and - to be particularly careful with the use of dietary supplements and industrial-made special sports foods.

The criteria for diagnosing eating disorders (anorexia, bulimia, non-specific eating disorders, sport-anorexia) are used world-wide. Previous studies have shown that athletes from almost all groups are at risk to develop eating disorders. One of the reasons for relatively low official prevalence of these disorders in athletes are the extreme manifestations of the symptoms of these disorders which undoubtedly lead to bad results and the termination of sports career. Early diagnosis and treatment are essential here. It is extremely important in order to prevent those disorders, to identify athletes with traits of perfectionism and compulsive behavior, to establish individual regimes of nutrition, encourage healthy lifestyles, provide athletes participation in setting the desired objective in terms of body weight and food selection, to track behavior, health and nutritional status of athletes, to strictly control use of dietary supplements and others. Factors which can lead toward athletes eating disorders are: early start with serious trainings, often varying in body weight, using non-medical diets, insisting on low body weight, life separated from the family, permanent change of residence, frequency of competitions and trainings, injuries, pressure of the environment and some personality traits such as perfectionism, redirection, tolerance to pain, a low opinion of themselves, low self-esteem, high expectations, excessive motivation, desires that are not in accordance with the possibilities and others.

Research conducted over the past year in Kragujevac showed that eating disorders among athletes have the same frequency as in the general population of young people of the same age and sex who are not involved in sports, but there are differences in the structure of the risk of eating disorders.

The survey was conducted through the measurement of body weight and body height by standard methods, the calculation of body mass index, body composition determining using method of bioimpedance device (produced by company Prizma Kragujevac) Omron BF 511. We used a questionnaire Eating Attitudes Test EAT-26. The questionnaire refers to the satisfaction of physical appearance, body weight, as well as on attitudes towards nutrition and body. This questionnaire is not used for diagnostic purposes but as a screening instrument for identifying an increased risk of developing an eating disorder. The total sum-result of EAT-26 as the sum of individual numerical values can range from 0 to 78. Answers are ranked on a scale of six points from always to never, with 3 points allocated to the answer "always", 2 points for "ordinary", 1 point for "often" and 0 applied to "rarely", "sometimes" and "never." Results that are higher or equal to the score of 20 points, with at least one positive response from behavioral part, are not associated with normal dietary attitudes and behavior that can be conditionally identified as eating disorder. EAT-26 is divided into three parts-subcales:

Factor 1-D (diet), Factor 2-B (bulimia), Factor 3-O (oral control of diet).

Factor 1-D (13 items) is closely linked to a distorted picture of the body, a high score in this area indicates that the EDNOS is developed.

Factor 2-B (6 items) is closely associated with body weight, provides information on body image and tendency to bulimic behavior.

Factor 3-O (7 items) reflects the tendency of self-control, high marks in this area are related to the maintenance of low weight and the absence of bulimia, as well as the tendency to anorexia.

Body mass index is an indicator of nutritional status but in athletes it has limited use due to the increased share of muscle mass in the body structure. In the study group of athletes the greatest number of people, 74 of them (74%) had normal body weight, 15 (15%) are underweight, while 11 (11%) are overweight, but there were no obese persons. In the control group, the ratio is a bit different: the number of normally weighted persons was 68 (68%), 8 (8%) were underweight, 22 (22%) overweight and 2 (2%) were obese in the first degree.

There was a statistically significant difference in the degree of nutritional status between tested and control group $\chi^2 = 6.82$, $p < 0.05$. In the group of athletes all malnourished subjects were females, while in the control group 3 patients were males and 5 females. The difference by gender, related to body mass index, is a statistically significant $\chi^2 = 9.38$, $p < 0.05$.

The tabulation shows the numerical and percentage distribution of respondents by age group and limit values of EAT-26 score (Table No.1), numerical and percentage representation of the examined dietary factors (D, B, O) for EAT-26 score higher than 20 (Table No. 2), and average values with standard deviation for age, body weight, BMI and EAT-26 score according to the type of eating disorder (table No. 3).

Table 1. Numerical and percentage distribution of respondents by age group and limit values of EAT-26 score

	Skor ≤ 19		Skor ≥ 20				χ^2	p
	Number	%	Number	%	Number	%		
Athletes	73	73	27	27	100	100	0,827	0,249
Control group	77	77	23	23	100	100		

Table 2. Numerical and percentage representation of the examined dietary factors (D, B, O) for EAT-26 score higher than 20

	Athletes		Control group		χ^2	r
	Number	%	Number	%		
D	14	51,85	12	52,18	7,16	0,025
B	8	29,63	2	8,695		
O	5	18,52	9	39,13		
Total	27	100	23	100		

Table 3. Average values with standard deviation for age, body weight, BMI and EAT-26 score according to the type of eating disorder

	D	B	O
	$\bar{x} \pm SD$		
Age (years)	20,54 ± 3,18	19,35 ± 2,34	22,38 ± 2,74
Weight (kg)	62,14 ± 8,068	61,89 ± 8,710	52,39 ± 6,617
BMI (kg/m ²)	21,98 ± 2,239	20,74 ± 2,469	18,38 ± 1,529
EAT-26 skor	24,93 ± 6,079	30,44 ± 9,658	21,83 ± 1,689

Properly balanced diet, in addition to the training, one of the most important factors for achieving and maintaining good health of athletes and good sports results.

Keywords: sports nutrition, sports, eating disorders

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ORAL PRESENTATIONS

1. RISK ASSESSMENT OF DRINKING WATER SAFETY FROM SMALL WATER SUPPLY SYSTEMS IN SOUTH-BACKA DISTRICT IN 2016

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Objectives: The objective of work is to identify hazards and assess the risk of drinking water from small water supply systems in South-Backa District for humans, especially for sensitive population (children, pregnant and lactating women, old and chronically ill people).

Materials and methods: The investigation was held in April 2016 as a part of Project "Rapid assessment of drinking-water quality in rural areas in the Republic of Serbia" guided by IPHS. The sampling and analyses of 36 drinking water samples were done according to standardize and accredited methods of IPHV. Gathering the data, defining the hazard and assessing the risk referred to sanitary inspections of water sources and water supply systems, was done according to World Health Organization (WHO) methodology from 2012. The risk from identified chemical hazards in water samples was assessed according to WHO methodology from 2011 by semi quantitative analyses.

Results: The results of sanitary inspection risk score of water sources and water supply systems showed that 2 (5.6%) / 10 (27.8%) are at low risk, 27 (75%) / 22 (61.1%) are at medium risk and 7 (19.4%) / 4 (11.1%) are at high risk. Among chemical hazards there were found concentration of arsenic and nitrates above the limit value (LV) in 15 (41.7%), i.e. 2 (5.6%) samples, so the 42% samples were at very high risk for human consumptions, while the 6% were at high risk for consumption among the sensitive population.

Conclusion: The main hazards from small water supply systems in South-Backa District are referred to chemical contaminants (arsenic and nitrates), as well as to construction and management of water sources and water supply systems.

Key words: Water, Public Health, Arsenic, Sanitary Engineering, Water Supply

2. DIETARY INTAKE OF PHOSPHORUS THROUGH COLA SOFT DRINKS AMONG ADOLESCENTS IN NIS (SERBIA)

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Phosphorus from food additives has better absorption than phosphorus naturally present in food (meats, fish, eggs, milk /dairy products, vegetables). It will have a greater effect on the development of hyperphosphatemia and a negative health effect on calcium metabolism. Cola soft drinks usually contain phosphate as a flavor stabilizer. The aim of this study is to estimate dietary intake of phosphorus through food additives via cola drink among adolescents in Nis (Serbia).

Information on consumption of cola drinks among 295 adolescents (aged 14-18) was collected by means of a food frequency questionnaire, while 103 cola drinks were analyzed. The values of phosphorus (mean; 457.1 ± 142.0 mg/l) in all of the analyzed samples of cola soft drinks did not exceed the maximum permitted level (MPL) - (700mg/l). Estimated daily intake of phosphorus via cola soft drink was 290.8 ± 369.3 mg, or 4.50 ± 5.45 mg/kg of body weight (bw) (Range: 0.21-30.1 mg/kg/bw; C95-15.8 mg/kg/bw). Maximum tolerable daily intake (MTDI) of phosphorus is 70 mg/kg/bw.

World Health Organization was considered inappropriate to establish an acceptable daily intake (ADI), because phosphorus is an essential nutrient, but literature data indicate negative health consequence of high intake of phosphorus through food additives among adolescents. For this reason moderate intake of cola soft drinks among adolescents is recommended as public health school policy.

Key words: cola soft drink, phosphoric acid, daily intake

POSTER PRESENTATIONS

1. REPRESENTATION OF MILK AND DAIRY PRODUCTS IN NUTRITION OF CHILDREN

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Introduction: In order to ensure a quality life school age children is necessary to provide proper and adequate nutrition. Proper nutrition is essential for ensuring| procuring the proper growth and development of child organism, as well as of His normal functioning.

Objective: The objective of the study is to determine the way in child nutrition (representation of scaffolding protected foods in diet and eating habits of children); what would be the basis for a comprehensive proposal for measures whose ultimate aim was to correcting nutrition and nutritional status, the preservation and promotion health.

Materials and methods: The study included a total of 1012, one of the students of the first and third class (age 7 - 9 years) from 6 urban and rural basic 5 rings on the territory of the Republic of Macedonia. The study was conducted interviewing students and of their parents. Data were analyzed with the help program SPSS for Windows (version 10.0). The results were presented to average values, standard deviation ($x \pm SD$), percentile values. The work was the use of similes Student's t test when processing the parametric data and χ^2 test with the nonparametric data. The value of $r < 0.05$ was considered as significant for all tests.

Results: With research were covered one children ages 7, 8 and 9 years old, with an average old in all subjects of 8.12 and SD 0.67 years. The largest number of respondents in research (745 or 73.6%) consumed milk and yogurt each day, 5% of these foods is taken once a week, and only 3% of them at all this does not drink milk and yogurt. These numbers refer to the respondents from all groups formed on the basis of nutritional status, so that the greatest number of normal (73.2%) and the highest and the number of obese children (64.6%) drink milk and yogurt each day. The same situation we have in the cases of dairy-term products. The largest proportion of respondents (573 or 56.6%) consumed daily dairy products, 29.6% of respondents used in dairy diets do not produce two to three times weekly, while 8.2% of them does so once a week and only 5.5% of the respondents generally do not eat milk products. From consuming milk and yogurt represents a risk factor for obesity, but not statistically significant, increased risk by 58%. On the other hand, from consuming dairy products represents a risk factor, but not statistically significant, increased risk by 32%.

Conclusion:To provide| healthy life-making school age children allows is necessary to a proper diet and representation of certain food products in the diet of children. Only in this manner can provide growing up generations that will be physically and mentally healthy and to adequately cope with the challenges they have time.

Key words: children, obesity, milk, products of milk

2. RISK ASSESSMENT AND OVERWEIGHT PRESCHOOL AND SCHOOL-AGE POPULATION IN THE REGION KICEVO FROM 2002-2014y.

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Introduction: Identification of nutritional status defined as nutritional status and development, implementing following the anthropometric parameters since 2002-2014y.

Objective: To present nutritional status and nutritional status of young adults from early childhood to maturity to identify potential risks and timely preventative measures aimed at improving the health to them.

Materials and Methods: The assessment of health risks was carried out by monitoring the anthropometrical parameters in the long term nutritional status of 4 population groups. Values are included under the guidelines WHO also made a survey of students regarding eating habits and lifestyles and the results are presented according to the statistical methods of charts and graphs.

Results: The kids have good results for height. Malnutrition occurs the school students from 12-20%. Normal weight is 39-54% of the population groups, a large percentage of overweight 27 - 37% and obese children 4 - 8% is present in all the examined groups. A very small percentage of 3% are sport active, and usually absence from classes is registered like education subject.

Conclusion: These data indicate disturbance in the nutritional status of children. Overweight dominates malnutrition. Necessarily the intensive training and other preventive measures.

Keywords: Nutritive status, health risks, education

3. MAGNESIUM IN THE DIET OF ADOLESCENTS

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Objectives: Magnesium is necessary for over 300 biochemical reactions in the human organism and is essential for health. Daily needs for this mineral adults on average are 6 mg per kg of body weight. The best sources of magnesium are green vegetables, some legumes (beans and peas), nuts and seeds, unrefined grains.

Materials and methods: A survey was conducted with the pools among high school students and students in Sombor, customers canteens, regarding use of cereals, meat, cheese, beans, fruits and vegetables, foods rich in magnesium in their diet

Results: About half of young people consuming these foods from 1 to 5 times a week or daily intake of 96 g magnesium of vegetables, 32 g of fruit, 22 g of meat, 5 g of cheese, 27 gr. of beans and 172 g of grain.

Conclusion: Adolescents who eat in canteen meals, on average, have met the needs for magnesium. However, given the significant percentage of magnesium that is lost during the cooking and reduced amount of magnesium in soils, this diet is still deficient in this element.

Key words: magnesium foods, adolescents, canteens

4. NUTRITIONAL HABITS AMONG STUDENTS OF UNIVERSITY OF NOVI SAD

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Objectives: The aim was to find out the nutritional habits among students attending the University of Novi Sad.

Materials and methods: This research was conducted from October 2014 until February 2015. We gathered information by a uniquely designed questionnaire. 600 students have participated (275 male, 325 female). Data was analysed with SPSS (20.0)

Results: Most of the students have their meals at home, 58.2% (54.8% male, 64.9% female); 33.5% at the student restaurant of the University of Novi Sad (22% male, 30.1% female) and 8.3% at fast food restaurants (8.1% male, 8.2% female). Three meals a day every day has 64.1% of students (66.2% male, 64.6% female), three meals two to three times a week has 26.2% (24.3% male, 25.7% female) and once a week 4.8% of all students (4.1% male, 5.2% female). Reported percent of students that never have three meals a day was 4.9% (5.3% male, 4.6% female)

Conclusion: The results of our study show that 2/3 of our students have three meals a day and that they eat at home. However, there are cases of students that never have three meals daily, and students that eat only in fast food restaurants. Only 1/3 of all students use the student restaurant.

Key words: nutrition, habits, student, health,

5. UNIVERSITY STUDENTS EATING HABITS IN KOSOVSKA MITROVICA

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Introduction: Eating habits are of primary importance for students, since they have to be adapted to long-term intellectual work.

Objectives: The aim was to determine the frequency of certain eating habits of University students in Priština with a temporary headquarters in Kosovska Mitrovica, and to examine the association of these habits with the basic socio-economic and demographic characteristics of the respondents.

Materials and methods: This research was a cross sectional study of a representative sample of students at the University of Pristina, with a temporary headquarters in Kosovska Mitrovica, in March and April 2011. It was surveyed 567 students. The research instrument was Behavior and Health Questionnaire. The frequency differences were tested by hi-square test. The criterion for statistical significance was $p < 0,05$.

Results: Among the students who declared that they "never" eat breakfast (14,3%), the largest proportion are students coming from the enclaves of central Kosovo and Metohija (17,3%) ($\chi^2=27,824$, $df=6$, $p=0,000$), medical students (22,1%) ($\chi^2=62,126$; $df=27$; $p=0,000$), respondents living in the dorm during the studies (23,1%) ($\chi^2=47,983$; $df=9$, $p=0,000$), well as those who approximately gain one or two thousand dinars per a week during the studies (23,1%) ($\chi^2=30,734$; $df=12$; $p=0,002$).

Fruit is consumed "several times a day" by more than a third (36,7%) of students of the Faculty of Sport and Physical Education ($\chi^2=70,742$; $df=36$; $p=0,000$), a third of the students who come from the enclaves in central Kosovo and Metohija (33,0%) ($\chi^2=23,175$, $df=8$, $p=0,003$), two-fifths of students living in their own apartments during their studies (39,5%) ($\chi^2=51,807$; $df=12$; $p=0,000$), the same proportions of the respondents who state their families material status described as "very good" (42,9) ($\chi^2=39,008$; $df=16$; $p=0,001$), and almost a third of students who are "extremely" satisfied with the selection of the faculty (28,6) ($\chi^2=32,954$, $df=16$; $p=0,007$).

Conclusion: The promotion and adoption of healthy eating habits of young people as an important step in increasing responsibility for their own health should become a basis of public health activities and health policy priorities of our society.

Keywords: frequency, eating habits, students.

6. DIETARY HABITS OF THE ADULT POPULATION OF NORTHERN KOSOVSKA MITROVICA

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Objectives: Objective was to determine: diet habits of the adult population of northern Kosovska Mitrovica, as well as significant difference in relation to basic demographic and socio-economic characteristics of the adult population

Materials and methods: The survey was conducted as a cross-sectional study on the representative sample of the adult population of northern Kosovska Mitrovica. The sample included 328 respondents. As survey instrument for data collection was used a questionnaire that was used in the Health Survey in the Republic of Serbia in 2013. From the analytical statistical methods were used chi-square test and Man-Whitney test, with the probability of risk of 0.05.

Results: Of all respondents, 76.5% eat breakfast every day, more often they with higher education (Mann-Whitney U = 7605; p = 0.003). White bread in the diet was used 78.0% of the inhabitants of this city, significantly more often men (83.9%) (Mann-Whitney U = 7.684; r = 0.013). Brown bread are significantly more likely to use those with higher levels of education (Mann-Whitney U = 7904; r = 0, 049).Fruit in the diet each day consumed 65.0% respondents, significantly more often women (74.9%) (Mann-Whitney U = 9.632; p = 0, 000) and then who assess their material situation as very good (77.8%) (Mann-Whitney U = 9, 9812; p = 0, 001).. Of all adult residents of northern Kosovska Mitrovica, a little more than a third (34%) salt foods which eat, significantly more often men (44.7%) (Mann-Whitney U = 9,436 ; r = 0, 000). On the other hand, women are significantly more likely to think about health when choosing food (73.7%) (Mann-Whitney U = 9.826; p = 0, 001).

Conclusion: Determination dietary habits among the population as well as those groups who eat healthy food is very important for the planning and implementation of prevention and health promotion programs.

Key words: dietary, food, habits, breakfast, fruit

7. EATING HABITS AMONG YOUNG PEOPLE: A CROSS-SECTIONAL STUDY

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Objectives: The purpose of this study was to provide an overview of the nutritional habits of young people and to analyse the connections between physical activity and dietary patterns.

Materials and methods: We performed a cross-sectional study which involved young people aged 15-30 years old. Subjects were randomly chosen among the visitors to the National library in Nis, Serbia. The data were collected between 1.06.2013 and 31.12.2013.

Results: The sample consisted of 280 subjects, of whom 15.5% declared themselves to be vegetarian (mean age 24.7 years). There was no statistical significance between the vegetarians and non-vegetarians in their level of education, gender structure, age. In addition, the study showed that the percentage of vegetarians who were physically active was 47.5% and non-vegetarians 31.7%. The difference in physical activity was significant, $\chi^2=8.84$ and $p=0.003$. Our findings show that there was no significant difference in bread, rice and pasta consumption. The two groups differed significantly from each other when it comes to fruit consumption with $Z=-4.3$, $p<0.001$, and vegetable consumption $Z=-5.52$, $p<0.001$. Daily fruit intake was 193.75 ± 108.71 gram for vegetarians and 117.05 ± 99.1 gram for non-vegetarian. Daily vegetable intake was 216.25 ± 102.15 gram for vegetarians and 114.20 ± 77.66 gram for non-vegetarians.

Conclusion: The eating habits of young people have improved in recent years. Moreover, there is no significant difference in the consumption of soft drinks and sweets between vegetarian and non-vegetarian. However, increased physical activity among vegetarians in comparison with non-vegetarians should be the focus of future research.

Key words: nutrition; eating habits; physical activity; young people

8. THE REGULATION OF GLYCEMIA IN ELDERLY PEOPLE SUFFERING FROM DEPRESSION WITH OR WITHOUT DIAGNOSIS DIABETES

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Objectives: Depression and diabetes mellitus (DM) are two important problems in elderly population. The aim of our study was to examine the regulation of glycaemia in elderly who suffer from depression.

Materials and methods: The study included 135 examinees (the average age was $80,55 \pm 6,49$). Geriatric Depression Scale (GDS) was used for the evaluation of depression. The level of glycaemia was determined out of the capillary blood. By the data from medical documentation, 31.9% of the examinees had the diagnosis of DM.

Results: In the group of examinees with DM, 34.9% of them had glycaemia level higher than 11mmol/L, but only 18,8% of the examinees had lower levels of sugar in blood than 7mmol/L. In the group of examinees without DM, the level of glycaemia above 9mmol/l was present in 9% of them, and only 45% of them had the level of sugar lower than 7mmol/l. There is statistically significant difference ($p < 0,001$) between value of glycaemia in the group of examinees suffering from DM ($10,02 \pm 4,8$) and those without the diagnosis of DM ($6,96 \pm 1,67$).

Conclusion: Unregulated and undiagnosed DM in the elderly with depression calls for a necessity for preventive medical examinations, correcting the therapy and for education of this population.

Key words: diabetes mellitus, depression in the elderly

9. THE ROLE OF REIKI IN LOSE WEIGHT

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Objectives: Reiki is a Japanese technique for stress reduction and relaxation that also promotes healing. It is administered by "laying on hands" and is based on the idea that an unseen "life force energy" flows through us and is what causes us to be alive.

Materials and methods: Theoretical explanation of how Reiki works to reduce body weight.

Results: We live in a modern world where we are getting far and far away from nature, which results in poor health condition. Obesity is also one of the main outcomes of this scenario.

In order to lose weight, one has to accept the fact fully that weight is more than what it should be. This is the first step to self-acceptance that you are overweight. Second one has to decide what is ideal weight is. There five methods to lose weight with Reiki: 1.Reiki food; 2.love your body; 3.drink plenty of Reiki water; 4.positive affirmation; 5. Reiki meditation.

Conclusion: The modern world brought advancement and ease in our lives, but at the same time introduced a obesity. Our current lifestyle is full of mental stress, very little or no physical activity, and eating fast foods. Ones, who are very close to nature, will never feel this physical condition.

Key words: Reiki, obesity, meditation

10. QUALITY OF DRINKING WATER IN MUNICIPALITY OF BIJELO POLJE

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Objectives: Water is very important for human health on which the right to use have all of us. Due to the importance and its multipurpose use water enjoys special protection and is used in the mode prescribed by law. It is a very important factor for a man, to the society, for life in general.

It can find a variety of materials and gases from the atmosphere and soil (H₂S, CO, nitrous gases, methane etc.) Minerals, microorganisms, radioactive materials also affect quality of water.

The aim of the study were to show the results of drinking water in Bijelo Polje before its distribution to consumers.

Materials and methods: We used the results of physico-chemical and microbiological analysis of drinking water of the Institute for Public Health in Podgorica, laboratories of Sanitary chemistry and microbiology of the Center for Medical ecology. Finding results were statistically analyzed and presented in tables.

Control of the city's water supply system is carried out by the Institute of Public Health, according to the number of equivalent inhabitants, twice a year.

Results: In 2005, 48 samples of water were analyzed and sorted by month, of which 33 (68.75%) corresponds and 15 (31.25%) does not match as drinking water piće. The most common cause of failure drinking water was inadequate concentration of residual chlorine (0, 0%) in terms of physical and chemical analysis. Microbiological analyzed 52 samples per month, of which 51 (98.07%) corresponds and 1 (0.96%) does not match.

Conclusion: The produced of drinking water has the necessary physical, chemical and microbiological quality, which is acquired in its natural form and correction, chlorination and meets quantitative- qualitative statutory requirements.

Key words: drinking water, quality of water, of physico-chemical analysis, microbiological analysis

11. ARSENIC IN DRINKING WATER IN THE TERRITORY OF NORTH BANAT DISTRICT OF SERBIA

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Objectives: In order to improve and preserve the health of the population it was carried out determination of arsenic in drinking water in the territory of North Banat districts of Serbia. Drinking water on the observed territory comes from the second layer of the depth from 220 m. There are no factory for purification plants and water after disinfection directly introduced into the water supply network. The survey was conducted in 2015 with the aim of reviewing the need to solve the problem of water supply.

Materials and methods: The concentration of arsenic in drinking water was determined by ISO 15586: 2003 (E). Water Quality- Determination of trace elements using atomic absorption spectrometry with graphite furnace. Methods value from 0.005 to 1.0 mg/L. This study included total of 136 samples.

Results: The average content of arsenic per Municipalities was: Kikinda 0.0123 mg/L, Senta 0,0385 mg/L, Kanjiža 0.0298 mg/L, Novi Kneževac 0.0344 mg/L, Ada 0.0991 mg/L, Čoka 0.0595 mg/L. The experimentally determined values of arsenic in the samples were compared with MDK values for this element 0.01 mg / L.

Conclusion: The research results indicate that the average content of arsenic in drinking water in the territory of North Banat district is high and exceeds the MDK values. This fact points to the need of resolving water supply in meaning of purification of drinking water.

Key words: Arsenic, graphite furnace AAS, drinking water

12. VITAMIN E CONTENT IN SOME COMMERCIAL DAIRY PRODUCTS

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Objectives: Vitamin E is the primary lipid-soluble antioxidant located in the cell membranes and available to protect lipoproteins by scavenging peroxy free radicals. Also, as a modulator of cell signaling, it inhibits inflammation process and atherosclerosis (1). One of the sources of vitamin E in human diet is milk and dairy products. For adults, estimated average requirement (EAR) and recommended dietary allowance (RDA) were set at 12 and 15mg, respectively (1). The content of the most active form of vitamin E, α -tocopherol was determined in kefir, sour cream and yoghurt.

Materials and methods: 1 g of the sample was mixed with 5 mL of ethanol. After centrifugation supernatant was purified by solid-phase extraction on Chromabond C18ec cartridges. HPLC determination was achieved at 40°C using C18 Ultra IBD column (RESTEK) with the mobile phase of 100.0% acetonitrile and fluorescence detection (ex 295 nm, em 330 nm).

Results: The analyzed samples of commercial kefir, sour cream and yoghurt had average α -tocopherol levels of 0.02 ± 0.008 mg/100g, 0.057 ± 0.025 mg/100g and 0.0079 ± 0.0014 mg/100g, respectively.

Conclusion: High concentration of vitamin E in sour cream is related to high content of milk fat in this product (20 %). Kefir and yoghurt contain milk fats 1-3 % and consequently lower levels of vitamin E. Examined products only partially contribute the EAR and RDA values.

Keywords: vitamin E, kefir, sour cream, yoghurt, HPLC determination

13. THE EFFECT OF VEGETARIAN DIET AND TREATMENT WITH LOW DOSE ACETYLSALICYLIC ACID ON URINARY EXCRETION OF SALICYLATES

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Objectives: Urinary excretion of salicylates in vegetarians and patients taking low dose of acetylsalicylic acid (AspirinTM) was examined.

Materials and methods: The study involved voluntarily participants (n=24) divided into three groups: control group - conventional diet, vegetarians group and patients taking AspirinTM at a dose of 100 mg/day. A questionnaire was used to obtain relevant data (period of a vegetarian diet or treatment, type and quantity of intake of certain foods). Salicylate concentration was determined in collected samples of first morning urine by spectrophotometric method.

Results: A significantly higher salicylate levels were found in urine of both investigated groups (vegetarians and patients) compared to the control ($p < 0.05$). In the group of vegetarians, concentration of salicylates in urine was significantly higher in urine of vegetarians consuming salicylate-rich foods ($p < 0.05$), while period of vegetarian diet has no effect on salicylate content ($p > 0.05$). In the patients group salicylate level was higher in patients taking AspirinTM for a longer time (more than 3 years) ($p < 0.05$).

Conclusion: Consumption of salicylate-rich foods significantly affects the urinary excretion of salicylates, while an amount of excreted salicylates depends only on the duration of low dose AspirinTM therapy, but not on duration of vegetarian diet.

Key words: salicylates, vegetarian diet, low-dose acetylsalicylic acid, excretion

14. HYGIENE-HEALTH ASPECTS OF WATER SUPPLY DRINKING WATER FROM OTHER TYPES OF BUILDINGS, URBAN AND ROADSIDE FOUNTAINS IN KICEVO REGION FROM 1996-2013y.

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Introduction:Department of Hygiene and Environmental Health-Kicevo 1996y. regularly follows the development of water supplies.

Objective:The aim of this paper is to give a realistic assessment of the water quality of water supply facilities at risk and suggest preventive measures.

Materials and Methods:Hygiene-sanitary condition of facilities will be shown through continuous inspection,statistically reports C.J.Z Bitola-Kicevo within 1996-2013y. (According to standard methods of Regulations on water safety R.M Official Gazette 46/2008)and epidemiological report on movement of stomach diseases.There been used retrospective method of operation,and the results will be shown in tables and graphics.

Results:Between 1996-2000y.water supply went combined.In 2013y. with 8 other water supply facilities supplying 2.767 inhabitants,5% of the total of 56 734 inhabitants.The population used water from the city(3) and roadside fountains(8),that are uncertain quality and bacteriological very often defective.High percentage of bacteriological pollution occurs in urban fountains and 26% roadside memorial fountains 17%.The total number of infectious diseases acute intestinal infectious diseases accounted for 69% in 2000,33% in 2005,38% in 2012.

Conclusion:In 2013y. 5% of the rural population,drink water of uncertain quality than other water supply facilities. In total number of infectious diseases account for a large percentage of acute intestinal infectious diseases.

Keywords:Risky water suppliers,quality,prevention.

15. BIOACTIVE CONSTITUENTS OF WILD BLACKTHORN (*PRUNUS SPINOSA* L.) FRUIT EXTRACTS AND FRESH BERRIES

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Prunus spinosa L. (blackthorn), belongs to the *Rosaceae* family, is a perennial plant growing as a shrub on slopes of wild uncultivated areas.

Objectives: The aim of this work was to establish relationships between the extraction solvent, content of phenolics and flavonoids in fruits of *Prunus spinosa* through *in vitro* tests. In addition, the amount of total anthocyanins and content of tannins were determined.

Materials and methods: Fresh berries were macerated with different solvents (methanol, propylene glycol 45%, distilled water and ethanol 70%). Total phenolic content was quantified using Folin-Ciocalteu assay and the amount of total flavonoids by aluminium chloride method. The total anthocyanins and tannins contents in fresh berries were determined applying the European pharmacopoeia methods.

Results: The highest phenolic content was in both ethanol 70% (365.35 ± 0.65 mg GAE/g FW) and methanol (356.91 ± 0.64 mg GAE/g FW, GAE - gallic acid equivalents, FW - fresh weight) extracts, while the propylene glycol 45% extract was with the highest quantity of flavonoids (0.861 ± 0.068 mg RE/g FW, RE - rutin equivalents). The obtained values for anthocyanins and tannins were 355.91 mg CGE/100g FW, CGE - cyanidin-3-glucoside equivalents) and 163.83 mg PE/100 g FW, PE - pyrogallol equivalents), respectively.

Conclusion: The results indicated that blackthorn berries were rich in components with high antioxidant potential and might represent the significant help in protecting the human cells against the oxidative damage caused by free radicals.

Key words: *Prunus spinosa*, fruit, extraction, phenolics, antioxidants

16. ANTIOXIDANT ACTIVITY AND POLYPHENOLIC CONTENT OF WATER EXTRACTS OF WILD APPLE FRUIT

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Objectives: Wild apple fruit-WAF (*Malus sylvestris* (L.) Mill., Rosaceae) is a good source of polyphenolic compounds which have therapeutic effects on many diseases. The use of preparations rich in this polyphenols represents a good basis for health improving and prevention of oxidative stress-related-diseases.

The aim of our study was to determine polyphenolic content-PC and antioxidant activity-AA of water extracts of wild apple fruit-WEWAF, originated from Serbia, obtained by different extraction methods.

Materials and methods: Extracts were prepared by maceration, percolation, Soxhlet and ultrasonic extraction, using purified water as solvent in drug-extract ratio 1:5. Total phenolic content-TPC was determined by Folin-Ciocalteu test, expressed as gallic acid equivalents (GAE) and total flavonoid content-TFC by Markham’s method, with rutin as standard (RE). AA was determined by DPPH test, and expressed as %RSC (Radical-Scavenging-Capacity).

Results: Interesting results were obtained for the investigated WEWAF proving to be rich in polyphenols (TPC ranged from 513.66-611.24 mgGAE/100g dry weight-dw and TFC from 3.97-7.95 mgRE/100g dw) and demonstrating satisfying AA (%RSC ranged from 47.90-69.28 %RSC), while giving the evidence of good correlation between AA and PC, as well.

Conclusion: WEWAF represent valuable source of natural antioxidants, and thus might be considered to possess great potential for application in food industry or dietary supplements production.

Acknowledgements: Serbian Ministry of education, science and technological development supported this study (Project No III 45017).

Keywords: wild apple fruit, water extracts, polyphenolic compounds, antioxidant activity

17. DETERMINATION OF ANTIOXIDANT AND ANTIMICROBIAL ACTIVITIES OF SWEET CHESTNUT OUTER SEED COAT EXTRACT

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Objectives: Sweet chestnut (*Castanea sativa* Mill.) is a known source of phenolic bioactive compounds, in particular of tannins. The antioxidant and antimicrobial potential of extracts obtained from brown seed coat (shell) were evaluated as a new phytochemical source.

Materials and methods: Extraction of seed coat of sweet chestnut and Lovran's Marrone cultivar were **performed** with 50% ethanol and afterwards the dry extracts were obtained. The total phenolic content of the extracts was determined spectrophotometrically. The capacity of extracts (in concentration of 0.2 mg/mL in water) to inhibit the stable free DPPH, hydroxyl and superoxide radicals were measured by EPR. The antimicrobial activity was determined using agar disc diffusion method.

Results: Higher content of phenolic compounds was determined for Lovran's Marrone extract (4.24±0.02)% of GAE. We showed using EPR that Lovran's Marrone extract expressed high antioxidant activity in scavenging DPPH (AA = 37±1%), hydroxyl (AA = 56±3%) and superoxide (AA = 77±0%) radicals. Furthermore, **both extracts exhibited** strong antimicrobial activity, especially against Gram-positive bacteria *Lactococcus lactis* ssp. *lactis* and *Micrococcus pyogenes* var. *albus*.

Conclusion: Brown seed coats of chestnuts are usually discarded. This study indicates that examined materials showed remarkable antioxidant activity, good antimicrobial activity and clearly have the potential as sources of valuable phenolics.

Key words: antioxidant activity, antimicrobial activity, phenolics, seed coat extracts, sweet chestnut

18. SPASMOLITIC ACTIVITY OF WILD GARLIC ETHANOLIC EXTRACTS

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Objectives: Wild garlic (*Allium ursinum* L., Amaryllidaceae) has been harvested for centuries for food and natural remedy. In order to investigate its traditional use for gastrointestinal disorders we have quantified and compared spasmolytic activities of ethanolic and hydroethanolic leaf extracts.

Materials and methods: Spasmolytic effects and mechanism of action of wild garlic extracts were tested *in vitro* in tissue baths. Three different experimental models were used: spontaneous contraction, acetylcholine and KCl-induced contractions of isolated rat ileum.

Results: Wild garlic extracts (0.03–10 mg/mL) produced a decrease in tone of ileal spontaneous contractions in a dose-dependent manner. Ethanolic extract showed prominent activity, although weaker than papaverin. Tested samples produced a significant and concentration-dependent inhibition of ACh-induced contractions but predominantly significantly less than atropine. Since relaxation of 80 mM K⁺-induced contractions was similar to that caused by papaverin, observed spasmolytic effect was induced through calcium channel inhibition.

Conclusion: Demonstrated wild garlic inhibition of both spontaneous and induced ileal contractions could contribute to the overall action of this *Allium* species on gastrointestinal system.

Acknowledgements: This research was supported by the Ministry of Education and Science of the Republic of Serbia (Grant No. III 41018 and III 46013).

Key words: *Allium ursinum*, traditional use, isolated rat ileum, spasmolytic effect, calcium channel inhibition

19. DEVELOPMENT OF GASTRORETENTIVE FLOATING MICROSPHERES WITH PROLONGED RELEASE OF CARVEDILOL

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Objectives: The aim of this study was to formulate gastroretentive prolonged release delivery system for carvedilol by increasing its residence time in the stomach. It was achieved through the preparation of porous floating microspheres, by the emulsion solvent diffusion technique.

Material and methods: Eudragit[®] S 100 and hydroxypropylmethylcellulose, in 4:1 ratio, were used to prepare the mixture with carvedilol, which was further dissolved (at 4% w/w) in a mixture of ethanol/dichloromethane (1:1) and dropped into 0.2 % w/w sodium lauryl sulfate solution. The organic phase in the total mixture was varied at the three levels (5, 7.5 and 10%). Prepared solutions were stirred with a propeller stirrer at room temperature, for 1 hour, at 300, 650 or 1000 rpm.

Result: Carvedilol content in formulations ranged from 55.66 to 84.07%. Prepared microspheres exhibited prolonged carvedilol release for 8 hours with preserved buoyancy. The highest degree of encapsulation, and the slowest release of carvedilol, was achieved from the formulation in which the proportion of the organic phase was 7.5% and the stirrer speed was 650 rpm.

Conclusion: Developed floating microspheres of carvedilol exhibited prolonged release for at least 8 hours and could therefore potentially reduce drug fluctuations in the plasma, as well as patient adherence.

Key words: floating microspheres, patient adherence, carvedilol

20. NITRITE CONTENT DETERMINATION IN MEAT AND MEAT PRODUCTSĐogo Mračević Svetlana¹, Lolić A.², Krstić M.¹, Ražić S.¹¹Faculty of Pharmacy, University of Belgrade, Serbia²Faculty of Chemistry, University of Belgrade, Serbia

Objectives: Nitrites have an important role in meat industry as additives to improve taste, color and texture of meat products, as well as preservatives. The downside effects of nitrite addition is development of toxic and carcinogenic nitrosoamine. The aim of this work was determination of nitrite content in samples of pate, sausage and minced meat and comparison of measured quantity with the allowable values of national and European Regulations on food additives.

Materials and methods: Determination of nitrite is done by standard method SRPS ISO 2918/1999. After processing the samples and the addition of sulfanilamide and naphthylethylendiamin- chloride in the filtrate in the presence of nitrite develops a red coloration whose absorbance is measured at 528 nm.

Results: Nitrite content in all samples is within the allowed concentration: pate 2.84 - 3.72 mg/kg, sausages 2.14 - 3.69 mg/kg, and minced meat below the limit of detection.

Conclusion: Obtained concentrations of nitrite represent the residual concentration. It is presumed that amount of nitrite added during production is increased, considering that a part of the nitrite oxidizes to nitrate, a part binds to myoglobin and meat proteins, and a certain amount is converted into potentially dangerous nitrosoamine. The method has shown good sensitivity and precision.

Key words: nitrites, meat, pate, sausage, photometric detection

21. DRY SKIN CARE WITH MULLEIN FLOWER OIL IN PREVENTION OF ATOPIC DERMATITIS

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Objectives: Since mullein flower preparations were used from Middle Age as a remedy for skin diseases, we evaluated *in vivo/in vitro* effects of the cream containing Mullein flower extract 10% (w/w).

Materials and methods: The oil produced by macerating fresh mullein flowers (*Verbascum densiflorum* L., Scrophulariaceae) in olive oil was used for formulation of moisturizing cream. Antioxidant and antimicrobial activity were evaluated *in vitro*. *In vivo* effects were evaluated in a patient with pathologically dry skin and severe atopic dermatitis who applied product twice a day for 5 days. Transepidermal water loss, electrical capacitance and pH of the skin were measured alongside visual scoring of parameters.

Results: The same samples demonstrated notable *in vitro* antioxidative activity and very weak activity against used bacterial stains. *In vivo* study showed a decrease in transepidermal water loss and an increase in hydration of atopic dry skin after a five-day treatment, which was also significant after two days of the treatment. Those results were in line with the findings of subjective visual scoring.

Conclusion: Topical formulations containing Mullein flower oil extract could be used as effective skin moisturizer, especially in prevention of atopic dermatitis and its exacerbations.

Acknowledgements: This research was supported by the Ministry of Education and Science of the Republic of Serbia (Grant No. III 41018 and III 46013).

Key words: mullein flower, olive oil, transepidermal water loss, antioxidant, antimicrobial activity

22. COSMETICS WITH NANO-TITANIUM DIOXIDE, SAFE OR NO?

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Objectives: Insight into the potential health risks related to the use of nano-form titanium-dioxide as cosmetic's ingredient.

Materials and methods: Literature survey with focus on authoritative opinions.

Results: Scientific Committee on Consumer Safety confirmed that titanium-dioxide nanoparticles, used as a UV-filter in sunscreens, can be considered safe for humans after application on a healthy, intact or sunburnt skin, as currently available scientific evidence shows an overall lack of dermal absorption. However, due to the fact that breathing in nanoparticles can lead to lung toxicity, inflammation and cancer, it is not advisable to use titanium-dioxide nanoparticles in form of powder or sprayable products. There is a very low risk for skin or eye irritation and skin sensitisation. Although no relevant information on reproductive toxicity is yet available, there are indications that, if penetrate into the body, titanium-dioxide nanoparticles can cause damage to genetic material. They can react with UV-light to accelerate photoreactions causing oxidation of some biological molecules and generating free radicals.

Conclusion: As the methodologies for evaluating the properties of nanomaterials in general are still in development, additional data may be required for a full assessment of the health impact of titanium-dioxide in nano-form. Thus, precautionary principle should be considered.

Key words: nanoparticles, titanium-dioxide, UV filters, risk assessment, cosmetics

23. TYPES, SYMPTOMS AND THERAPY OF MUSHROOM POISONING

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The mushroom poisoning represent regional and local health problem. More than 3% of the identified mushrooms are toxic to humans. Every year, the new toxic species are discovered which increasing the incidence of poisoning. Ingestion of toxic mushrooms causes various types of symptoms. The adverse effects are ranged from the temporarily allergic reaction, mild digestive disorder and hallucinations to the severe cytotoxic effects resulting in liver and kidney failure or death. Worldwide, hundreds of mushroom poisonings are fatal and the most fatalities are caused to „death cap“ (lat. *Amanita phalloides*) ingestion. The seriousness of the mushroom poisoning depends on several factors: species, age and amount of the mushroom; the geographic location; the season and the way of mushroom preparation before the consumption. The aim of this assay is to represent types and syndroms of different mushrooms poisoning such as: amatoxin, gyromitrin, muscarine, orellanine, norleucine, psilocybin, coprine, ibotenic acid, muscimol and miscellaneous gastrointestinal poisoning.

Objectives: Objective of this assay is to represent the symptoms of different mushrooms poisoning and an analytical method for determination of the most potent toxin alpha-amanitin.

Materials and methods: Symptoms of mushroom poisoning are reported according the literature such as: amatoxin, gyromitrin, muscarine, orellanine, norleucine, psilocybin, coprine, ibotenic acid, muscimol and miscellaneous gastrointestinal poisoning. The high-performance liquid chromatography tandem mass spectrometry (HPLC-MS) was used for determination of alpha-amanitin in biological fluids and the solid-phase extraction (SPE) for sample preparation with neutral-copolymer HLB cartridges.

Results: The search results were showed that the ingestion of toxic mushrooms causes various types of symptoms. The adverse effects are ranged from the temporarily allergic reaction, mild digestive disorder and hallucinations to the severe cytotoxic effects resulting in liver and kidney failure or death. Worldwide, hundreds of mushroom poisonings are fatal and the most fatalities are caused by the alpha-amanitine from the „death cap“ species (lat. *Amanita phalloides*). The high sensitive HPLC-MS method was developed for determination of alpha-amanitin with limit of detection of 2.5 ng/mL and limit of quantification of 5.0 ng/mL. The analysis time was 10 min and the extraction recovery of alpha-amanitin >90%.

Conclusion: The developed HPLC-MS method could found useful application in clinical and forensic toxicology.

Key words: mushrooms, poisoning, symptoms, HPLC-MS

24. VITAMIN C CONTENT OF WHITE CURRANT (*Ribes album* L.) JUICES AND EXTRACTS

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Objectives: Different varieties of currants (*Ribes sp.*) show a very high biological activity such as antioxidant, anti-inflammatory, antimicrobial and anticancer which is attributed to the presence of phenolic compounds. Also it reduces platelet aggregation, decreases blood pressure and has positive effect on changes in cholesterol metabolism. Phenolic compounds (flavonoids, anthocyanins, tanins) are secondary metabolites produced by plants that with vitamin C have a protective effect on people's health. The aim of the work was to determine the content of vitamin C in the juice and the ethanol and methanol extracts of white currant (*Ribes album* L.) variety *Primus*.

Methods: Determination of vitamin C was performed by L. J. Harris method. All experiments were conducted in triplicate.

Results: The highest content of vitamin C was shown by ethanol extract (0.52 ± 0.03 mg/g), and the lowest by white currant juice (0.21 ± 0.01 mg/g). Statistical analysis was performed using SPSS software version 17 and using factorial analyse variance was determined whether there is a statistically significant difference between samples with a significance level of 0.05.

Conclusion: Presented data could be used as baseline for further research of white currants juices and extracts, that would examine chemical composition, biological activity as well as design and use as dietary supplements.

Acknowledgements: This research was supported by the Ministry of Education, Science and Technological Development of the Republic of Serbia (Grants no. III 46013 and 41018).

Keywords: white currant, antioxidative activity, vitamin C, juice, extracts

25. THE INTAKE OF FOLIC ACID THROUGH FOOD AND DIETARY SUPPLEMENTS IN PREGNANT WOMEN IN NIŠ

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Objectives: Pregnant women, as a specific group, have different nutritional requirements, which implies the intake of foods with special nutritional values. The largest segment of the population is not acquainted with all details related to healthy nutrition and supplementation during pregnancy, so they do not adhere to them. However, potential complications most often occur as a result of an inadequate nutrition as a risk factor.

The aim of this paper is the introduction of the needs that this population has regarding the intake of folic acid through food and supplements in order to improve the health and reduce the risk of complications.

Materials and methods: The methodology of this paper is based on the collection of data and statistical analysis following the survey which included 85 pregnant women from the territory of the City of Niš. The survey was anonymous and it had 10 open-ended and close-ended questions. The participants were divided into three age categories: up to 25 years, between 25 and 30 years, and over 30 years.

Results: In our research process, we determined that 75% of pregnant women of over 30 years of age complied with the recommendations and took folic acid through supplements and food, respondents between 25 and 30 years of age partly complied with the recommendations and took folic acid mostly through supplements, whereas 28% of pregnant women below 25 years of age did not comply with the recommendations and took folic acid only through nutrition, which was insufficient.

Conclusion: Based on the results of the survey, we concluded that pregnant women have insufficient knowledge regarding the significance of healthy habits in nutrition and that they do not fully comply with them. Therefore, there is an imperative need for a strategic general awareness of female population about the importance of folic acid intake, as well as about the consequences that may occur due to its low intake.

Key words: folic acid, pregnant women, food

26. NUTRITIONAL IODINE INTAKE AMONG PREGNANT WOMEN IN NIŠ

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Objectives: The needs for micronutrients during pregnancy increase primarily due to physiological changes and altered homeostatic control. Food, as the primary source of all nutrients, is not always sufficient to satisfy the increased needs, and the extent and frequency of nutritional deficits during pregnancy vary in different demographic groups. The reduced iodine intake during pregnancy results in the inability of the thyroid gland to produce a sufficient amount of hormones, which can result in lower IQ of the child, hearing impairment, attention deficit disorder, hyperactivity, as well as mental retardation.

The aim of this study was to estimate the daily intake of iodine through food among pregnant women in Niš.

Materials and methods: The research was conducted in 2015. and 2016. on a random sample of 50 pregnant women aged between 23 and 32. The respondents were asked to complete a 24-hour questionnaire according to their memory, on the basis of which the data were obtained on the type and amount of food they were consuming on a daily basis.

Results: The results have shown that 32% of the pregnant women had a sufficient daily intake of iodine through food, 38% of the respondents reached the desired iodine intake only with the use of supplements, while 30% of the women did not take a sufficient amount of iodine.

Conclusion: It is necessary to work on the education of pregnant women about the importance of the increased iodine intake during the whole pregnancy period. This can be achieved with a dietary change or with the use of appropriate dietary supplements.

Key words: iodine, pregnant women, nutrition, deficiency

27. ANTIOXIDANT ACTIVITY OF THE PINEAPPLE AND CHOKEBERRY JUICES

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Objectives: Pineapple (*Ananas comosus* (L.) Merr., Bromeliaceae) and chokeberry (*Aronia melanocarpa* (Michx.) Elliott, Rosaceae) have been used for centuries in diet. Moreover, they have been used in phytotherapy in recent years due to the high nutritional value and the high content of biologically active compounds. Numerous studies have confirmed the pharmacological effects of those plant species and their potential use in the prevention of many chronic noncommunicable diseases. The aim of this research was to examine the antioxidant activity of pineapple and chokeberry juice and their mixtures in different ratios.

Materials and methods: The pineapple and the chokeberry juice were prepared by squeezing. Juices were mixed in 1:1, 1:2 and 2:1 ratios. Antioxidant capacity was evaluated by the 1,1-diphenyl-2-picrylhydrazyl (*DPPH*) assay.

Results: The mixture of pineapple and chokeberry juice in the 1:2 ratio exhibited the highest antioxidant activity. Other combinations of the juices and juices exhibited lower antioxidant activity, in following decreasing manner: chokeberry juice, 1:1 mixture, 2:1 mixture and pineapple juice.

Conclusion: Pineapple and chokeberry juices exhibit a significant antioxidant activity. Our results demonstrated that pineapple juice improves the antioxidant properties of the chokeberry juice. Therefore those mixtures could be used in the prevention of diseases caused by oxidative stress.

This research was supported by the Ministry of Education and Science of the Republic of Serbia (Grant No. III 41018 and III 46013).

Key words: Pineapple juice, chokeberry juice, antioxidant activity.

28. THE USE OF THE HYSOP EXTRACTS IN PREVENTION OF DISEASES CAUSED BY OXIDATIVE STRESS

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Objectives: Hyssop (*Hyssopus officinalis* L.) is an aromatic plant species usually used in traditional medicine for digestive and respiratory disorders relief and wounds healing. Polyphenols are known to prevent the generation of free radicals which are considered to be the cause of many diseases of the modern age. The aim of the research was to examine antioxidant activity of the hyssop extracts and the determination of the total polyphenols and tannins content.

Materials and methods: The above-ground parts of the herb were collected in full blossom at the experimental fields of the Institute of Medicinal Plant Research "Dr Josif Pancic". The plant material was extracted with absolute methanol and 96% ethanol in an ultrasonic bath. The content of total polyphenols and tannins were determined by Folin-Ciocalteu method. Antioxidant capacity was estimated by DPPH (1,1-diphenyl-2-picrylhydrazyl) assay.

Results: The hyssop extracts, particularly methanol extract, contained high levels of total polyphenols and tannins. Methanol extract also expressed stronger capability of neutralizing DPPH free radicals with the concentration, which was capable of scavenging 50% of free radicals, of $30.79 \pm 0.91 \mu\text{g/ml}$.

Conclusion: Due to powerful antioxidant capacity the hyssop extracts could have considerable role in the prevention of the diseases caused by oxidative stress.

This research was supported by the Ministry of Education and Science of the Republic of Serbia (Grant No. III 41018 and III 46013).

Key words: *Hyssopus officinalis* L., extract, polyphenols, tannins, antioxidant activity

29. THE TOTAL FLAVONOID CONTENT AND ANTIOXIDATIVE POTENTIAL OF THE CLARY SAGE EXTRACTS

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Objectives: In the past decades plant polyphenols, especially flavonoids, have been gaining in importance due to their potential use as prophylactic and therapeutic agents in many diseases that have oxidative stress implicated in their pathogenesis. *Salvia sclarea* L., clary sage, is rich in polyphenols and it has been used as a spice and aroma worldwide expressing many biological effects, as well. This research investigates the total flavonoid content of the clary sage extracts and evaluates their radical-scavenging activities.

Materials and methods: The above-ground dried parts of the herb were extracted with 96% ethanol by maceration, and in water bath at 40°C with 80% and 60% ethanol. The total flavonoid contents in the extracts were determined by AlCl₃ method. Antioxidative potential was estimated by 1,1-diphenyl-2-picrylhydrazyl assay.

Results: All extracts contained high quantity of total flavonoids but there was no statistically significant difference among the values. The highest radical-scavenging activity was determined in the extract prepared with 60% ethanol with the concentration, which was able to neutralize 50% of free radicals, of 57.09 ± 1.22 µg/ml.

Conclusion: Considering the high amounts of total flavonoids and strong antioxidative effects the clary sage extracts could have significant role in food preservation or as health care products.

This research was supported by the Ministry of Education and Science of the Republic of Serbia (Grant No. III 41018 and III 46013).

Keywords: *Salvia sclarea* L., flavonoids, antioxidative potential, extracts

30. MINERAL CONTENT IN VARIOUS TYPES OF FLOUR

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Objectives: By the flour, we mean products obtained by milling grains. The most common is wheat flour, but in recent years, rice, corn, and barley flour are available on the market. **Material and methods:** The goal of this study is chemistry analysis of minerals in various types of flour and evaluation of their importance in the daily diet. The samples were prepared by microwave digestion. Mineral content was determined by FAAS.

Results: 8 types of flours were analyzed : whole grain barley, rice, flaxseed, wheat flour t- 400 and t-950, spelt, whole grain buckwheat and corn flour.

The analysis included following minerals: copper, iron, zinc, manganese, calcium, sodium, potassium and magnesium. The highest mineral content was in flaxseed flour.

Conclusion: Minerals are essential for biochemistry processes in our body. Due to the fact that they are not synthesized in the body, minerals must be supplied by food intake. The content of these minerals, expressed as mg / 100g, depends on the type of cereal and milling technological process. Therefore, a balanced diet is relevant for normal body functions.

Key words: flour, mineral content

31. CONNECTIONS SOCIO ECONOMIC AND DEMOGRAPHIC FACTORS WITH ADULT NUTRITION HABITS

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Objectives: to show the connection between socio-economic and demographic factors to the nutrition habits of adult population of urban and rural areas.

Materials and methods: This cross-sectional study included adults of northern Kosovska Mitrovica and rural areas of the municipality of Gracanica. To collect data on socioeconomic and demographic characteristics and nutrition habits questionnaire was used to explore the health of the population of the Republic of Serbia (used in 2013). For the assessment of the significance of difference between the mentioned variables is use the chi-square test, with a significance level of 0.05.

Results: The study included 740 subjects (374 women). Milk or dairy products consumed 32.02% of respondents, most often respondents with higher education ($p = 0.008$), while integral breads only 7.7% of respondents. Females and people from urban areas often to consume fruits and vegetables ($p < 0.001$). About your health when choosing food considering 22.3% of respondents, significantly more women ($p < 0.001$), persons with higher education ($p < 0.001$), respondents from rural areas ($p = 0.017$), and respondents with high monthly salary ($p < 0.001$).

Conclusion: There is a connection between frequent consumption of fruit and vegetables with the female gender and the urban areas, while higher education is associated with more frequent consumption of milk and dairy products. For their own health when choosing food more account women, people who live in the countryside, respondents with higher education and high monthly salary.

Keywords: habits, nutrition, adults

32. QUALITY OF COCOA POWDER

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Objectives: Cocoa is one of the foodstuffs that we almost daily consume, but we rarely ask ourselves what cocoa contains and how it affects us. Cocoa powder is formed by fine grinding of cleaned, peeled, fermented, dried and heat treated (fried) fruit seeds of the cocoa tree, after the separation of cocoa butter. Cocoa powder is a basic product which is further used in the production of other foods, mostly sweets (chocolate, various drinks and pastries).

Methods: The accredited laboratory of the Center for Hygiene and Human Ecology of the Institute of Public Health Niš, examines the quality of cocoa powder samples. These are samples of cocoa powder with reduced and highly reduced content of fats, which are only present on our market. Quality testing includes organoleptic examination, fat and water content. Organoleptic examination determines the appearance, color, smell and taste of cocoa powder. The water content can be determined using the method of drying to a constant mass. The fat content is determined by multiple extractions with an organic solvent in the Soxhlet apparatus (Soxhlet) after hydrolysis of the sample with hydrochloric acid.

Results: In the period 2013-2016, in the analyzed samples of cocoa powder water content has ranged from 1,44% to 6,11%. The fat content on the dry material, has ranged from 5,40% to 15,79%. The water content determined by the rules of maximum 7%. According to the fat content in the dry matter Cocoa powder is ranked as cocoa powder with a cocoa content of at least 20% of cocoa butter, with a reduced cocoa butter content less than 20% and with highly reduced content of cocoa butter with less than 10%.

Conclusion: Based on the results of testing samples in accordance with the requirements and provisions of the Regulations for the declared product category in the future demands and standards harmonization with European standards will certainly contribute to a better quality of the products.

Keywords: cocoa, cocoa powder, chocolate.

33. ANTIOXIDANT CAPACITY OF HOPS (*Humulus lupulus* L.) SUPERCRITICAL EXTRACTS

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Objectives: The female inflorescences of *Humulus lupulus* (hops), have attracted a great deal of attention as a source of bioactive components which possess antioxidant, antibacterial and antiinflammatory activities. The supercritical fluid extraction (SFE) is a clean technology since it is environmental friendly as well as more safe and **efficient** for food processing. Our objective was to evaluate the antioxidant capacity (AC) of *Humulus lupulus* supercritical extract (HE) and extracts obtained by isomerisation of HE.

Materials and methods: HE was produced from hops pellets by SFE. Extracts with isomerized α -acids were prepared from HE using potassium salts (KHE) and magnesium oxide (MgHE). AC of extracts was measured using DPPH and FRAP assays. The total phenolic content (TPC) was determined by a modified Folin-Ciocalteu method.

Results: The amount of TPC was found to be highest for HE (119,6±0,72 mg Gallic acid equivalent (GAE) /g dried extract) in comparison to isomerized KHE (86,48±0,57 mg GAE/g de) and MgHE (51,14±0,65 mg GAE/g de), leading to assumption that those components were lost during the isomerization process. Also, HE demonstrated satisfying AC (IC₅₀ 0,26±0.02 and FRAP 0,42±0.02 mmol Fe²⁺/g de), while the AC of KHE and MgHE was significantly lower.

Conclusion: The results from this work suggest that HE has a potential as natural antioxidant due to its satisfying AC which can be significantly lowered by isomerization process.

Acknowledgement: This research was financially supported by the Serbian Ministry of Education, Science and Technological Development, Grant No III 45017.

Keywords: antioxidant capacity, *Humulus lupulus*, isomerisation, supercritical extraction

34. HEALTH SAFETY OF DRINKING WATER IN RURAL AREAS OF THE BOR AND ZAJECAR DISTRICT

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Public Health Institute "Timok" Zaječar

Objectives: The objective of this study is to provide a realistic assessment of the state of water supply in rural areas in the territory of Bor and Zajecar district, consider with the safety of drinking water and sanitary inspection of water supply systems.

Material and methods: the quality of drinking water from small water systems and individual water facilities to the sanitary control.

Results: In May and June 2016 were examined 80 samples of drinking water in rural areas. Total number of samples is 32 in the Bor region and 48 in Zajecar district. Sanitary control of sources and distribution network is done using standardized questionnaires. Analysis of microbiological parameters indicate that the largest percentage of defects is presence of bacteria *Escherichia coli* 33.75 %. In relation to the physicochemical parameters are incorrect 8 samples or 10 % for concentration of nitrates. In 67 samples has not been proven residual disinfectant.

Conclusion: It is important to continuously control the drinking water in rural areas, to increase the sanitary control and the establishment of sanitary protection zones of existing water sources.

Key words: drinking water, sanitary control, *Escherichia coli*

35. WATER SUPPLY OF THE MONTENEGRIN COAST

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Introduction: For the water supply of coastal municipalities use the local water sources and water from the regional water supply. The construction of the regional water supply for Montenegrin coast has significantly improved the system of water supply of coastal municipalities.

Objective: The objective of this paper is to show the hygienic quality of drinking water from water supply systems for the coastal municipalities.

Materials and methods: This paper present the results of the control of hygienic quality of drinking water from the water supply system of coastal municipalities in the period from 2011 to 2015.godine. Water was examined by standard chemical and microbiological procedures, in accordance with the Regulation on detailed requirements, which in terms of safety should meet drinking water OGM 24/12. The analysis included samples from urban water supply networks, the individual requirements of individual facilities and water supply.

Results: The total number of physical and chemical samples analyzed chlorinated water in 1746 (12.1%) did not correspond to the current regulations. Of the total number of microbiologically analyzed samples of chlorinated water in 2390 (16.39%) did not correspond to the prescribed standards, usually because of the total number of bacteria and identification of coliforms.

Conclusion: The water from the regional water supply system has positively affects the safety of the water supply systems in the coastal municipalities. It is necessary to work on improving the water supply systems of coastal municipalities, as well as to protect local water sources.

Key words: water, microbiological, chlorinated water

36. REFORMULATION AND LABELING OF PRODUCTS IN THE STRATEGY OF REDUCING SALT INTAKE IN THE POPULATION

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Objectives: Excessive salt intake (more than 5 g per day) contributes to increased blood pressure and increases the risk of Noncommunicable diseases (NCDs). Reformulation of foods is a set of activities with the aim to reduce salt content in processed foods, from the hidden sources which the individual has no influence. Labeling the salt content in food will be mandatory from 01.01. 2017.

Materials and methods: Salt content is analyzed in bakery and meat products and cheeses in the IPH in the period 2012 - 2016. Mohr Volumetric Method was used to determine the salt content in food.

Results: There were not significant differences in the examined period in salt content in cheeses and bakery products, except meal "burek". The average value was ranged from 2.48% (2014) to 1.54% (2015). Significant reduction of salt content was not registered in meat products, except for fresh minced meat. The average value ranged from 3.3% in 2014 to 1.7% in 2016. This reduction was result of consultation with manufacturers to gradually reduce the salt content.

Conclusion: In order to establish a comprehensive approach to reducing salt intake, it is necessary to obtain basic data on food consumption and urine salt excretion. Other than this is very important to appoint realistic and sustainable goals, invest in reformulation of products, information and awareness-raising. Monitoring of health outcomes on population level is key aspect in order to have evaluation of implemented measures.

Key words: Salt content, Noncommunicable diseases, Labeling of food, Hidden salt

SESSION: MICROBIOLOGY TODAY (I)

INVITED LECTURES

1. THE GLOBAL SPREAD OF CARBAPENEMASE-PRODUCING ENTEROBACTERIACEAE: CHALLENGES FOR THE BALKAN REGION

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During the last 10-15 years, the prevalence of multidrug-resistant (MDR), extensively drug-resistant (XDR) and pandrug-resistant (PDR) Gram-negative pathogens, mainly consisting of those producing carbapenemases, is on the rise worldwide, particularly including South-eastern European countries (Balkan States). The majority of carbapenemase-producing isolates belong to *Klebsiellapneumoniae*, *Acinetobacterbaumannii* and *Pseudomonas aeruginosa*, and in a lesser extent other Gram-negative species, such as *Enterobacterspp.* or *Proteus spp.*

The carbapenemases produced by the above Gram-negative pathogens include class A enzymes, such as KPC (among *Enterobacteriaceae*), class B enzymes, such as VIM (among *Enterobacteriaceae* and *P. aeruginosa*) and NDM (among several Gram-negative species) and class D enzymes, such as OXA-48 (among *Enterobacteriaceae*), OXA-58 (among *A.baumannii*) and OXA-23 enzymes (among *A.baumannii*).

The early and accurate detection of carbapenemases is important not only for epidemiological purposes/surveillance, but also for improving antibiotic stewardship, cohorting, infection control and outbreak prevention. To detect carbapenemases, CLSI and EUCAST introduced low breakpoints for susceptibility testing of cephalosporins and carbapenems in order for isolates to be reported “as found”. However, susceptibility tests are not enough and laboratories should still detect carbapenemase activity directly, for several reasons: determination of MICs is not always precise; even the ‘revised breakpoints’ cannot detect all carbapenemase producers; clinical studies have reported therapeutic failures with carbapenems in the presence of carbapenemase, despite low MICs, we may lose valuable epidemiological data.

For these reasons, phenotypic methods for the detection of carbapenemase activity have been designed and represent valuable, easy to adopt in the clinical laboratory and cost-effective tools (getting >80% of the information).

In Greece, due to the complex epidemiology of carbapenemase producers, a battery of phenotypic tests for *Enterobacteriaceae* has been implemented in many clinical laboratories. These tests are based to combined disc tests using meropenem discs without and with carbapenemase inhibitors (mainly phenylboronic acid and EDTA). These tests may effectively discriminate class A from class B carbapenemase producers and also detect isolates producing both class A and class B carbapenemases. The phenotypic detection of the class D OXA-48 carbapenemases, increasingly identified during the last few years, is a more challenging issue (“The phantom menace”) due to the low carbapenem MICs they confer and the absence of a specific inhibitor of OXA-48 activity. Lately, an accurate phenotypic test has been developed for the direct differentiation of OXA-48-producing strains from those producing KPC, KPC/VIM, NDM, VIM, IMP or AmpC/ESBL with porin deficiency; this test could be used along with the algorithm for the detection and differentiation of class A/class B carbapenemases using the carbapenemase inhibitors. Also lately, the rapid phenotypic (antigen detecting) OXA-48 K-SeT test was developed to specifically detect OXA-48-like carbapenemases.

The implementation of the above phenotypic tests helped us to stabilize or even reduce carbapenem resistance rates among *Enterobacteriaceae* in Greece. It was also crucial to avoid further spread of the more recently introduced OXA-48 and NDM-1 producers, despite the fact that outbreaks were initially noticed.

Nevertheless, the implementation of phenotypic tests for β -lactamases' detection in *P. aeruginosa* and *A. baumannii* is difficult, due to the accumulation of multiple mechanisms of resistance in non-fermenters that hinders their detection. Such mechanisms include overexpression of intrinsic AmpC, decreased outer membrane permeability (OprD/CarO, Omps, OmpW), up-regulation of efflux pumps (MexAB-OprM, MexXY-OprM, AdeABC) and/or alterations of PBPs. In these cases, molecular methods and detection of carbapenemases with MALDI-TOF MS usually represent the only diagnostic tools, while Carba NP and CarbAcineto NP tests have proposed as cost-effective assays for detecting carbapenemase production in *P. aeruginosa* and *A. baumannii*, respectively.

In conclusion, the ongoing dissemination of carbapenemase-producing Gram-negative organisms in the Balkans, necessitates concerted actions for their containment, particularly involving the active contribution of the microbiological laboratories. Exchange of data between microbiologists of Balkan countries would also be very important and is cordially encouraged.

2. CARBAPENEM RESISTANT *Acinetobacter baumannii* VERSUS MRSA ISOLATES IN ICU IN CLINICAL CENTER SKOPJE

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Background: *Acinetobacter baumannii* is often referred to as the “Gram-negative methicillin-resistant *Staphylococcus aureus*”, because it is frequently resistant to antibiotics. Clonal outbreaks of carbapenem-resistant and OXA-23-producing *A. baumannii* have been reported worldwide. **Aim:** The goal of this study was to promote the phenomenon of disbalance in endemic hospital ECO system which included increase of carbapenemase-resistant *Acinetobacter baumannii* on account of reduction of MRSA rate in surgical ICU and its clonal relatedness as well as the specific precautions. **Material and Methods:** Computer database from 1994 – 2012 from surgical ICU patients in the Clinical Center Skopje was used as basic material for this study. Comparative study indicated 2007/8 as a break point period in which almost a twofold decrease of MRSA rates (from over 80% to 45%) versus increased rates of *Acinetobacter baumannii* (from 29% to 40%) was observed. In 2011 the very first eight strains of carbapenem resistant (resistant to imipenem and meropenem) *A. baumannii*, were observed. Disc diffusion and VITEK were used for antibiotic susceptibility testing. **Results:** Three distinct strains were detected by PFGE and were designated as UKIM01AC-1 (5 strains), UKIM01AC-2 (two strains) and 642/2 (one strain). UKIM01AC-1 representatives were PCR positive for bla (OXA-23-like), in addition to the bla (OXA-51-like) gene which is intrinsic in *Acinetobacter baumannii*. All isolated strains belonged to European clone II lineage. **Conclusion:** This clone dispersed very fast in 2012 and achieved the rate of 61.9%. This implicated changes in infection control precautions.

Keywords: *Acinetobacter*, Carbapenem Resistance, Clonal Distribution, Endemic ECO System

3. ALTERNATIVE APPROACHES AND PERSPECTIVES OF NANOTECHNOLOGY IN ANTIMICROBIAL RESISTANCE AND INFECTION CONTROL

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Introduction: Infection diseases caused by antibiotic resistant bacteria present major global health concern and a great challenge for science and medicine. Over 700 000 deaths worldwide (25 000 in Europe), including 214 000 neonatal sepsis deaths, are caused to resistant bacterial pathogens each year.

Currently, insufficient access and delays in access to antibiotics cause more deaths than antibiotic resistance, but more resistance-related deaths are being reported in all countries irrespective of income level.

Objectives: To present possibilities and limitations of current antimicrobial therapy against resistant Gram-positive and Gram-negative bacteria, and current, new concepts, approaches and methods as very promising to overcome this tremendous problem.

Methods: Extensive use and misuse of antimicrobials has led to increased bacterial resistance. Studies have revealed that antibiotic resistance genes existed within the microbial genome prior to the discovery of antibiotics. There is evidence that heavy metals and some pollutants, introduction of antibiotics into the environment through human waste (medication, farming), animals, agriculture and the pharmaceutical industry may select antibiotic-resistant bacteria. Current concepts in antimicrobial therapy against resistant Gram-positive bacteria imply use of vancomycin, daptomycin, ceftaroline and telavancin, while, against Gram-negative bacteria (*Multidrug-resistant/MDR, Extensively drug-resistant/XDR, Pandrug-resistant/PDR*) mostly used arecolistin, polymyxin B, carbapenems, tigecycline, fosfomycin, aminoglycosides and rifampicin. Limitation of current antimicrobial therapies are due to concerns of side effects such as: the potential of selecting and rapid spread of resistant strains, toxicity, reduction of normal microbiota and high cost.

Therefore, one of the major challenges for scientists and highest priorities of modern medicine and biotechnology has become developing of novel alternative methods. A promising approach seems to be manipulation of microbes using natural or synthetic molecules which have potential to be used in controlling microbial behavior and virulence.

Current approaches includes:

- Anti-infectious Approaches Based on Biological Factors (Bacteriophages, Synthetic Biology);
- Anti-infectious Approaches Based on Physical Factors (Cold Plasmas low-temperature, Photodynamic Antimicrobial Chemotherapy);
- Chemical Virulence Modulators and Alternative Antimicrobial Compounds
 - Natural Virulence Modulators
 - Synthetic Virulence and QS Signaling Modulators
- Increasing the Efficiency of Antimicrobial Compounds Using Nanotechnology
 - Nanostructures Used in Anti-infectious Therapy
 - Zinc Oxide Nanoparticles
 - Silver Nanoparticles
 - Magnetite Nanoparticles such as Fe₃O₄
 - Synthesis of Fe₃O₄ Nanoparticles
 - Functionalized Magnetite Nanoparticles
 - Antimicrobial Nanoshuttles

○ Antimicrobial Nano-modified Surfaces (Anti-adherent Nano-surfaces)

Extremely small size (1-100 nm) enables nanoparticles to enter the human body through cell membranes or cross the blood-brain barrier.

Metal nanomaterials (silver, gold, copper, titanium, zinc, magnesium, cadmium, and alumina) possess advantage of unique antimicrobial activities. Scientists offers also new complex antibacterial and antiviral Nano systems on the basis of metal oxides or intermetallic oxide compounds (such as TiO₂, ZrO₂, SnO and SiO₂). Silver ions showed strongest bactericidal effect, copper and gold weaker one. Silver ions are non-toxic to human cells in low concentrations.

In our preliminary study on antibacterial activity of several different compositions of nanoparticle coatings (titanium, inox and silver), we found antimicrobial activity of silver, double composition of titanium plus silver against *Staphylococcus aureus* and *Staphylococcus epidermidis*, but not against *E. coli*, *Pseudomonas aeruginosa*, *Listeria monocytogenes* and *Candida albicans*.

The Global antimicrobial resistance crisis alerted WHO to prepare and adopt Global Action Plan (GAP) on Antimicrobial Resistance (2015) which outlines five strategic objectives:

1. to improve awareness and understanding of antimicrobial resistance through effective communication, education and training;
2. to strengthen the knowledge and evidence base through surveillance and research;
3. to reduce the incidence of infection through effective sanitation, hygiene and infection prevention measures;
4. to optimize the use of antimicrobial medicines in human and animal health;
5. to develop the economic case for sustainable investment that takes account of the needs of all countries and to increase investment in new medicines, diagnostic tools, vaccines and other interventions.

The strategic goal of GAP, as a need for an effective “one health” approach is to ensure successful treatment and prevention of infectious diseases with effective and safe medicines accessible to all who need them.

In 2016, EASAC (European Academies Science Advisory Council) and FEAM (Federation of European Academies of Medicine) issued the final report of the Independent Review on Antimicrobial Resistance including recommendations similar to GAP, also suggesting:

- establishment of a Global Innovation Fund for early stage and non-commercial research;
- better incentives to promote investment for new drugs and improvement of existing drugs;
- building of a global coalition for action, via G20 and the United Nations;
- intensify the surveillance activities (antimicrobial resistance and antibiotic use).

Seven new EU research projects on AMR, aim to develop novel antibiotics, vaccines or alternative treatments for drug-resistant microbial infections. Other projects set out to identify better methods to use currently available antibiotics or to study antibiotic resistance within the food chain.

Three projects, funded by the EU Seventh Framework Program (FP7) and the Nano sciences, Nanotechnologies, Materials and New Production Technologies (NMP) Program are working to develop novel nanotechnology-based AMR approaches as follows:

- PneumoNP: Nano therapeutics to treat pneumonia infections
- **FORMAMP: Innovative Nano formulation of antimicrobial peptides to treat bacterial infectious diseases**
- NAREB: Nano therapeutics for antibiotic resistant emerging bacterial pathogens

Conclusion: After 70 years use of antibiotics, concerns of reentering the “preantibiotics” era has become very real because of the rapid spread of antimicrobial resistance and little to no

progress in the development of new antibiotics. Alternative approaches, based on natural or synthetic molecules able to modulate virulence and cell-to-cell communication, become one of the highest priorities of modern medicine and biotechnology. Current technological progress allowed the development of nanosized molecular particles, composed of different components which showed a great antimicrobial effect while at the same time safe for the human use. WHO Global Action Plan on antimicrobial resistance, recommendations of professional organizations and scientific projects in progress emphasize priority needs of joint action to combat antibiotic resistance with greatest goal to control infections, improve health and save lives.

Key words: alternative, antimicrobials, nanoparticles, nanotechnology, resistance.

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4. MIKROBIOM OF THE HUMAN RESPIRATORY TRACT

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The microbiome is defined as the whole habitat of microorganisms and their genetic material present in the human body and research in this field has become a topic of great interest. However, just a 1% of bacterial species was recognized during era of conventional microbiology. Also, it was believed that the lungs of healthy humans were sterile. Development of molecular techniques has dramatically increased knowledge of microbiome and demonstrate that the lungs of healthy people are inhabited by diverse types of bacteria. Furthermore, it is thought that the microbiome of the lungs is very dynamic and transient. The composition of the lung microbiome is determined by the balance of several factors - microbial microaspiration into the airways, elimination of microbes from the airways, and the relative growth rates of its members. Any change in the bacterial community—within an individual or across disease states—must be due to some perturbation in these factors. Recent studies have demonstrated that multiple types of bacteria are linked with asthma development and chronic respiratory disease. Investigation of the lung microbiome is an emerging field and recognition of polymicrobial interactions is necessary for better understanding diseases and the development of effective prevention and treatment strategies.

Key words: Microbiome, respiratory tract, disease

5. DOUBLE CAMP TEST AND ITS SIGNIFICANCE IN DIAGNOSTICS OF CORYNEFORM BACTERIA

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Introduction

Arcanobacterium haemolyticum, *Corynebacterium ulcerans*, *Corynebacterium pseudotuberculosis*, *Trueperella pyogenes* and *Rhodococcus equi* represent pathogenic types of microorganisms that are often misidentified in routine work and in both human and veterinary microbiology laboratories.

Differentiation of these bacteria can be controversial in those species that have the appearance of colonies similar to the usual and expected species. They can easily be mistaken for them precisely due to this "colonial mimicry". Genera *Staphylococcus*, *Streptococcus*, *Corynebacterium*, *Nocardia*, or gram-negative glucose non-fermenting species are bacteria with which they can be confused.

In the coryneform group, the most important species include:

- Phospholipase D producers (*Arcanobacterium haemolyticum*, *Corynebacterium ulcerans* and *Corynebacterium pseudotuberculosis*)
- *Rhodococcus equi*
- *Trueperella pyogenes*

Phospholipase D producers

Phospholipase D is an enzyme that destroys the membrane of mammalian cells and only three bacterial species can produce it. Thus, confirmation of this enzyme is a crucial diagnostic parameter (Součková and Souček, 1972; Barksdale et al., 1981). All three species were classified into the genus *Corynebacterium* until early eighties: *Corynebacterium haemolyticum*, *Corynebacterium pseudotuberculosis* and *Corynebacterium ulcerans*. In 1982, a separate genus was proposed for *Corynebacterium haemolyticum*, thus the organism was renamed to *Arcanobacterium haemolyticum*.

Arcanobacterium haemolyticum

Arcanobacterium haemolyticum (*A. haemolyticum*) predominantly causes diseases of the upper respiratory tract of human population. However, some strains can produce erythrogenic toxin, in which case they can clinically mimic the scarlatina, exanthema toxialergicum and rash fever. The organism rarely causes severe health problems and complications such as sepsis (Ford et al., 1995), endocarditis (Worthington et al., 1985), mixed wound infections (Barker et al., 1992), neurological complications (Chandrasekar and Molinari, 1987) and cavitary pneumonia (Waller et al., 1991).

It is rarely isolated in general population (1/100 in throat swab samples), but it is much more frequent in teenagers, which are predilection category. Its rare identification is most likely a consequence of its misidentification due to similarity of its colony with mimicking genera and species, such as *Trueperella pyogenes* and species of genera *Streptococcus* and *Listeria*.

Precise diagnosis of this bacterium is not just "l'art pour l'art", because *Arcanobacterium* is treated differently than mimicking species. Its misidentification leads to diagnostic and therapeutic failures, increasing the number of hospital days and time spent on sick leave (Kovatch et al., 1983).

In our country, a case of seventeen year old girl was reported. The patient had mild symptoms of pharyngitis, marked urticarial rash and heavy desquamation of palms and soles. According

to the antibiogram and bacteriological diagnosis of *Streptococcus* non A non B group, the patient was treated with penicillin; however, ineffectively. Escalation of urticaria and failure of the initial penicillin therapy shifted the diagnosis towards exanthema toxialergicum and, thus, to the treatment with corticosteroids and antihistaminics, yet with no improvement. Repeated bacteriological examination of throat swabs applying more complex diagnostic procedures confirmed the identity of *Arcanobacterium haemolyticum*. Erythromycin 500 mg, twice a day for seven days, resulted in complete eradication of the causative agent. The patient fully recovered (Suvajdžić et al., 2006)

A. haemolyticum is rarely isolated from animals. There are only few cases reported from animal samples. The lungs are the most commonly infected organs (Roberts 1969; Suvajdžić 2000; Suvajdžić et al., 2002; Suvajdžić et al., 2012a), but it was also reported from bull semen (Richardson and Smith, 1968) and the central nervous system of goat (Younan and Drescher, 1996).

Corynebacterium pseudotuberculosis* and *Corynebacterium ulcerans

The diseases caused by these pathogens are widespread throughout the world. *Corynebacterium pseudotuberculosis* (*C. pseudotuberculosis*) is a well-known animal pathogen, with rare reports of the isolation in humans. Epidemiological data for *Corynebacterium ulcerans* (*C. ulcerans*) are inverted.

Although sheep (Queen et al., 1994; LeaMaster et al., 1987; Brown and Olander 1987; Pepin et al., 1997) and horses (Merchant 1935; Aleman et al., 1982-1983) are most frequently infected species, the other species are prone to infection as well. The organism was isolated from goats (Brown and Olander, 1987; Gezon et al., 1991), pigs (Suvajdžić 2000; Biberstein and Zee, 1990), cattle (Suvajdžić 2000; Yeruham et al., 1996; Songer et al., 1988), camels (Songer et al., 1988) and humans (Jones and Collins, 1986).

Animal feed can be source of infection especially if not stored properly. The organism can be transmitted by insects (Aleman et al., 1982-1983; Yeruham et al., 1996), which is important for epidemiological prognosis (Yeruham et al., 1997).

Skin wounds are the most common entry portal of infection (Aleman et al., 1982-1983) while the skin and lymphoid tissue is usually its target (Biberstein and Zee, 1990).

Distribution and spectrum of changes vary depending of the entrance portal of infection and paths of spreading. Lymphogenic dissemination is always included (Biberstein and Zee, 1990), but hematogenic and *per continuitatem* just occasionally (Aleman et al., 1982-1983). The exudate produced during the infection demonstrates greenish opalescence. Lesions are caseous to dry and crumbly (Biberstein and Zee, 1990).

Pathogenicity: diphtheria toxin

In the late seventies and early eighties (Barksdale et al., 1981; Jones and Collins, 1986), it became clear that within the genus *Corynebacterium* there is a group of related microorganisms able to produce real diphtheria toxin. To produce this toxin, they have to be lysogenized by beta phages. Besides *Corynebacterium diphtheriae*, this group includes *Corynebacterium ulcerans* and *Corynebacterium pseudotuberculosis*.

Cases of skin manifestations (in the form of gangrenous dermatitis) (Olson et al., 1988) and granulomatous necrotizing pneumonia, where *C. ulcerans* was isolated as a monoculture, are described.

If not lysogenized by beta phage, the organisms produce only their own toxin, the ovis toxin. Its main component is phospholipase D. Determination of ovis toxin structure has ended a half-century long speculation about the nature of this toxin, which is produced independently of the presence of beta phage (Barksdale et al., 1981).

From an epidemiological point of view, it is important to emphasize that *C ulcerans* could be transferred to humans by milk and dairy products. This microorganism was the only causative agent of food borne outbreaks associated with milk consumption in two of the 27 cases in England and Wales (1983; 1984). This indicates the importance of mandatory ruling out the presence of *C ulcerans* in milk samples in cases of mastitis, as well as in consumable milk and milk products.

Treatment and control in human

In the beginning, penicillin was the drug of choice (numerous reports of symptoms withdrawal three days after the introduction of); many clinical failures were noted in the per oral and parenteral administration. Banck described 18 patients treated with penicillin V per os 25 mg per kg a day in two daily doses during seven to ten days. Patients had *A. haemolyticum* in the throat 2 to 4 weeks after therapy (Banck and Nyman, 1986). Based on the high level of penicillin tolerance in 40 isolates, Nyman found that penicillin V is ineffective in the treatment of *A. haemolyticum* (Nyman et al., 1990). Osterlund is of the same opinion, interpreting that with the intracellular survival of microorganisms (Osterlund 1995).

Uniform *in vitro* sensitivity to erythromycin (Carlson et al., 1994) and an excellent effect in clinical practice qualifies erythromycin as antibiotic of choice for treatment of *A. haemolyticum* infections. Erythromycin has proven to be effective in oral administration of 250 mg four times a day during ten days and at a dose of 500 mg twice a day during seven days.

Treatment and control in animal

In sheep and goats, the penicillin treatment of infections caused by the *Corynebacteria* is not efficient. Prevention of disease spreading is limited to the separation of sick animals, limiting the exposure of infection, sanitary care and hygiene measures. Bacterin-toxoid combination could be useful in infection limiting. Abscesses are treated surgically. According to our experience, local administration of gentamicin gives better results than penicillin, which is consistent with the experience in human medicine.

Reason for diagnostic wandering and how to avoid them

What is this all about? Colonies of *A. haemolyticum* resemble beta hemolytic species of the genus *Streptococcus* and *Listeria* and *Trueperella pyogenes* colonies. In bacteriological jargon, all of the mentioned genera and species are known as "beta small". Thus, a veterinary bacteriologist will "see" what he expects, *T. pyogenes* or *Listeria* sp.. Medical microbiologist will pursue, through normal routine procedure, this isolate to the "bacitracin, CAMP test" and, the next day, he will interpret the result as *Streptococcus* non A non B group (Suvajdžić and Suvajdžić, 2014).

As for the diagnosis of *Corynebacterium ulcerans*, there is an even bigger trap: colonies can mimic species of the genus *Staphylococcus*. Each microbiologist, medical or veterinarian, will subject such colonies to plasma coagulation in a test tube, rather than making smears. Since plasma in a tube test will be positive (detection of free coagulase), neither human nor veterinarian microbiologist will have any reason to doubt that he proved "coagulase positive staphylococcus". *C. pseudotuberculosis* could "pass" as species of genus *Staphylococcus*, *Nocardia*-like organism or diphtheroid. Sometimes we declare unrecognized colonies as "Luft bacteria" (air bacteria), which implies insignificant contamination (Suvajdžić and Suvajdžić, 2014).

In veterinary medicine, clinicians commonly alert microbiologists at the delivery of the material or samples for examination because of typical cheesy changes (“cheesy gland”) in *C. pseudotuberculosis*, but not in the cases of *C. ulcerans* and *A. haemolyticum*.

Rhodococcus equi

Rhodococcus equi (*R. equi*) was first isolated and identified from the lungs of foals by Magnuson in Sweden in 1923 and nominated for a new species (Magnusson, 1923). Since then, many researchers have found *Rhodococcus equi* in many mammals, such as horses, cattle, goats, sheep, pigs, dogs, cats, deer and bears. It was isolated from poikilothermic animals such as crocodiles, wild birds and arthropods (Takai et al., 1996; Suvajdžić, 2000; Suvajdžić et al., 2001; Flynn et al., 2001; Takai et al., 2003; von Bargen and Haas, 2009). However, this microorganism is predominantly isolated from horses (Prescott, 1991; Muscatello, 2012; Suvajdžić et al., 2015b) and due to possible consequences on health of horses, it is studied in details (Suvajdžić et al., 2015a).

Rhodococcus forms visible colonies after 18 hours of incubation. Colonies are shiny, white, resembling porcelain and up to 1mm in diameter. (Krech and Hollis, 1991; Claridge and Spiegel, 1995; Quinn et al., 1998).

Imitation of *Acinetobacter* spp. can lead to double confusion: 1. Bacterium has coccus shape during 6 hours in 24 hours life cycle, and it is labile in Gram staining 2. Biochemically, *Acinetobacter* can have the same activity as *R. equi*.

What is the reason to think of *R. equi*? After the subsequent 24 hours of incubation, colonies became mucous, confluent, reaching few millimetres in diameter and growing better in aerobic than in microaerophilic conditions. After seven days at room temperature colonies are turned salmon pink in colour. In the Gram-stained smears, regular cycle bacterial morphology revealed an appearance transformation: coccus-coccoid-bacillus-coccoid-coccus in 24 hours (Barton and Hughes, 1980; Suvajdžić, 2000; Suvajdžić, 2004; Suvajdžić et al., 2015b).

R. equi produced free and bound coagulase. It coagulates rabbit plasma diluted 1:4 and it is positive in Cadnes Graves test. In classical biochemical series: Triple Sugar Iron agar (TSI slant), Sacharose, Lactose, Glucose, Simmons' Citrate Agar, Clark Lubs medium, Adonitol and Inositol broth, Christensen's Urea agar slant i Sulfide, Indole, Motility (SIM) medium- the organism is non-reactive in each tested parameter (Suvajdžić et al., 2015b), or it is positive only in Christensen's Urea test (Suvajdžić, 2000).

The first case of infection among humans in the form of lung abscess was described by Golub et al. in 1967 (Golub et al., 1967), in a 29 years old man who was diagnosed for plasma cell hepatitis and treated with prednisone.

Today, it is known that 10% of infected patients are treated with immunosuppressive drugs (La Rocca et al., 1998). It is believed that about two-thirds of patients infected with *R. equi* suffer from HIV. However, brain abscess (Corne et al., 2002) and endophthalmitis of a 9 year old boy, were also found although patients were not immunocompromised (Ebersole and Paturzo, 1988).

Since then, more than 20 endophthalmitis in humans with different immune statuses were found (Van Etta et al., 1983) and approximately 30 entities in imunocompetent persons, including infections of soft tissues, intestinal, pulmonary and abscess forms, and even generalized forms (Weinstock and Brown, 2002).

In Serbia, reports of the isolation of *R. equi* were extremely sporadic: isolations from the lungs of pigs and calves (Suvajdžić, 2000), from the lungs of a colt (Suvajdžić et al., 2001), from a dog's eye (Mišić et al., 2004), from a human's eye (Suvajdžić, 2004), from pulmonary malakoplakia (Suvajdžić and Považan, 2006) and from blood and sputum cultures and lung empyema (Mikić et al., 2014).

These rare isolations of this species suggest its misidentifications in human and in veterinary microbiology laboratories. This can be avoided if suspect colonies are tested in CAMP test with *S. aureus*.

Trueperella pyogenes

Trueperella pyogenes was first isolated, described and proposed as a new species by Glage in 1903. He named it *Bacillus pyogenes*. In 1918, in cooperation with Ebersson, the same author suggested a new name, *Corynebacterium pyogenes*, due to the similarity with the coryneform microorganisms. Since then, this causative agent went through several genera, *Corynebacterium*, *Actinomyces*, *Arcanobacterium* and it was recently renamed and reclassified in the *Trueperella* (Carneiro et al., 2016).

By the late seventies, it was underestimated as a source of disease in humans, and reports of its isolation or co-isolation were sporadic (Gahrn-Hansen and Frederiksen, 1992; Vega and Gavan, 1970). The prejudice that it was strictly an animal pathogen culminated in 1950s, when scientists found a similar species, *A. haemolyticum*, and named it *A. pyogenes var. hominis* (Barkdale et al., 1957).

It causes suppuration of all types of tissues, organs and organ systems, in all species of mammals (including humans) and certain birds. The lesions are usually abscesses, empyema, and pyogranuloma. Infections are often of opportunistic or traumatic origin, and they can be local, generalized and metastatic. It is rarely isolated in pure culture, apart from primarily sterile regions in the body. Usually, it is associated with other suppurative causative agents or gram negative anaerobes (Azawi, 2008; Machado and Bicalho, 2014).

Colonies on blood agar may not be visible until the second or third day of incubation at 37° aerobically. Prior to the formation of visible colonies, spots with observed hemolysis can be noted. This gives the impression of defects in the agar, as colonies are growing into the surface. Colonies have all the characteristics of "β small" S forms of growth, with a two to four times larger diameter of hemolysis than the diameter of colonies. In some strains, on the fourth day of incubation, a milky white blur appears on top of the colonies, and in the following days previously colorless colonies become completely milky-white. A superior way to differentiate them from similar species is a double CAMP test (Lämmle and Blobel, 1988; Suvajdžić, 2000).

Microbiological diagnosis- double camp test

The double CAMP test represents two associated CAMP phenomena: the inverse CAMP phenomenon, and the *Rhodococcus* CAMP phenomenon.

Zaharova and Kubelka (1960) found that some bacteria produce substances that protect red blood cells from lysis by staphylococcal toxin in the blood agar. This phenomenon is called the "inverse CAMP phenomenon." In the following decades, this has been confirmed by many researchers (Součková and Souček, 1972; Lämmle and Blobel, 1988; Comman, 1996; Claridge, 1989 and 1995; Suvajdžić et al. 1994-2015).

Based on the synergistic haemolysis with equi factors of *Rhodococcus equi* (*Rhodococcus* CAMP phenomenon), in 1989 Jill E. Claridge developed a simple and reliable test that can be performed in every routine practice laboratory because it requires only one blood agar in supplies. Suvajdžić et al. confirmed this through a series of papers in the period 1994-2015.

To perform this test, the following material is needed: a Petri plate with blood agar and diagnostic strains of *Staphylococcus aureus* and *Rhodococcus equi*. The test is performed as a classical CAMP test, but there are two vertical lines of diagnostic strains instead of one. Between them, the positive control and the testing isolates are drawn perpendicularly (at 90°).

Every microbiological laboratory has in its collection *Staphylococcus aureus* for classical CAMP testing and *Streptococcus agalactiae* as a positive control for it. What is still missing is a reference or an indigenous isolate of *Rhodococcus equi*, which can be obtained easily.

The bacteria that produce phospholipase D (*Arcanobacterium haemolyticum*, *Corynebacterium ulcerans* and *Corynebacterium pseudotuberculosis*)- These species restrict beta hemolysis of *S. aureus*. They produce specific and recognizable CAMP phenomena with *Rhodococcus equi*, which take shapes picturesquely described as a shell, a mushroom or an umbrella. In all of the isolates, a synergistic hemolysis with an equi factor of *R. equi* and antagonistic hemolysis with *S.aureus* can always be observed.

R. equi- It develops synergistic hemolysis with *S. aureus*, in the characteristic spade shape, with sides converging to the top. In a double CAMP test, when *S. aureus* is vertically drawn to *R. equi*, synergistic hemolysis gains the shape of a crescent (Suvajdžić, 2000; Suvajdžić et al., 2015b).

T. pyogenes- In the double CAMP test, this bacterium shows synergistic hemolysis with *R. equi*, is the shape of a spoon or a scoop, but it is smaller in comparison with phospholipase D producers. However, the most important difference is that *T. pyogenes* does not show the inverse CAMP phenomenon (antagonistic hemolysis with *S. aureus* is not present).

Listeria spp.- By using the double CAMP test, it is possible to confirm the identity of *Listeria monocytogenes* and *Listeria ivanovii*, which give synergistic hemolysis in the shape of match head and closed umbrella, respectively, while antagonistic hemolysis with *S. aureus* is absent. Commercial kits are not available in most routine laboratories, they are expensive and their use is limited. The double CAMP test is very simple, inexpensive and a widely available method to determine the identity these bacteria with certainty, in just 24 hours after obtaining a pure culture. The price of the test is identical to the price of Petri plates with blood agar, because blood agar it is the only expendable material.

Conclusion

The double CAMP test is inexpensive, reliable and available method for the differentiation of phospholipase D producers, *Rhodococcus equi*, *Trueperella pyogenes* and beta hemolytic forms of *Listeria* spp. Such a large benefit in the precise identification of numerous "Streptococcus like" and "Staphylococcus like" species, suggests that in the routine work a double CAMP test should be applied instead of classic CAMP test.

Each "beta small" colony, beta hemolytic staphylococcus and nocardioform microorganism should be examined in a double CAMP test. At the price of a single Petri plate with blood agar, we can confirm the diagnosis of all three phospholipase D products, as well as several other species that are rarely found in clinical samples. We should not forget that we can find just what we are looking for.

It is recommended that phospholipase D producers should be excluded from milk and dairy products for its possible effect on human health. In mastitis and feed, they should be excluded because of the animal health.

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6. LABORATORY DIAGNOSIS OF GENITAL CHLAMYDIAL INFECTION: DISTINCTION BETWEEN ACUTE AND PERSISTENT INFECTION

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Chlamydial anogenital infection is the most common bacterial STI affecting over 100 million people each year worldwide. Clinically, chlamydial infections are presented as asymptomatic, acute symptomatic as well as persistent infections. Majority of chlamydial infections are asymptomatic and remain undiagnosed and untreated. Untreated chlamydial infection may cause severe complications, including salpingitis, pelvic inflammatory disease, ectopic pregnancy and infertility.

C. trachomatis can be diagnosed by culture, direct immunofluorescence assays, enzyme linked immunosorbent assays and serology, but nucleic acid amplification tests (NAATs) are preferred due to their superior performance characteristics. Distinction between acute and persistent infection is rather difficult and no widely accepted laboratory criteria for persistent infection exist at present. By definition, the detection of persistent chlamydial infection (defined as the presence of viable but non-cultivable chlamydiae) by culture is not possible. The detection of chlamydial antigen(s) by immunocytochemistry in tissues obviously require more invasive sampling than swabbing of the mucosa to demonstrate the hallmarks of persistent infection, the aberrant bodies. The NAATs, including polymerase chain reaction, are well suitable for the detection of persistent chlamydial infection, as presence of chlamydial DNA in tissues, when the bacteria are not cultivable is suggestive of persistence, as DNA in the non-viable bacteria degrades fast *in vivo*. Although serology is not recommended for diagnosis of acute *C. trachomatis* infections it has been a valuable tool in studies describing persistent infection. Consistently present/elevated anti-chlamydial IgA antibody titers or elevated serum of IgA and IgG antibodies together with elevated C-reactive protein and Hsp60 proteins is associated with tubal factor infertility as manifestation of persistent *C. trachomatis* infection. Proteomic analyses have revealed that a part of the chlamydial proteins are more frequently and a part of them less frequently expressed during persistent than acute infection. Using proteomic approach, reactivity with several proteins (CT110, CT376, CT557 and CT443) could distinguish women with acute infection and those with TFI.

Utilizing these new data will lead to the development of more precise serological assays that could better differentiate responses related to acute infection, cured past infection (serological scar) and persistent infection.

Key words: diagnosis, *C. trachomatis*, acute, persistent, infection.

7. ENDING TUBERCULOSIS: ROLE OF THE MYCOBACTERIOLOGY LABORATORY

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Tuberculosis (TB) is a top infectious disease killing patients worldwide. According to the last report of the World Health Organization (WHO), in 2014 there were 9.6 million new TB cases, and 1.5 million patients died from the disease (1). The emergence of multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB presents an additional threat for the control of the disease. In 2015 Stop TB Strategy was replaced with the End TB Strategy, which aims to end the global TB epidemic by 2030 (2). One of the major components of The End TB Strategy is early diagnosis of TB and universal drug susceptibility testing (DST). The Strategy, therefore, recognizes the critical role of the mycobacteriology laboratories that should provide accurate and rapid detection of TB and drug resistance. Commercial liquid culture systems and molecular assays based on nucleic acid amplification techniques have been developed for rapid TB diagnosis and DST (line probe assays: GenoType[®] assays; automated real-time nucleic acid amplification: Xpert MTB/RIF system). In 2016 WHO recommended TB-LAMP (loop-mediated isothermal amplification) as a new rapid test to diagnose TB in peripheral health centers (3). The sensitivity and specificity of rapid molecular assays is high for pulmonary TB, but still those techniques cannot replace conventional diagnostics, and display lower sensitivity for extrapulmonary samples and HIV positive patients (4).

While novel tests of higher sensitivity, and well-designed point-of-care tests are most certainly needed in the future, it is obvious that mycobacteriology laboratories have a central role in achieving an end to the global TB epidemic.

Key words: tuberculosis, multidrug-resistant tuberculosis, drug susceptibility testing, nucleic acid amplification techniques, End TB Strategy

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ORAL PRESENTATIONS

1. CONTROL AND MONITORING OF MICROBIOLOGICAL CONTAMINATION IN WATER FOR DIALYSIS

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Objectives: Water of the appropriate quality used in the preparation of dialysis fluid is an essential requirement of haemodialysis and related therapies. International standards have been developed to promote the installation of fit for purpose water treatment facilities for haemodialysis and to safeguard the routine production of treated water suitable for use for haemodialysis and haemodiafiltration.

Quality requirements for the water and concentrates used to prepare dialysis fluid, and for dialysis fluid, are provided in ISO 13959:2014, ISO 13958:2014 and ISO 11663:2014. In addition, the requirements for water treatment equipment are provided in ISO 26722:2014. ISO 23500:2011 addresses the quality management of the water treatment system and distribution loop within the renal unit. The rationale for the development of these standards is to protect haemodialysis patients from adverse effects arising from known chemical and microbiological contaminants found in water and improperly prepared dialysis fluid.

In Serbia, regulation on dialysis water quality has not been established yet, but some of dialysis centers have introduced EU quality requirements. The crucial point are: design and disinfection of system; method and frequency of monitoring; sampling location, timing and techniques; culturing water borne microorganisms; measuring endotoxin levels; outcome measures.

Key words: Dialysis fluid, LAL, microbial count

2. *Legionella* - EUROPEAN SURVEILLANCE AND RECOMMENDATIONS FOR MICROBIOLOGICAL INVESTIGATIONS

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Objective: Information from ECDC training course on Legionnaires' disease (LD). *Legionella* spp. are causative agents of LD, atypical pneumonia with high lethality rate. *Legionella* is spread by mechanism/operation that generates aerosols or water droplets, therefore cases are usually linked to poorly maintained/designed water/cooling system.

Most countries have legislation for control of *Legionella* in water/cooling systems. In Serbia investigations for *Legionella* are performed lately in few laboratories, but surveillance and legislation are not in place.

Microbiological investigations are necessary for diagnosis of LD. Urine antigen testing is rapid but only detects *L.pneumophila serogroup 1*. Culture detects most species, provides epidemiological information but takes time. PCR and sequence based tests provide sensitive, specific and rapid analysis and enable linking of clinical and environmental isolates.

European Legionnaires' Disease Surveillance Network - ELDSNet supports rapid diagnosis, information and coordination of response to cases of LD in EU/EEA to decrease incidence and mortality, through establishing guidelines and case definitions of LD.

Guidelines standardize investigation procedures across Europe increasing protection of Europeans from acquiring travel associated LD.

Case definitions set national and international standards for defining cases, verify the diagnosis, facilitate investigations and collaborations.

Conclusion: ECDC recommends regular testing for *Legionella* and adopting legislative/guidelines.

Key words: *Legionella*, ELDSNet, guidelines, microbiological investigations

3. PHENOTYPIC AND GENOTYPIC METHODS FOR DETECTION OF EXTENDED SPECTRUM β -LACTAMASE PRODUCING *Klebsiella pneumoniae* AND *Escherichia coli* ISOLATED FROM NEONATAL BLOOD CULTURES

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Objectives: Rapid spread of resistance to broad spectrum beta-lactams in pathogenic bacteria causes antibiotics ineffectiveness and increased severity of illness. The CTX-M groups are among most dominant Extended Spectrum β Lactamases (ESBL) in *Enterobacteriaceae* in the world. The aim of the study was to identify the occurrence of ESBL production and to detect the presence of ESBL genes by phenotypic and genotypic methods using VITEK -2 and Polymerase Chain Reaction (PCR) method, respectively.

Materials and methods: The isolates from neonatal blood cultures were identified by standard biochemical methods. Isolates with decreased susceptibility to 3 (rd) generation of cephalosporins were tested for the ESBL production by combination disc diffusion method. Susceptibility patterns for these isolates were also obtained using VITEK -2 system while the presence of CTX-M group of genes were done by PCR.

Results: Among the 50 primoisolates collected from neonatal blood cultures during the period of two months, 13 isolates belonged to the *Enterobacteriaceae* family (9 *Klebsiella pneumoniae* isolates and 4 *Escherichia coli*) and all of them showed the production of beta-lactamases by phenotypic methods. Using PCR methods the presence of CTX-M genes were detected in all 13 isolates with CTX-M Group 1 found in 11 (84.6%). The simultaneously presence of CTX-M Group 1 and SHV-1 genes were detected in 10 isolates (77%).

Conclusion: Although phenotypic method can be used in routine work for determining the profile of bacterial sensitivity to antimicrobial drugs in purposes.order to help clinician in managing the treatment of the patient, detecting the presence of genes responsible for the production of ESBL by genotypic method is necessary for the infection control

Key words: Extended Spectrum Beta Lactamase, Polymerase Chain Reaction, VITEK-2, blaCTX-M gene, blaSHV gene

POSTER PRESENTATIONS**1. EVALUATION OF A NEWLY DEVELOPED MULLER HINTON E AGAR FOR THE DETECTION OF METHICILLIN-RESISTANT *Staphylococcus aureus* STRAINS**
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Objectives: In recent evaluations, cefoxitin proved superior to oxacillin for detection of methicillin-resistant *Staphylococcus aureus* (MRSA) strains. Furthermore, the studies revealed considerable differences between Muller Hinton (MH) agars from different manufacturers. The objective of this investigation was to evaluate the newly developed MH E agar for detection of MRSA isolates.

Material and methods: The evaluation included 30 MRSA isolates confirmed by multiplex PCR detecting *mecA* gene. The strain collection represented different Clonal Complexes (CCs): CC5, CC8, CC45, CC80 and CC152. MH E agar (bioMérieux) and in house prepared MH agar (Torlak) were tested. Inhibition zone diameters were measured for 30 mg cefoxitin discs using a conventional methodology and MICs for vancomycin were measured using Etest. Data were interpreted in accordance with EUCAST recommendations.

Results: MH E agar correctly identified 100% of the isolates. There was significant difference between newly developed and in house MH agar for determination of cefoxitin resistance ($p < 0.001$) and vancomycin susceptibility ($p = 0.004$). Also, the significant difference was noticed between CCs in cefoxitin resistance ($p = 0.008$), with CC5 and CC8 having the lowest value of inhibition zones (med 6, 6-12).

Conclusions: The correct phenotypic identification of MRSA isolates using MH E is an improvement compared to the former MH agars.

Key words: MRSA, MH E agar, clonal complexes, cefoxitin, vancomycin

2. INVESTIGATION OF CAMPYLOBACTER INFECTIONS IN CHILDREN PRESENTING WITH DIARRHEA IN SOFIA, BULGARIA

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Objectives: Campylobacters are zoonotic bacteria and a leading cause of gastroenteritis among young children worldwide. The most commonly isolated in humans are *Campylobacter jejuni* and *C. coli*. The aim of this study was investigation of *Campylobacter* infections in children with acute diarrhoea by three different methods.

Materials and methods: For the period April - May 2016 forty one stool samples were obtained from children with acute diarrhea (age range one month - 5 years) in HIPD, Sofia. All the samples were investigated by immunochromatographic card test (ICT) (CerTest, Spain) and a multiplex-PCR assay was applied for simultaneous identification and discrimination of *C.jejuni* and *C.coli* directly in stool. Culturing was performed in a microaerophilic atmosphere at 42°C for 48hr.

Results: Twenty-five out of 41 (60.2%) samples tested positive by multiplex-PCR; 30/41 (73.2%) by ICT and 12/30 (40%) by culturing. Determined by PCR 15/25 (60 %) were *C. jejuni*, 8/25 (32 %) *C. coli* and 2/25 (8 %) *Campylobacter sp.*

Conclusion: In accordance with the obtained results the most sensitive method for detection of *Campylobacter sp.* directly in stool was ICT. But the multiplex PCR analysis demonstrated highest accuracy for identification and differentiation of the most frequent causes of campylobacteriosis - *C jejuni* and *C. coli*, that makes it necessary in clinical diagnostics.

Key words: multiplex-PCR; *Campylobacter* infections.

3. HUMORAL RESPONSE TO *CAMPYLOBACTER JEJUNI* IN INFANTS UP TO TWO YEARS OF AGE

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Objectives: The “hygiene hypothesis” addresses the correlation between the occurrence of atopy and the frequency of infections in the earliest age, explaining an increase in the incidence of atopic diseases by living in good, infection-free, hygienic conditions. The aim of our study was to determine the connection between atopy and *Campylobacter* infection, and to analyze the association between serum concentrations of total IgE and *Campylobacter* infection in relation to atopy in children up to two years.

Methods. A case control study was conducted with the sample of 98 infants of the average age of 8 months. Total serum IgE and Phadiatop infant multi-test were determined on Immunocap-100. The presence of atopy was determined by detection of serum-specific IgE ≥ 0.35 kUA/L and serum IgM, IgA, IgG levels against *C. jejuni* were determined by a quantitative immuno-enzyme test - SERION ELISA classic.

Results and Conclusion. The risk factors for *C. jejuni* infection are age and tIgE, and the protective factors are breastfeeding and atopy. *C. jejuni* infection increases the total serum IgE level, which is predictive of infection, regardless of the presence of atopy. The presence of symptomatic *C. jejuni* infection reduces the risk of atopy in a child of the age of 5–24 months by the factor of 10.

Key words: Campylobacter jejuni, child, atopy, immunoglobulins, immunologic tests

4. APPLICATION OF TRIPHENYLTETRAZOLIUM CHLORIDE IN MICROBIOLOGY

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2,3,5-triphenyltetrazolium chloride (TTC) is a tetrazolium salt which has found its application in the detection of biological reducing systems. This colorless hydrosoluble oxidized form becomes a dark red liposoluble formazan derivative, 1-phenyl-2-[(Z)phenyl(phenylhydrazono)methyl]diazene, in the irreversible reaction of reduction. The appearance of red color indicates viability and activity of the biological system, which are directly proportional to the intensity of color.

The concentration of the TTC that is added to the tested medium mainly depends on the type of the microorganism, and it varies in the range of 0.005- 2%.

TTC dye allows visualization and makes counting of colonies on agar plates easier. However, this is applicable only in TTC reducing microorganisms.

Positive TTC urine test suggests the presence of uropathogens, with the biggest reliability precisely in cases of the most frequent causative agents of urinary tract infections, *Escherichia coli* and other enterobacteria.

The compound has also found its application in differential diagnostics. Based on the TTC test, it is possible to distinguish between certain types of streptococci, staphylococci and yeasts.

TTC has found its application in determining antimicrobial susceptibility. The minimal microbicidal concentrations can be determined on the basis of the red solution absorbance (measured at 480 nm).

Key words: triphenyltetrazolium chloride, TTC test, formazan, indicator, viability

5. IS CERVICAL *CHLAMYDIA TRACHOMATIS* INFECTION FREQUENT FINDING IN WOMEN WITH ALTERED VAGINAL FLORA?

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Serbia

Objectives: The aim of this study was to examine the relationship between altered vaginal flora and cervical *Chlamydia trachomatis* (CT) infection.

Materials and methods: Gram-stained smears of vaginal discharge from 66 women of reproductive age were examined. Vaginal flora was classified according to the Nugent's microscopic criteria as normal (NF), intermediate (IF) and bacterial vaginosis (BV). IF and BV were marked as altered vaginal flora. Direct immunofluorescence test (bioMérieux, France) was used for detection of CT infection.

Results: Of 66 examined women, 40 were defined as having NF (of which 4 with and 36 without CT infection), 11 as having IF (4 with and 7 without CT infection), and 15 as having BV (1 with and 14 without CT infection). CT infection was detected significantly more often in women with IF compared to women with NF ($p < 0,05$).

Conclusion: Women with altered vaginal flora as intermediate flora had significantly more frequently cervical infection caused by *Chlamydia trachomatis*.

Key words: altered vaginal flora, bacterial vaginosis, *Chlamydia trachomatis*

6. PREVALENCE OF MULTIDRUG RESISTANT NONFERMENTIG GRAM-NEGATIVE BACILLI IN LOWER RESPIRATORY TRACT SAMPLES

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Background: Nonfermenting Gram-negative bacilli have emerged as important healthcare-associated pathogens in lower respiratory tract. The most commonly isolated bacteria are: *Acinetobacter spp.*, *Pseudomonas aeruginosa* and *Stenotrophomonas maltophilia*. They often exhibit resistance to multiple groups of antibiotics.

Methods: In the period from 1st January to 31th December 2015, non duplicate strains were isolated from lower respiratory tract of patients hospitalized on the various wards in the Clinical Centre of Vojvodina and Institute of Child and Youth Healthcare of Vojvodina. The samples were obtained from: sputum, bronchoalveolar lavage, endotracheal aspirate. Isolation and identification of strains were based on standard microbiological methods. Antibiotic susceptibility was tested by disk diffusion method according to EUCAST recommendations.

Results: Out of 655 isolates, 356 (54,3%) were identified as *Acinetobacter spp.*, 186 (28,4%) as *Pseudomonas aeruginosa*, 95 (14,1%) as *Stenotrophomonas maltophilia* and 18 (3,2%) as other nonfermenting bacteria. There were 329 (92,4%) multidrug-resistant isolates of *Acinetobacter spp.* and *Pseudomonas aeruginosa* 34 (18,6%). All isolates of *Acinetobacter spp.* were susceptible to colistin. Resistance to co-trimoxazol occurred in 14,5% *Stenotrophomonas maltophilia* isolates.

Conclusion: The most commonly nonfermenting Gram-negative bacilli isolated from lower respiratory tract samples were *Acinetobacter spp.*, *Pseudomonas aeruginosa* and *Stenotrophomonas maltophilia* with high prevalence of multidrug resistance profiles.

Key words: non fermenting Gram-negative bacilli, antimicrobial resistance

7. MACROLIDE RESISTANCE PHENOTYPES OF INVASIVE AND NONINVASIVE GROUP B STREPTOCOCCI

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Objectives: The aim of this study was to determine macrolide resistance prevalence, as well as macrolide resistance phenotypes among invasive and non invasive group B streptococci (GBS) in Belgrade, isolated from January to December 2015.

Methods: Isolated GBS strains from neonates with sepsis (n=50) and genital tract of colonized and infected pregnant and nonpregnant women (n=430) were obtained from two major obstetric and two pediatric hospitals in Belgrade. All strains were screened for antimicrobial susceptibility while macrolide resistance phenotypes were determined using double disk diffusion test.

Results and conclusion: All isolates were susceptible to penicillin, vancomycin, norfloxacin and chloramphenicol. The prevalences of erythromycin and clindamycin resistance among invasive neonatal strains were 20% and 16%, respectively. Of all genital isolates 28% and 24,65% were resistant to erythromycin and clindamycin. Predominant macrolide resistance phenotype in both study groups was MLS. Tetracycline resistance was high (90% and 83.48%) among both groups of isolates. In conclusion, the rate of macrolide resistance among GBS in our country is worrisome and these results support the recommendations that all isolates must be tested for the resistance to macrolides, whereas erythromycin should be used as prophylaxis only in penicillin-allergic patients.

Key words: Group B streptococci (GBS), resistance, macrolide resistance phenotypes, newborns, women

8. CHARACTERISTICS OF THE NEW VAGINAL SUPPOSITORY FORMULATION CONTAINING PROBIOTIC STRAIN *Lactobacillus rhamnosus* LB-68 PRESENTED THROUGH PROCESS CONTROLS RESULTS

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Objectives: Experimental work on the development of a new product is accompanied with extensive documentation including specifications, product and control protocols, operational procedures, internal methods, production instructions, and packaging protocols.

At the Department for lactic preparation production of the Institute of Virology, Vaccines and Sera "Torlak" internal methods for examination of vaginal suppository during the process control were developed and implemented during the development of the new vaginal suppository formulation containing the probiotic strain *Lactobacillus rhamnosus* LB-68

The aim of this study is to present characteristics of the new vaginal suppository formulation containing the probiotic strain *Lactobacillus rhamnosus* LB-68 through process controls results.

Material and methods: Examination of new vaginal suppository formulation containing the probiotic strain *Lactobacillus rhamnosus* LB-68 included the following assays: total count of lactobacilli in the vaginal suppository using decimal dilutions method, microbiological purity by strain seeding on standard bacteriological media, disintegration of vaginal suppositories, oscillation in mass, and organoleptic examinations.

Results: We confirmed that the vaginal suppositories' strain *Lactobacillus rhamnosus* LB-68 was pure with the total bacterial count of 10^8 - 10^{10} CFU / ml, of pleasant smell, disintegration results were less than 60 minutes, while the oscillation of mass was within the required limits.

Conclusion: A new, well soluble formulation, containing the total number of 10^8 - 10^{10} CFU/ml pure probiotic strain *Lactobacillus rhamnosus* LB-68 was developed according to the European Pharmacopoeia and formulation requirements.

Key words: *Lactobacillus*, vaginal suppository, *Lactobacillus rhamnosus*

9. SUSCEPTIBILITY OF CLINICAL ISOLATES OF *ACINETOBACTER SPP.* TO ANTIMICROBIAL AGENTS

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Acinetobacter spp. is an opportunistic microorganism that often cause infection in hospitalized immunocompromised patients. This microorganism is characterised by innate resistance to many antimicrobial agents and easy can acquire resistance by the horizontal gene transfer. The aim of this study was to examine susceptibility profile to antimicrobial agents of clinical isolates of *Acinetobacter spp.*

Material and method: We investigate phenotypic susceptibility profile of 175 clinical isolates of *Acinetobacter spp.* isolated from endotracheal aspirates and wound smears that were obtained from patients hospitalized in Clinical Center Niš. The susceptibility testing was performed in the Center for microbiology, Institute for Public Health of Nis, by using disk diffusion method for gentamycin, amikacin, tobramycin, ciprofloxacin, levofloxacin, imipenem, meropenem and citrimoxasole (Bio-Rad,France) and Etest strips (Liofilchem, Italy) for colistin and tigecycline. The test was read according to the EUCAST interpretive standards and The Food and Drug Administration for tigecycline.

Results: From endotracheal aspirates were obtained 28,57% of isolates of *Acinetobacter spp.* and other samples were from wound smears. Carbapenem sensitive were 16,57% of isolates and 5 isolates of them were MDR. All carbapenem resistant isolates were MDR and 71,92% were obtained from surgical patients. Carbapenem resistant isolates were susceptible to tobramycin in 26,76%, and all were resistant to gentamycin and amikacin. Sensitivity to tigecycline was detected in 78,3% and the rest of isolates were with reduced susceptibility - MIC range from 0,38µg/ml to 6,0µg/ml. All isolates were sensitive to colistin - MIC range from 0,5µg/ml to 2,0µg/ml.

Conclusion. We found that resistance of *Acinetobacter spp.* isolates to carbapenem is high. Even though all isolates were sensitive to colistin there it is necessary to continuously monitor susceptibility in our local area.

Acknowledgments

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SESSION: MICROBIOLOGY TODAY (II)

INVITED LECTURES

1. PATHOGENESIS OF INFLUENZA VIRUS INFECTION DETERMINES THE APPLICATION OF COMBINED THERAPY

Galabov Angel

The Stephan Angeloff Institute of Microbiology, Bulgarian Academy of Sciences, Sofia, Bulgaria

ORAL PRESENTATIONS

1. ACTUALITY AND DILEMAS ABOUT ZIKA VIRUS

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Introduction: Zika virus (ZIKV) is an arthropod-borne virus related to yellow fever, dengue virus and West Nile virus, transmitted mainly by mosquitoes of the genus *Aedes*.

Zika infections in humans were sporadic for half a century before emerging in the Pacific and the Americas. Large outbreaks of human Zika virus infection have started since 2007 on the Pacific islands, and spread to the Americas in 2014.

WHO has declared the Zika virus a global public health emergency after a large outbreak in Brazil.

Virus actuality: ZIKV is an arbovirus in the family Flaviviridae. ZIKV contains a positive single-stranded genomic RNA, encoding three structural proteins, and seven nonstructural proteins. Mosquito injects the virus into the human skin followed by viral replication initially in dendritic cells. ZIKV infection of epidermal cells induced the appearance of cytoplasmic vacuolation indicative of cell apoptosis. Laboratory tests for ZIKV are: molecular methods, serological test, the plaque reduction neutralization assay.

Molecular methods have high sensitivity and specificity. In serological test virus can cross-react with other flavivirus. Infection Approximately 80% of infected patients are asymptomatic. Symptomatic patients develop, after an infection period of 2-7 days, rapid onset fever, maculopapular rash, arthralgia, and conjunctivitis, often associated with headache and myalgia. The clinical manifestation of ZIKV infection has apparently changes with new epidemic, as evident by increasing report of neurological complication, such as congenital anomalies in neonates and Guillan-Barre syndrome in adults. Brazil, with ZIKV epidemic, has observed a significant increase in microcephaly cases in 2015 as compared to previous years. **Dilemas:** The recent outbreak ZIKV infection in Brazil has drawn the attention of the world towards this relatively unknown and unstudied virus. ZIKV has the potential to become endemic in all countries infected by *Aedes* mosquitoes. The changes of the virus genome could impact viral replication in humans, leading to increased virulence, viability and transmissibility of ZIKV. Studies are urgently needed to answer the questions surrounding ZIKV and its role in congenital neurological conditions.

Summary: The large change of Zika virus pathogenicity upon its introduction to Brazil has remained unknown. There is very limited knowledge about the possible mechanisms of how ZIKV infection leads to fetal damage. In the future, researches are required the relationship between Zika virus and microcephaly and should establish differential diagnosis of suspected cases of Zika virus infection. However, scientists are still far from giving relevant conclusion in this emerging infection.

Key words: Zika virus, mosquito vector, infection microcephaly.

POSTER PRESENTATIONS**1. SCREENING OF PREGNANT WOMEN ON HEPATITIS E VIRUS IN THE SOUTHERN BACKA DISTRICT**

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Objectives: For pregnant women, Hepatitis E (HEV) can be a serious illness with mortality reaching 10%–30% in their third trimester of pregnancy, while in immunocompetent individuals is considered asymptomatic and latent.

Aim of this study was to estimate the presence of HEV infection in pregnant women of Southern Backa district.

Materials and methods: During the 2016, 177 serum samples from pregnant women were tested of the IgA, IgG i IgM anti-HEV antibodies, by ELISA (Euroimmun, Germany).

Results: Anti HEV antibodies were identified in 15 of 177 samples (8.47%). Even though HEV infection was more present in rural area (10.5%, 4/38) in comparison to pregnant women in urban area (7.9%, 11/139, $p=0.608$) there was no statistically significant difference in number of patients who live in rural or urban area towards the results of examining.

There was no statistically significant difference in the age of pregnant women with the negative and positive results of the test ($p=0,343$).

Conclusion: Results of this investigation clearly suggest that HEV is present among pregnant women in our region, who are at the greater risk of obstetrical complications and mortality from hepatitis E. According to that, screening would have significant impact on the reduction of possible consequences of HEV infection.

Key words: HEV, pregnant women, ELISA

2. THE PREVALENCE OF SEVERE ILLNESS AMONG PATIENTS WITH INFLUENZA A AND B

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Objectives: Influenza is benign acute upper respiratory infection caused by influenza A and influenza B viruses. However, about 3-5 millions of patients develop severe complications and 250-500 000 die, each year.

The aim of this study was to investigate the prevalence of severe influenza among patients with real-time RT-PCR-confirmed influenza A and B.

Methods: Total of 309 patients were classified according to clinical manifestations of illness. Influenza like illness (ILI) was defined as an acute respiratory infection with measured fever of $\geq 38^{\circ}\text{C}$ and cough. Severe acute respiratory infection (SARI) was defined as ILI with difficulty breathing, demanding hospitalization. Patients with acute pulmonary edema and infiltration, hypoxemia, and dyspnea, were classified as cases of acute respiratory distress syndrome (ARDS).

Results: Out of 309 patients 192 (62.1%) had ILI, while 117 (37.9%, $p=0.0001$) developed complications. Influenza A positive patients more often developed severe influenza (45.2%, 74/164) comparing to influenza B positive patients (29.6%, 43/145, $p=0.0068$). Significantly greater proportion of ARDS was recorded in patients with severe influenza A (22.9%, 17/74) than in patients with complicated influenza B (4.6%, 2/43, $p=0.0093$).

Conclusion: Comparing to influenza B viruses, influenza A viruses were more often associated with severe influenza.

Key words: Influenza A and B, SARI, ARDS, real-time RT-PCR

3. RESPIRATORY SYNCYTIAL VIRUS INFECTION IN CHILDREN AGED UP TO 2 YEARS IN RELATION TO ATOPY

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Objectives: Respiratory syncytial virus (RSV) bronchiolitis in early childhood is considered to be important risk factor of the recurrent wheezing and asthma development, while RSV infection itself could be determinant of bronchial hyperreactivity (BHR). The general objectives of this study were to define the characteristics of the RSV infection relative to atopy and characteristics of BHR compared to RSV infection and atopy in children up to two years.

Methods: The study presents the epidemiological-clinical observational study section with experimental work on the material of human origin *in vitro*. Serum IgA and IgG antibodies were determined by the quantitative ELISA (SERION ELISA classic, Institute Virion/Serion GmbH, Würzburg, Germany). Atopy was established by measuring specific IgE in relation to usual allergens, using *Phadiatop* Infant Multitest.

Results and Conclusion: Children with atopy were more often infected with RSV than those without atopy (43.3% vs 2.8%). Boys with atopy and expressed BHR had RSV infection in more than 80% of cases, but BHR in male children without atopy was not associated with RSV infection. Children up to two years of age with atopy had more often RSV infection (43.3%). Every third child with atopy had BHR and 77.8% of them also had RSV infection. There is high risk for child with atopy to develop BHR when infected with RSV.

Key words: Respiratory syncytial virus, bronchial hyperreactivity, comorbidity, atopy, child

4. EPIDEMIOLOGICAL AND CLINICAL CHARACTERISTICS OF CHRONIC HEPATITIS B

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Introduction: Hepatitis B virus is primarily a hepatotropic virus that causes both acute and chronic form of hepatitis B. It is estimated that 2/3 of the world's population has been infected with hepatitis B virus at some point during their lifetime. Chronic hepatitis B is a global health problem. About 400 million people develop chronic hepatitis B worldwide and more than million people die every year due to chronic HBV infections, liver cirrhosis or hepatocellular carcinoma. The aim of the paper was to analyze epidemiological and clinical characteristics of CHB.

Material and methods: The study enrolled 35 consecutive patients with CHB, treated at the Clinic for Infectious Diseases, Clinical Center Niš, in the period from May 2015 to May 2016. The sources of data collection were surveys and anamnestic data of patients with confirmed CHB. The method of descriptive epidemiology was applied. Student's *t* test, chi-square test, and Fisher's test with significance level $p < 0.05$ were used in data analysis.

Results: During the observation period, 35 consecutive patients were registered (24 male patients-69 %, 11 female patients- 31 %), mean age of 40.95 ± 12.83 years (min=15, max=62), (43.18 ± 12.66 years in males and 39.43 ± 13.87 years in females). Males were older than females for 3.75 years. Most patients were within the age group between 41 and 50 years (16 patients- 46 %); 46 % of them were males and 45% females. They were followed by individuals over 50 years of age (9 patients- 26%); 27 % of them were males and 25% females. Anamnestic data revealed the following routes of infection transmission: surgeries and dental interventions (9 patients-26 %), unprotected sex with unknown partners (5 patients - 14 %), unprotected sex with HBsAg positive partners (3 patients- 9 %), tattooing (2 patients- 6 %), accidental prick (2 patients- 6 %), hemodialysis (2 patients- 6 %); in 12 patients (34%) the route of transmission was not established. Confirmed clinical signs and symptoms in patients were: exhaustion (23 patients- 66 %), pain under the right rib arch (20 patients -57%), hepatomegaly (11 patients-31%), dyspepsia (10 patients - 29 %) and subicterus (10 patients - 29 %), splenomegaly (6 patients -17 %). All the symptoms were more prevalent in male patients.

Conclusion: Due to CHB course and its severe complications, special efforts should be made regarding prevention and eradication of HBV infection.

Key words: chronic hepatitis B, epidemiological characteristics, clinical characteristics, prevention

5. FREQUENCY OF PARVOVIRUS B19 INFECTIONS IN THE POPULATION OF VOJVODINA

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Objective: Determining the frequency of parvovirus B19 infections in the Vojvodina population, especially high-risk groups (pregnant women, young children, and immunodeficient individuals).

Materials and methods: A sample of 400 patients of various ages were tested for IgM and IgG antibodies during a year-long period at the Institute of Public Health of Vojvodina, Center for Virology, using a SERION ELISA assay.

Results: Acute parvovirus B19 infections were confirmed in 70 patients (17.5%). Seroprevalence (only IgG positive) was detected in 43%, while 39.5% were negative.

Other results were as follows:

In 90 pregnant women – acute infection (18.9%), seroprevalence (47.8%), negative (33.3%);

In children aged 0-14 with febrile illness and rash – acute infection (21.3%), negative (24%);

In 235 adults with various diagnoses – acute infection (15.74%), negative (12.76%).

Predominant diagnosis among patients with acute infections was febrile illness with lymphadenopathy and rash (32%), arthropathy (17.95%), cardiac symptoms (20%), and immunodeficiency (16.67%). Acute infections were found in 5.94% of patients referred without a diagnosis.

Conclusion: Significant percentages of identified acute infections, as well as a large number of individuals without previous exposure to parvovirus B19, indicate a necessity for routine diagnostics, especially in pregnant women.

Key words: Human Parvovirus B19; Parvovirus Infections; Epidemiology; Parvovirus diagnosis.

6. ANTIBODY TO TOSCANA VIRUS IN MILITARY

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Intraduction: *Toscana virus* (SFTV) belongs to the Sandfly viruses (SFV) together with next serotypes sandfly Naples virus (SFNV,) sandfly Sicilian Virus (SFSV) and sandfly Cyprus virus (SFCV). *Toscana virus* was first isolated in 1971 in Tuscany, Italy, from sandfly vector *Phlebotomus perniciosus*. It causes sandfly fever, also known as “three-day fever” or “pappataci fever”, aseptic meningitis and mild encephalitis.

Objectives. We investigated the presence of IgG antibodies against Toscana virus in serum samples of soldiers from Serbia before their departure to the peacekeeping mission in Africa. **Materials and method** 119 healthy soldiers were included into the study. All the sera were tested by the indirect immunofluorescent test - Mosaic: Sandfly Fever Virus IgG antibodies (Euroimmun, Germany).

Results: IgG antibodies against *Toscana virus* were observed in 2.52% (3/119) of samples. Cross reactivity was observed between Sandfly Fever Viruses. Cross reactivity was observed between SFTV and SFNV, between SFTV and SFSV and SFTV and all three serotypes (SFNV, SFSV, SFCV). Cross-reaction issues between SFV can be solved by determination of IgG antibody titer against SFV using IIFT.

Conclusion: Data regarding activity of Toscana virus in Serbia are limited. The results of serological tests indicate that Toscana virus circulate among humans in Serbia.

Keywords: Seroprevalence, Sandfly virus, Toscana virus

7. REPRESENTATION high-risk HPV genotypes-OUR EXPERIENCE

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Objectives: Papillomaviruses are viruses that infect the basal epithelial cells of the skin and mucous membranes and complete their life cycle that depends on the differentiation of epithelial cells. Under certain circumstances, they lead to a complete loss of control of proliferation and differentiation of infected cells and the occurrence of malignant changes.

Materials and methods: In the period from January 2015. until July 2016.god. the Center for Microbiology Institute of Public Health in Nis performed 301 analyzes genotyping of HPV. Samples were cervical smears in women and urethral swabs in men. From the obtained samples of isolated DNA commercial kit for the isolation of (DNA-Sorb, Sacace). Target DNA sequences were multiplied using conventional PCR and commercial kit (HPV High Risk Typing, Sacace) for detection and genotyping of 12 high-risk genotypes. Replicate and sequences were detected by UV lamps to the product gel electrophoresis stained with ethidium bromide.

Results: From 301 samples of HPV, was found positive 165 (55%), and the negative 136 (45%) of the samples. Amongst the most positive of the number of HPV genotypes HPV16-75 (46%), HPV 35-28 (17%), HPV 56-22 (13%), HPV 66-19 (11%), HPV 33-17 (10 %), HPV 58-17 (10%), HPV 18-15 (9%), HPV 45-15 (9%). HPV positive samples were divided into three age groups: Group I 16-30years (120), Group II 31-45 years (141) and Group III 46-60 years (40). In the first representation of the group of HPV genotypes in relation to the overall presence of the HPV: HPV 66 (74%), HPV 35 (71%), HPV 18 (67%), HPV 16(61%), HPV 45(53%),HPV31(46%). In another group of HPV 58(41%), HPV 45(40%), HPV 31(31%), HPV 16(29%). The third group of HPV 31(15%), HPV 18(13%), HPV 16(7%).

Conclusion: It has been found that HPV type 16 and type 18 have the greatest potential oncogenes and are responsible for about 70% of the resulting cancer. Sexual behavior with frequent changes of partners and early sexual relations without a condom definitely increases the risk of HPV infection. The incidence of HPV infection is increasing.

Key words: HPVinfection, latent infection, malignant changes, PCR, high-risk

8. DEVELOPMENT OF GASTRORETENTIVE FLOATING MICROSPHERES WITH PROLONGED RELEASE OF CARVEDILOL

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Objectives: The aim of this study was to formulate gastroretentive prolonged release delivery system for carvedilol by increasing its residence time in the stomach. It was achieved through the preparation of porous floating microspheres, by the emulsion solvent diffusion technique.

Material and methods: Eudragit[®] S 100 and hydroxypropylmethylcellulose, in 4:1 ratio, were used to prepare the mixture with carvedilol, which was further dissolved (at 4% w/w) in a mixture of ethanol/dichloromethane (1:1) and dropped into 0.2 % w/w sodium lauryl sulfate solution. The organic phase in the total mixture was varied at the three levels (5, 7.5 and 10%). Prepared solutions were stirred with a propeller stirrer at room temperature, for 1 hour, at 300, 650 or 1000 rpm.

Result: Carvedilol content in formulations ranged from 55.66 to 84.07%. Prepared microspheres exhibited prolonged carvedilol release for 8 hours with preserved buoyancy. The highest degree of encapsulation, and the slowest release of carvedilol, was achieved from the formulation in which the proportion of the organic phase was 7.5% and the stirrer speed was 650 rpm.

Conclusion: Developed floating microspheres of carvedilol exhibited prolonged release for at least 8 hours and could therefore potentially reduce drug fluctuations in the plasma, as well as patient adherence.

Key words: floating microspheres, patient adherence, carvedilol

SESSION: CURRENT PARASITOSIS

INVITED LECTURES

1. POST MALARIA ERADICATION IN SERBIA AND FOLLOWING PROBLEMS

Milorad Pavlović, Belgrade

Imported tropical diseases in recent years have reminded us of the need of permanent epidemiological vigilance. Various forms of influenza, SARS and similar disease like MERS, West Nile fever, Ebola and in recent months Zika fever, have pushed into the background the fear of the most common infectious diseases, malaria. Despite the knowledge that the eradication of malaria in our region was made nearly fifty years before, contact with the disease keeps us in constant vigilance, even the fear that it could re-emerge as an autochthonous disease, which has already happened in some countries in the region. In recent years, there has been a drastic reduction in the total number of patients, but the world is still far from a solution to this medical problem. According to WHO report of about 3.2 billion people - nearly half of the world's population - are at risk of malaria. In 2015, there were roughly 214 million malaria cases and an estimated 438,000 malaria deaths. Increased prevention and control measures have led to a 60% reduction in malaria mortality rates globally since 2000. Sub-Saharan Africa continues to carry a disproportionately high share of the global malaria burden. In 2015, the region was home to 89% of malaria cases and 91% of malaria deaths.

The experience of the author in relation to 40-year-old work at the Clinic for Infectious Diseases in Belgrade, the department for imported tropical diseases, and malaria at the first place. In this period we have treated more than 700 patients suffering from malaria, caused mostly by *Plasmodium falciparum* infection, which is the cause of death in a small number of patients, despite the fact that more than 30% of patients had severe forms of the disease. The reason for such a large percentage of severe forms malaria is late recognition of the disease by the general practitioner and inadequate, hazardous self-treatment.

The diagnostic procedure in all this period is based on the classical approach to the parasitological examination of thick/thin blood smears, despite of the new diagnostic techniques (antigen test, QBC etc.) which serve predominantly in special epidemiological circumstances. This statement obliges all medical centers, within the accepted patients from the tropics to provide permanent presence of an experienced parasitologist, as delaying diagnosis can be devastating to outcome the disease.

In therapeutic scheme happened in recent decades drastic changes! They are the result of the rapid development of resistance to numerous antimalarial drugs, primarily to chloroquine, which was until the mid-eighties a universal therapeutic drug, and today is the drug of choice for most form of non-falciparum malaria. Severe forms of malaria then and until today were successfully treated with a combination of quinine/quinidine and tetracycline/clindamycin. Since the nineties happened the era of artemisinin drugs, which is successfully used in the treatment of all forms of falciparum malaria. Their advantage is that these drugs may be administered parenteral (IV/IM) as well as oral and rectal. Artesunate, which is most commonly used to treat severe forms of falciparum malaria, pursues in combination with atovaquone/proguanil, mefloquine, sulfadoxime-pyrimetaminom to protect against recrudescence, offer more comfortable and effective treatment of a severe form of malaria compared with therapies model based on quinine.

To facilitate less severe forms of malaria especially good experience we had with the combination artemeter lumefantrine, which replace therapy model based on mefloquine and sulfadoxine/pyrimethamine combination, both for efficiency, so and because of side effects.

Some artemisinin based combinations include also artesunate/chloroquine, artesunate/amodiaquine, artesunate/sulfadoxine/pyrimethamine, piperaquine/dihydroartemisinin/trimethoprim, piperaquine/dihydroartemisinin/trimethoprim/primaquine and artemether/humefantrine. The tendency to malaria therapy follows a progressive development of resistance of the parasite and limits the side effects opens new therapeutic pathways, with which need clinical experience (eg. artefenomel).

The central place in the prophylaxis of malaria today occupies a combination of atovaquone/proguanil (Malorone), which make up less widely recommended alternatives to doxycycline, chloroquine and mefloquine.

A particular problem in our conditions is the supply of antimalarial drugs, since no one is registered by our health authorities. The manufacturers, for economic reasons, have no interest in implementing the procedure, and the acquisition is realized mainly in the form of donations or possibly in the form of „small purchases“.

Possibilities for the development of indigenous malaria in the region should be the summation of several factors in addition to which the source of infection vector control plays an important role, especially related to the favorable climatic and environmental conditions. Active attitude toward each of these factors can certainly reduce the probability of occurrence. Otherwise, we could become witnesses of its recurrence.

Key words: tropical diseases, malaria, antimalarials

2. LABORATORY DIAGNOSIS OF MALARIA: PROSPECTS AND RECOMMENDATIONS

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A prompt diagnosis with accurate identification of *Plasmodium* species is crucial in proper treatment of malaria, potentially fatal disease.

Although still the gold standard, microscopy is highly subjective (non detectability of low parasitemia, misdiagnosis of the *Plasmodium* species and mixed infection) depending on experience of the microscopist.

Therefore, numerous diagnostic methods have been introduced to overcome these limitations. Rapid diagnostic tests (RDTs) for are fast and easy to perform, but with wide variations in sensitivity and specificity, especially with lower sensitivity of non-*falciparum* species. Introducing various methods based on polymerase chain reaction (PCR) significantly improved diagnosis of malaria. These methods are capable of detecting very rare parasites of blood and constantly being improved for increased sensitivity and specificity and elimination of prolonged DNA-anemia.

New technologies, e.g. loop-mediated isothermal amplification, quantitative nucleic acid sequence-based amplification, mass spectrometry, and flow cytometric assay techniques are generating new strategies for malaria diagnosis.

As of yet, the gold standard in Serbia for malaria diagnosis is microscopy in combination with RDT. Our research showed that combining quantitative real-time PCR with conventional diagnosis seems currently the best diagnostic approach, particularly in cases of low parasitemia and submicroscopic malaria, and for species determination, especially in non-*P. falciparum* infections.

Key words: malaria, *Plasmodium* species, microscopy, molecular detection

3. VECTORIAL CAPACITY OF MOSQUITOS (Diptera: Culicidae) IN SERBIA

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The definition of vectorial capacity is: a measurement of the efficiency of vector-borne disease transmission. There is the formula to measure is. Factors that make up the formula are: the density of vectors in relation to density of hosts, the proportion of vectors feeding on a host, vector competence, daily survival of vectors and the extrinsic incubation period.

Many epidemiologists believe that every second person in the past died of malaria; one of the most famous victims of malaria was Alexander the Great. Therefore mosquitos became, besides the honey bee, the most important insects in various scientific researches. When adults, both sexes feed on nectar and plant juices. Haematophagous diet of females starts few days after mating, just before laying eggs; females keep the sucked blood in their abdomen. Biting occurs during night because these insects must avoid overheating. Mosquitoes feed on the blood of amphibians, reptiles, birds, and mammals, including humans. They locate their victims at a great distance by using chemo- and thermo-sensors on their antennae in search for trace amounts of carbon dioxide and heat released in animal's breath. Females lay the eggs on the water surface. Larvae are aquatic, passing through several molting to the stage of pupa. In all stages, mosquitos are an important link in the food webs of insects, spiders, fish, frogs, lizards and small birds.

World fauna of the family Culicidae has more than 3.500 species, about 100 species of which are vectors of a hundred of human diseases such as malaria, lymphatic filariasis, yellow fever, dengue fever, West Nile virus, arboviruses and the recently actual Zika virus. Most notorious mosquitos belong to the genera *Anopheles*, and also *Aedes* and *Culex*. Here we consider vectorial capacity of several mosquito species transmitting protozoans from the genus *Plasmodium* and several nematodes. *Plasmodium* is a widely spread genus among protozoans owing to the vectorial capacity of mosquitos from the genus *Anopheles*. There are about ten *Anopheles* species of mosquitos registered in Serbia that are ready to transmit malaria; however they are still constrained by the average annual temperatures. Considering nematodes, there are microfilariae that attack blood and lymphatic vessels such as *Wuchereria*, *Brugia* and *Dirofilaria*.

Activity and vectorial capacity of mosquitos primarily depend of temperature and relative humidity. The "temperature suitability index" is calculated for each species. For transmission of *Plasmodium* species to occur, the parasites must first undergo all immuno-responses in mosquitos. Sporozoites have to invade epithelia of the mid-gut and the salivary glands of mosquitos, establishing contact with salivary gland proteins. A multifunctional protein – glycoprotein known as thrombospondin (TSP) is responsible for this interaction. *Plasmodium* sporozoites express the thrombospondin-related adhesive protein (TRAP) composed of two distinct adhesive domains. Sequence and structure of those domains are homologous with human thrombospondin, allowing sporozoite to enter host hepatocytes. This mechanism is still unknown but the identification of the *P. falciparum* thrombospondin-related apical merozoite protein which is homologue in *P. vivax* (PvTRAMP) could be potential candidate for the vaccine.

A wide range of mosquito species can transmit nematodes causing Lymphatic *filariasis*. Inhabiting lymphatic vessels and lymph nodes nematodes create irreversible swellings. The most common nematodes causing lymphatic filariasis belong to the family Onchocercidae such as *Wuchereria bancrofti* (widely spread in the Southern hemisphere), *Brugia malayi* and

B. timori (both in the Oriental region). From the same family is also *Dirofilaria immitis* and *D. repens* causing *dirofilariasis* known as a dog heartworm. The species *D. immitis* has been reported for every continent, as well as in Europe. The larval stage (L3) is infective. Injected larvae migrate to lymphatic vessels and lymph nodes, developing into microfilariae (early stage = pre-larvae). Onchoceridae can live up to seven years in the host.

Besides all the mentioned parasites, mosquitos transmit self-destructive microorganisms such as *Parathelohania anopheles* from the phylum Microsporidia. This protozoan/fungi parasite destroys mosquitos in their larval stage. To complete the life cycle *P. anophelis* needs the copepod *Microcyclops varicans* and the mosquito *Anopheles quadrimaculatus* (horizontal transmission). The first transient host – the copepod is infected by uninucleate spores of *P. anophelis*. These spores infect early instar larvae of the second transient host – a mosquito *A. quadrimaculatus*. Both sexes, males and females are infected. The production of cylindrical, binucleate spores occurs inside the adult mosquito bodies. Vertical transmission continuously maintains in *A. quadrimaculatus* colonies by direct transfer from mother to offspring – from infected eggs, through larvae to adults. Knowing that mosquitos become significantly pesticide resistant, this knowledge can be used in the biological control programs of Culicidae. This could be one way to suppress the vectorial capacity in insect vector by simple elimination of their number in target populations.

Key words: mosquitos, vector, capacity

4. TICKS IN SERBIA - RISK FOR HUMAN HEALTH

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Abstract

For their specific biology and obligate hematophagy, ticks are of great significance for both animals and humans. Studies on ticks in Serbia commenced at the beginning of the last century. However, the fauna of these arthropods has not yet been completely studied in this region. The methodological approach used until now applied mainly to hard, exophilous tick species. There are five genera (*Ixodes*, *Dermacentor*, *Rhipicephalus*, *Haemaphysalis*, and *Hyalomma*) with 27 species of hard ticks recorded in the fauna of Serbia and only one genus (*Argas*) with three species of soft ticks. Serbia is an endemic area for a number of tick-borne diseases (Lyme disease, human granulocytic anaplasmosis, tularaemia, Q fever, rickettsioses, CCHF, TBE). Autochthonous cases of these diseases were continuously or periodically registered, with sporadic outbursts (CCHF, tularaemia, Q fever), but it is considered that the real epidemiological situation is underestimated. Up to now several tick borne pathogens (CCHF virus, TBE virus, *A. phagocytophilum*, *A. ovis*, *Babesia* sp., *Coxiella burnetii*, *F. tularensis*, *Rickettsia* sp., and *B. burgdorferi* s. l.) were detected in human, animal or tick samples collected in Serbia. The raising of awareness on effects of tick-borne diseases on public health requires a strategic control of ticks and animals that transmit these diseases on humans and domestic animals.

Key words: ticks, tick-borne pathogens, human, health, Serbia

Introduction

Ticks are arthropods distributed in almost all regions of the world, including areas with temperate but particularly those with subtropical and tropical climate. As ectoparasites, they feed on blood of amphibians, reptiles, birds and mammals. Up to now, more than 860 species of ticks have been described, classified into three families (*Argasidae*-soft ticks, *Ixodidae*-hard ticks and *Nuttalliellidae*) with distinct morphological characteristics, diet and life cycle (Gugliemone et al., 2010). Ticks display a high degree of specialization, both in choice of host and choice of feeding location upon the host's body. Although tick infestations may be massive, the impact caused by direct activity (blood sucking) is limited. The direct effects of ticks are manifested as mechanical damage, local irritation, anemia, paralysis and intoxication. In some cases secondary infections caused by bacteria or fungi can develop at the bite site. Saliva of certain tick species from North America (*Dermacentor andersoni*, *D. variabilis*), South Africa (*Ixodes rubicundus*, *Rhipicephalus everstieveri*) and Australia (*I. holocyclus*) contains toxins causing various forms of paralysis or even death in livestock and humans (Mans et al., 2004). In most cases tick bites are unnoticed, but they may be painful in species with long mouth parts. The depth to which the mouth apparatus enters the host's skin depends on morphology and dietary habits of the particular tick species. Those with long mouth parts, such as the representatives of genera *Ixodes*, *Hyalomma* and *Amblyomma*, penetrate much deeper than ticks with short mouth parts, such as the representatives of genera *Dermacentor*, *Haemaphysalis* and *Rhipicephalus*. Tissue damage caused by penetration of the parasite's mouth apparatus is not always easy to distinguish from damage caused by host's immune response. The lesions may complicate if tick mouth parts break after the manual removal and remain at the bite site. In most ticks this rarely happens but in removal of females from genus *Ixodes* it may happen even in over 50% of cases (Milutinović et al., 2012).

Importance of ticks as vectors of pathogens

However, ticks are far more important as vectors of causative agents of disease in humans and animals. They can transmit a higher number of pathogenic microorganisms (protozoans, bacteria, viruses) than any other vector group of arthropods (Jongejan & Uilenberg, 2004). The global importance of ticks as vectors is reflected in their wide distribution, diversity and complexity of pathogens they transmit, as well as in high impact on veterinary and human medicine. The specific biology and life cycle contribute to their extraordinary vector potential, and there is not a single molecular, cellular, physiological, anatomical or behavioral characteristic of ticks that does not contribute to their role as parasites and vectors.

Ticks as parasites of humans were already described in Ancient Greece (Sonenshine, 1991), while today, over 30 species of ticks are known to parasitize on humans (Estrada-Peña & Jongejan, 1999). In the early 20th century it was determined that ticks may be vectors of bacterial diseases in humans (Dutton & Todd, 1905). After the discovery of Lyme disease, which is presently considered the most important vector-transmitted disease in Europe and North America, and its causative agent, the spirochete *Borrelia burgdorferi sensu lato* during the 1980s (Johnson & Sar, 1984), the studies on tick-borne diseases were intensified and a significant number of emerging tick-borne pathogens have been recorded since (Vorou & Sar, 2007).

Although certain soft ticks (*Argasidae*) transmit causative agents of diseases including human relapsing fever, African swine fever etc., the ticks from the family *Ixodidae* (hard ticks) have a far greater importance for human and veterinary medicine (Gray, 2002).

Many tick-borne diseases are natural focal infections, characterized by endemism and seasonal occurrence. Pathogens transmitted by ticks exist in nature through enzootic cycles, which, along with the vector, include vertebrate tick hosts as reservoirs. Ticks and pathogens have coevolved with various vertebrate hosts and are most often in equilibrium with them. The nonspecificity of some tick species, regarding the host preference, produces the dispersal of pathogens to species that are not involved in the enzootic cycle, including humans, and provoking in this way zoonotic diseases in them (Jongejan & Uilenberg, 2004). Identification of links of enzootic cycles and knowledge of their ecological relations is of key importance in understanding of epizootiology and epidemiology of tick-borne diseases. The main factors determining epidemiology of tick-borne diseases are the infection rate of reservoirs and ticks, as well as the population size of host species. Spread of tick-borne diseases depends on zoogeographic distribution of both tick vectors and host reservoirs (Korch, 1994). Active dispersion of ticks is limited to distance of approximately 50 m (in the case of *I. ricinus* 5 m), but ticks may travel passively, attached to hosts, at much greater distances. If an infected tick appears in a new habitat, the possible survival of the pathogen in the new environment depends on finding an adequate host (susceptible to infection, able to reproduce and transfer the pathogen to the new vector) (Sonenshine, 1991). It is important to note that a zoonosis, and particularly tick-borne, is a result of a synergy of two independent phenomena - risk caused by natural enzootic cycles and exposure of humans and domestic animals to that risk. The epidemiology of tick-borne diseases is influenced not only by the complex biology and ecology of pathogens, vectors and hosts, but also by anthropogenic activities. Humans directly influence tick dispersion by altering the conditions in their habitats (cultivation, timbering etc.) or transporting them to greater distances together with host animals. The increase in visits to areas inhabited by ticks leads to increase in number of tick bites and expansion of tick-borne diseases, particularly tick encephalitis and Lyme disease (Randolph, 2001). Monitoring the fluctuations of social, ecological, technological and microbiological factors influencing the expansion of tick-borne diseases is of crucial importance in defining the strategy for prevention, control and eradication of these diseases.

Ticks and tick borne pathogens in Serbia

The first available data on ticks from former Yugoslav countries come from a group of German authors (Knuth *et al.*, 1918), who represented the military commission that studied the piroplasmiasis in Macedonia at the end of the WWI. After the German military commission (Knuth, Behn, and Schulze), Oswald started the first serious work during the WWI and we may consider Branko Oswald as the first ixodidologist who approached the research systematically in the former Yugoslav countries (Milutinović *et al.*, 2012). Studies on ticks in Serbia commenced at the beginning of the last century as well. However, the fauna of these arthropods has not yet been completely studied in this region. The methodological approach that was applied in existing studies was such that it could mainly be applied to hard, exophilous tick species. The first systematic faunistic-ecological research of ticks were commenced in 1980's, in scope of the Laboratory of Medical Entomology (Institute for Medical Research, University of Belgrade). Of 17 tick species recorded from the former Yugoslav countries, Milutinović (1992) found the following ten species in Serbia: *I. ricinus*, *D. marginatus*, *D. pictus*, *R. bursa*, *R. sanguineus*, *Ha. punctata*, *Ha. sulcata*, *Ha. inermis*, *Hy.savignyi*, and *B. calcaratus*. Further studies were mainly focused on ticks in Belgrade and its surroundings, as an area of endemic Lyme disease (Kulišić *et al.*, 1995; Milutinović *et al.*, 1996, 1997, 1998/7, 1998; Milutinović, 2000; Milutinović&Aleksić-Bakrač, 1998). During this research period seven species of ticks from the family Ixodidae were found, *I. ricinus*, *D. marginatus*, *D. reticulatus*, *R. bursa*, *R. sanguineus*, *Ha. punctata*, and *Ha. inermis*, and two species from the family Argasidae, *Ar. persicus* and *Ar. reflexus*. Until now, five genera (*Ixodes*, *Dermacentor*, *Rhipicephalus*, *Haemaphysalis*, and *Hyalomma*) with 27 species of hard ticks were recorded in the fauna of Serbia and only one genus (*Argas*) with three species of soft ticks. Out of this, several species are of significance as human parasites (*I. ricinus*, *I.persulcatus*, *I.acuminatus*, *D.reticulatus*, *D.marginatus*, *R.sanguineus*, *Hy.marginatum marginatum*, *Ha. concinna*, *Ha. punctata*).

Serbia is an endemic area for a number of tick-borne diseases (Lyme disease, human granulocytic anaplasmosis, tularaemia, Q fever, rickettsioses, CCHF, TBE). Autochthonous cases of these diseases were continuously or periodically registered, with sporadic outbursts (CCHF, tularaemia, Q fever), but it is considered that the real epidemiological situation is underestimated. Up to now several tick borne pathogens (CCHF virus, TBE virus, *A. phagocytophilum*, *A. ovis*, *Babesi* sp., *Coxiellaburnetii*, *F. tularensis*, *Rickettsia* sp., and *B. burgdorferi* s.l.) were detected in human, animal or tick samples in Serbia (Obradović *et al.*, 1978; Pavlović *et al.*, 2002; Drndarević *et al.*, 1992; Milutinović *et al.*, 2004, 2008; Samardžić *et al.* 2008; Tomanović 2009; Tomanović *et al.*, 2010a, 2010b; Savić *et al.*, 2010; Radulović *et al.*, 2010; Radulović *et al.*, 2011; Gabrielli *et al.*, 2015; Potkonjak *et al.*, 2016). In addition to microscopic techniques, molecular methods have been used for detection of these pathogens. *Anaplasma phagocytophilum* has been detected in *I. ricinus* and *D. reticulatus* ticks, *A. ovis* in *H. punctata*, *H.concinna* and *I. ricinus*; *Babesi* sp. in *D. marginatus*, *D. reticulatus*, *H. concinna* and *R.sanguineus*; *B. burgdorferi* s.l. in *I. ricinus*; *C. burnetii* in *D. reticulatus*, *H. concinna* and *I. ricinus*; *F. tularensis* in *I. ricinus*; *R. helvetica* and *R. monacensis* in *I. ricinus* ticks (Tomanović *et al.*, 2015). The results of our previous studies, based on direct molecular methods, revealed high diversity of species of the *B. burgdorferi* s.l. complex and unexpected high prevalence of *B. lusitaniae* in *Ixodes ricinus* ticks from Serbia. The presence of five *B. burgdorferi* sensu lato species, namely, *B. burgdorferi* sensu stricto, *B. afzelii*, *B. garinii*, *B. lusitaniae*, and *B. valaisiana* was identified by restriction fragment length polymorphism (RFLP) analysis. The most frequent *B. burgdorferi* sensu lato genospecies was *B. lusitaniae* (18.8%), followed by *B. burgdorferi* sensu stricto (13.6%). This result is not in the line with distribution and prevalence rate of *B. burgdorferi* sensu lato genospecies in other countries in the region (Milutinović *et al.*, 2008; Tomanović 2009).

Prevalence rates of tick-borne pathogens in ticks from Serbia vary from 1.9% for *A. phagocytophilum* in *D. reticulatus* to 63% for *C. burnetii* in *I. ricinus*. Up to 28.8% of infested ticks harboured more than one pathogenic species (Tomanović 2009; Tomanović *et al.*, 2010a, 2010b; Radulović *et al.*, 2010; Radulović *et al.*, 2011, Tomanović *et al.*, 2013).

It's important to stress that the presence of CCHF virus, TBE virus, *Francisellatularensis* and five *B. burgdorferi* s.l genospecies, was confirmed by local strain isolation (Gligić *et al.*, 1977; Bordjoški *et al.*, 1972; Lako *et al.*, 2001; Tomanović *et al.*, 2011).

These findings indicate health risk for human population in Serbia of tick-borne diseases.

Conclusion

The research of the Laboratory of Medical Entomology includes the control of natural seats of tick-borne diseases, with the aim to examine the real risks of epidemic outbursts and identify new seats of disease, as well as to estimate the vector/agent correlation and emergence of a disease in a changed environment. The results of such research have both fundamental and applicative significance in the clinical practice. The diversity of pathogens at the local level is a direct consequence of the constant selective pressure, which leads towards the adaptation to diverse micro and macro environmental conditions. The variability in genetic structure of pathogens generates differences in pathogenic potential, virulence, and clinical manifestation of the disease. The knowledge on genetic variability in a certain region is of the crucial importance for a reliable diagnostics and efficient prevention of tick-borne pathogens. Production of diagnostic tests, adequate for studied areas, is possible by using the local pathogen isolates.

Since the ecology of the etiological disease agent is the reflection of the vector's ecology, the pathogen transmission control is mostly realized through different aspects of control of the vector itself. Complex, modern control strategies include activities at several levels: a) personal protection, b) habitat surveillance and control, c) vector and reservoir abundance surveillance and control, d) use of acaricides on animals (reservoirs), e) use of habitat-targeted acaricides, f) biological and natural control. The raising of awareness on effects of tick-borne diseases on public health requires a strategic control of ticks and animals that transmit these diseases on humans and domestic animals (Milutinović *et al.*, 2012).

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5. AIDS – DEFINING PARASITOSIS

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Acquired immune deficiency syndrome (AIDS) is the final stage of HIV infection, which is manifested by the development of opportunistic infections and tumors, the so-called AIDS-defining conditions. Among them, traditionally, the most common are *Pneumocystis carinii* pneumonia (PCP) and cerebral toxoplasmosis. Although later classified as fungi according to their genomic structure, now termed *P. jirovecii*, pneumocystis has been considered more similar to protozoa according to their life cycle, clinical presentation and response to therapy. Other parasitic AIDS-defining conditions are more or less endemic: chronic intestinal cryptosporidiosis and isosporiasis (with diarrhea lasting more than one month), atypical disseminated leishmaniasis and reactivation of American trypanosomiasis (meningoencephalitis or myocarditis). In addition to mentioned, with respect to impaired cell-mediated immunity as a pathogenetic substrate of HIV infection, other protozoal infections also have more severe clinical forms and more complex treatment than usual. On the other hand, the continuous improvement of antiretroviral therapy significantly reduced their occurrence, reserved primarily for still a considerable number of HIV infection late presenters.

Key words: AIDS, protozoal infections



**6. INSIDE OF HUMAN TOXOCARIASIS: EPIDEMIOLOGY, CLINICAL ASPECTS
AND MANAGEMENT**

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ORAL PRESENTATIONS**1. TRICHINELLOSIS OUTBREAKS IN TWO DISTRICTS OF SERBIA AT THE BEGINNING OF 2016**

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Domestic pigs, raised and slaughtered in the backyards of small individual farms in Serbia still represent a major risk for human infection with *Trichinella spiralis*. In most cases small family outbreaks appear due to the consumption of uninspected raw or undercooked infected meat and meat products. However, the risk of the infection from wild boar meat in Serbia is apparently underestimated. At the beginning of 2016 Serbian National Reference Laboratory for Trichinellosis (NRLT) participated in analyzing human sera collected from 2 outbreaks (Districts: North Backa and Zlatibor) for the presence of specific antibodies. The source of the infection in the first outbreak was meat products made of untested pork. Fifteen persons were suspected on infection, out of which 10 seropositive patients for *Trichinella* (analyses performed at NRLT) met the case definition and were treated (2 patients were hospitalized). For the second outbreak, source of infection was meat from two wild boars caught on November 2015 on Zlatibor Mountain. Meat samples were analyzed and found not to be contaminated with *Trichinella*. During December 2015 hunters prepared dried sausages and ham and spread it among relatives and friends. When the very first symptoms of trichinellosis appeared in mid-January 2016, dried meat was inspected again and the presence of *Trichinella* was found. At that time the Public Health Institute Uzice announced that 273 persons were suspected on infection, out of which 114 were diagnosed as trichinellosis. No deaths occurred. Data regarding epidemiological investigation, clinical manifestations and laboratory will be presented.

(Project No.173047, Ministry of Education, Science and Technological Development, R.Serbia)

Key words: trichinellosis, epidemiology, serology

2. TRICHINELLA SPP. INFECTION IN SERBIA: A 5-YEAR STUDY, JANUARY 2011- DECEMBER 2015

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Infection with *Trichinella spp.* in Serbia continues to be a human health and animal husbandry problem primarily due to the lack of knowledge that causes the reluctance of some individual farmers to provide the sample of meat for *Trichinella* testing to the veterinary service. Despite of the fact that the rate of domestic swine infection with *Trichinella spiralis* gradually decreased from 0.026 % in 2011 to 0.006 % in 2015, the number of human cases per year remains similar overtime (average number for the last 5 years: 90, total number 450), with no fatality. Most of the outbreaks were small family epidemics. The cause of the infection in total of 41 of outbreaks included pork, wild boar and horse meat. For now, *T. spiralis* and *T. britovi* are the only two species detected in Serbia in domestic swine and wild boars. However, the risk of infection from wild boar meet in Serbia was underestimated, probably due to the fact that data on the infection presence were not collected regularly. During the last 4 years the number of districts in which the wild boars were hunted and tested increased (from 10 districts in 2012 up to all 25 districts in 2015), showing nowadays the reliable value of 0.734 % for infection prevalence.

Annually repeating outbreaks of trichinellosis indicate insufficient awareness of the risk of the disease and suggest that further efforts should be made in terms of education and trichinellosis prevention. (Project No.173047, Ministry of Education, Science and Technological Development, R.Serbia)

Key words: *Trichinella spiralis*, *Trichinella britovi*, infection, epidemiology, epizootiology

3. A SEROLOGICAL STUDY ON TOXOPLASMA GONDII INFECTION IN GENERAL POPULATION OF SOUTH BACKA DISTRICT

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Objectives: evaluate the levels of *T. gondii* specific IgM and IgG antibodies in population of South Backa District and determine avidity index in the population of pregnant women.

Methods: The retrospective study from 2014 to 2016 included 5152 patients: 792 male and 3118 female (18 to 65) and 1242 children (< 18). *Toxoplasma* serology was evaluated by ELISA method using a commercially available kit (Euroimmun, Germany).

Results: The overall *T. gondii* seroprevalence in population of South Backa District was 22.4%. The highest seroprevalence of 30.4% was found in male population, while seroprevalence among women and children were 21.5% and 15.3%, respectively. Incidence of acute infection in male population (6.2%) was higher than incidence in populations of women and children (2.5% and 3.2%, respectively). Of the 1767 pregnant women seroprevalence of *T. Gondii* was 19.4%, while acute infection was found in 2.1%. All pregnant women had high avidity index of IgG antibodies.

Conclusions: Our results show that the *T. gondii* seroprevalence in the examined population was 22.4% with statistically significant difference in seroprevalence between men and women. The avidity testing proved to be a powerful tool in screening of pregnant women.

Key words: *Toxoplasma gondii*, ELISA test, general population

4. PREVENTION OF LYME DISEASE, ENCEPHALITIS, HUMAN GRANULOCYTIC ANAPLASMOSIS AND HUMAN MONOCYTIC ERLICHIOSIS IN BELGRADE FROM 1. 1. 2014-1. 1. 2016.

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Ticks transmit many diseases in our work of particular significance were the ticks that live on the territory of Belgrade and can carry *Borrelia burgdorferi*, *Ehrlichia chaffeensis* and *Ehrlichia muris* and *Anaplasma phagocitophilum*. These are causes Lyme disease, human granulocytic anaplasmosis, tick-borne encephalitis (TBE) and human monocytic ehrlichiosis.

We used the white sheets for collecting ticks we did a detection via RT PCR.

The mean value of the presence of bacteria in samples of ticks 25.2% for 2014 year. No other pathogens we found. In 2015 year the mean value of the presence of bacteria in samples of ticks 15.7%. *Anaplasma phagocytophilum* was detected on Avala and hollow walls, while TBE virus was not detected in Belgrade.

We want to preventive action on the population of tick mapped potential morbidity and biocide treatment to ticks.

Key words: Lyme disease, HME, TBE, HGA



5. INFECTIONS CAUSED OF PROTOZOA AND HELMINTHS IN R. OF MACEDONIA FOR THE PERIOD FROM 2011 TO 2015.

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6. EPIDEMIOLOGICAL IMPORTANCE OF DOG PARASITES CONTAMINATION OF GREEN AREAS AND PUBLIC PLACES IN URBAN ENVIRONMENTAL CONDITION

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Objectives: Continuous increase of dog's population, both strays, and pets, present permanent epidemiological problem at urban environmental condition worldwide. Those animals permanent contaminated parks, public places, green areas and etc. with faeces. Besides its unpleasant appearance and odor, dog feces is a high epidemiological danger. Dogs are carriers and hosts of a large number of zoonotic parasites species which eggs were eliminated by faeces and contaminate urban areas. Those parasites, transmitted to human by faecal contamination, especially to children which play at those dirty places.

Materials and methods: Soil and grass samples were collected in a chess-board manner at distance of 1-1,5m according to the extent on the study area, and up to depth of 2-3cm. Dog faeces were collected from same area. All samples were examined by sedimentation and floatation method. Determination of eggs and development forms of endoparasites performed on their morphological characteristics.

Results: Parasites contamination of urban areas were detected worldwide. The most dangerous and also most usually occurred helminth eggs are by *Toxocara canis*, *Ancylostomidae spp.*, *Echinococcus granulosus.*, *Trichuris vulpis*, *Strongyloides stercoralis*, *Dipylidium caninum* and protozoas *Giardia intestinalis*, *Amoeba spp.* and *Cryptosporidium spp.*

Conclusion: Result of contamination of public places (parks, green areas and etc.) indicate high possibility to human infection.

Key words: epidemiology, dogs, parasites, zoonoses, environmental contamination



SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF COMMUNICABLE DISEASE EPIDEMIOLOGY

INTRODUCTORY LECTURES

1. EPIDEMIOLOGY AT THE CROSSROADS CHALLENGES AND SOLUTIONS – REFUGEES CRISIS AND CLIMATE CHANGE

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Migration has become an integral and indispensable part of the global social and economic development. What is more important is that the possibility of migration is becoming an increasingly important part of the world view of people who live in growing poverty. Migration, voluntary or forced, is becoming more common around the world.

International border traffic has been long associated with the spread of infectious diseases. The need to achieve the highest level of health protection while minimizing barriers to migration of people and the international trade in goods and services has become a leading principle of which is regulated by the International Health Regulations (2005). In some regions, people are encouraged to look for opportunities elsewhere, but at the same time politicians trying to stop immigration or with the pretext to protect the public health. People migrate in large numbers faster and further than ever before in history. This is happening at a time when many countries are not well prepared to cope with changes in demography, and when politics and attitudes on migration and immigration are only now forming.

Migrants represent a vulnerable group for many reasons, particularly because of problems relating to access to the health system, because of discrimination, language and cultural barriers, legal status and other economic and social difficulties. They often come from communities affected by war or economic crisis. Strenuous travel increase the risk of disease, particularly infectious.

With the arrival of migrants from endemic areas of Africa and Asia, Europe and the Balkans and Serbia on its way to the main migration authorities are becoming endangered by many risks including infectious diseases in these parts of the world unknown or long eradicated or eliminated.

Climate change is one change that is attributed directly or indirectly to human activity that alters the composition of the atmosphere, which are recorded over a long period. Side effects global warming: more frequent occurrence of stronger hurricanes and storms, the occurrence of floods and droughts in various regions of the world, reducing the amount of available fresh water, large disturbances in different ecosystems due to their "shift" to the north, the spread of some infectious diseases (eg. vector diseases) in the north areas, disruptions in the food chain, disruption of life cycles and stages of growth, so it can happen that some plants bloom earlier than the appearance of their pollinators. All it can lead to the emergence of a new type of migrant - climate refugees.

Conclusion

1. Migration and the international mobility of the population are facts of life globally. The extent of population migration within and across national borders creates a situation in which a large number of different populations is the road in a position to live together. The traditional approach to the administrative management of migration processes can not respond to the many needs of migrants, in particular medical needs, nor can answer in the

sense that people in transit can have an impact on the population of the host country. Identifying the health needs of migrants, in order to protect them and to improve their health, avoiding the stigmatization and marginalization, can reduce the health and social costs in the long run, protect global public health, to flowed easily integration and contribute to social and economic cohesion and development.

2. Establishing effective system of monitoring and identification of risks of infectious diseases, which includes data collection, analysis and reports through simple forms that they fill every health worker, by which they can report the number and type of health services as well as suspected or actual occurrences infectious diseases, as well as hygienic and sanitary conditions.

3. The application of preventive measures that include risk identification, activities related to the promotion of health, education and vaccination, especially those who work with migrants (health workers, police, Red Cross, municipal workers ...), and the provision of adequate conditions for temporary stay refugees. Implementation control measures circumstances that allow for the formation of infectious diseases, whether individual cases of certain diseases or epidemics of these diseases. In the existing conditions of current migration, inadequate hygiene conditions of acceptance, accommodation and transport of refugees represents the greatest risk to health and the greatest threat to the emergence of infectious diseases.

4. Education of migrants through individual and group forms of health-related educational work for the most important risk factors that affect their health (hygiene and nutrition in emergency situations with special emphasis on child nutrition, prevention of infectious diseases, protection from extreme weather conditions, prevention of injuries and other health damage incurred as a result of travel, etc.)

5. Education of health workers on the cultural traits and habits of migrants and adequate ways of communication with this population as well as education on behavior in emergency situations. Education of population through campaigns through mass media (in cooperation with governmental and civil society organizations), on protection against infectious diseases and establishing an adequate relationship to migrants. Education representatives of mass media on reporting on migrants (issues related to infectious diseases, where there are migrants, communication with migrants ...)

6. If on our territory forming centers for the accommodation of migrants, it is necessary to educate staff employed in them, tied for the most important risk factors for this population, communication with migrants and protection from infectious diseases. Bearing the fact that this vulnerable population, can pose potential threat to public health in Serbia when it comes to infectious diseases, what is needed is an intense cooperation of all institutions involved in the recording, storage and implementation of health surveillance against immigrants in order to improve the implementation of health care. The main component of this cooperation is a continuous exchange of information at all levels.

**2. PUBLIC HEALTH RISK RELATED TO COMMUNICABLE DISEASES AT THE
RIO DE JANEIRO OLIMPICS AND PARAOLIMPICS GAMES, BRAZIL, 2016:
SERBIAN EXPERIENCE BEFORE, DURING AND AFTER HIS RETURN FROM
THE OLYMPICS GAMES**

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The Rio 2016 Olympics and Paralympics Summer Games (OPSG), Brazil, as international mass gatherings pose a public health risk for communicable disease outbreaks and rapid global spread. Since 1 February 2016, Zika virus infection (ZVI), clusters of microcephaly cases and other neurological disorders associated with ZVI reported in Brazil, pose additional challenges for public health authorities. Therefore, with the aim to decrease public health risks related to communicable diseases and other health treats for Serbian athletics and citizens traveling to OPSG and to prevent its health implications after returning from Brazil, National Institute of Public Health (NOPH) “Dr Milan Jovanovic-Batut” from Belgrade, Serbia issued Interim guidance for protecting travelers (IGPT) from communicable diseases and exposure to Zika virus, fact sheets (FSs), conducted health promotional activities (HPA) and organized educations for Serbian Olympics and Paralympics teams members. IPGT consisted of recommendations related to the period prior traveling, while in Brazil and upon returning from 2016 OPSG. Prior departure theIPGT emphasized the vaccination status to be checked, if necessary updated, followed for sylvatic yellow fever areas and malaria chemoprophylaxis to be considered. While in Brazil, for decreasing the risk of gastrointestinal illness travelers should ensure standard and general hygiene precautions, as well as, for preventing sexually-transmitted and vector-borne diseases, measures as safe sex and protection of mosquito bites, respectively, will be performed. Upon returning from Brazil for prevention of sexual transmission of Zika virus, recommendations for couples who are pregnant, couples trying to become pregnant and ones concerned about sexual transmission, need to be followed. All measures included in IPGT were described in issued FSs. ICPT and FCs were delivered to all Olympics and Paralympics teams members. NIPH carried out HPA by all its available methods.

Key words: The Rio 2016 Olympics and Paralympics Summer Games, public health risk, communicable diseases, Zika virus

3. SURVEILLANCE OF ANTIMICROBIAL RESISTANCE

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CLINICAL AND EPIDEMIOLOGICAL IMPORTANCE

Antimicrobial resistance (AMR) is a serious threat to public health worldwide. The discovery of antibiotics and other antimicrobials has dramatically changed human and veterinary medicine by curing infections and saving many lives. Unfortunately, through the natural process of adaptation and selection, greatly accelerated by the overuse of antimicrobials, microorganisms become resistant and the resistance rate emerges every minute in every corner of the world. Effective antimicrobials preventing and treating disease complications are crucial for many medical interventions in surgery, transplants and aggressive cancer treatment. As currently available antimicrobials lose their effectiveness and no new antimicrobials are being developed, many infections are becoming life threatening (1).

Overuse of antibiotics in human medicine through inappropriate prescribing mainly in primary care, over-the-counter availability and taking the medication without physician's indication usually with insufficient dosages contribute to bacterial natural process of adaptation speeding up the development of the antimicrobial resistance. Antimicrobial consumption data in multicentric survey in 2011 showed that Serbia was among countries with the highest consumption of antibiotics, and the current data presented on national conferences indicate that the consumption of antimicrobials is increasing (2).

Antimicrobial agents are widespread used in veterinary medicine for prophylaxis and treatment of infections among farm animals and in food production as growth promoters making intensive selective pressure and development of resistant flora in animals. Both humans and animals serve as source of contamination of the environment (ground and water) through sewage water making the environment a huge reservoir of antibiotic resistance. In the community, while antimicrobials make ecological pressure on bacteria and select those with AMR genotype, poor infection prevention practice and sanitary conditions favour the further spread of MDR bacteria.

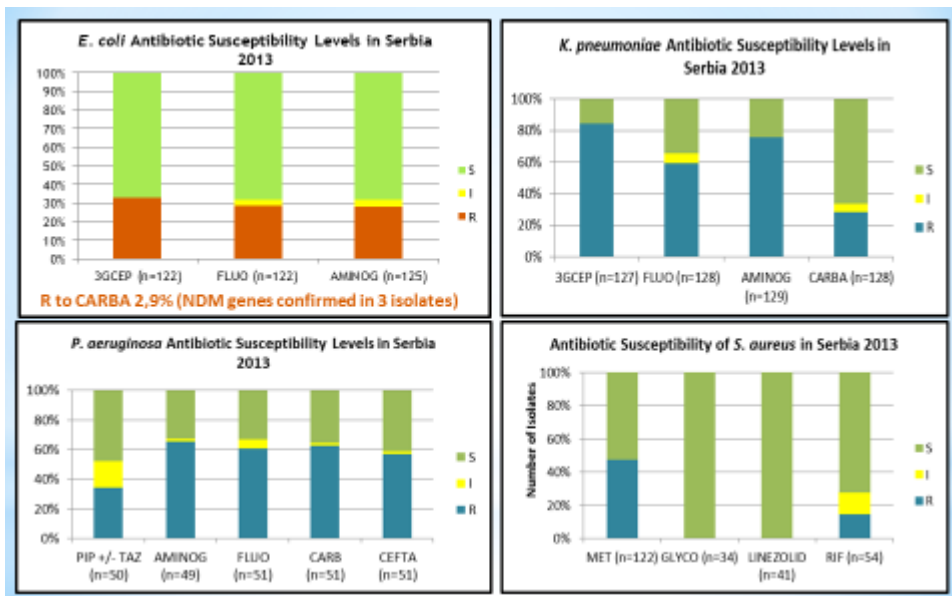
THE MAGNITUDE OF THE PROBLEM

Healthcare-associated infections (HAIs) are today leading cause of morbidity and mortality worldwide and over the last decade are almost all caused by multidrug resistant organisms (MDRO) with limited therapeutic solutions. A high incidence of MDRO thus adds to the overall clinical and economic burden in hospitals, causing prolonged hospital stay mainly due to delayed initiation of appropriate therapy and less effective alternative regimens.

AMR is a microorganism's ability to resist the action of one or more antimicrobial groups of agents. Multidrug resistance is defined as resistance to one or more tested antimicrobials in three or more antimicrobial classes. This phenomenon in USA is under the surveillance through the Centers for Disease Control and Prevention (CDC) National Nosocomial Infection Surveillance System (NNISS) which registered the increase over the past decades in rates of infections caused by MDR organisms (3). The latest European Centres for Disease Control and Prevention (ECDC) report through European Antimicrobial Resistance Surveillance Network (EARS-Net) showed that methicillin-resistant *Staphylococcus aureus* prevalence is rather steady or even decreasing in some countries, while from 2011 there is a significant increase in resistance in Gram negative pathogens under the

surveillance. *Klebsiella pneumoniae* and *Pseudomonas aeruginosa* showed the proportion of antimicrobial resistance to at least three antimicrobial classes of 22.3% and 15.3% respectively, while *Escherichia coli* invasive isolates were resistant to third-generation cephalosporins in a worst proportion of 36% in southern and eastern European countries. For several antimicrobial agent–microorganism combinations, lower resistance percentages are reported from the north and higher percentages from the south and east of Europe. These geographical differences may reflect differences in infection control practices and antimicrobial use in the reporting countries. (4,5). While EARS-net is based on a network of Member States collecting AMR data, the CAESAR network support all non-EU countries of the European Region to collect comparable, representative and accurate AMR data using the same methodology. Serbia through national reference laboratory for AMR in Center for Microbiology of Institute for Public Health of Vojvodina in Novi Sad and national network for AMR, together with currently other 17 non-EU countries, participates in the surveillance submitting data to the CAESAR database that were for the first time internationally presented in the annual report in 2014, shown at Figure 1 (6).

Figure 1. The proportion of resistance of some bacteria under surveillance to antimicrobials in Serbia. CAESAR Annual Report 2014.



SURVEILLANCE ON ANTIMICROBIAL RESISTANCE

The high resistance levels confirm the need for action. The first step is administrative support to build, maintain and improve national AMR surveillance programmes to provide timely information for national policy decisions. One of the main parties interested in this information is the Ministries of Health (MoH). Therefore it is essential to involve the MoH when setting up a national surveillance network on resistance and consumption of antibiotics. The national Ministries are expected to act in accordance with previously adopted legislation, to ensure prompt and effective communications, to appoint the reference laboratory with the national AMR focal point and data manager and to allocate sufficient resources to sustain surveillance and control activities in the country.

National focal point for AMR should build and lead the national network of laboratories and ensure that the laboratories generate their antimicrobial susceptibility test (AST) data according

to EARS-Net/CAESAR protocols. National AMR focal point should appoint national data manager who collects data from participated laboratories on quarterly basis and assists the AMR focal point.

National network should be built from laboratories from diverse regions with a coverage of at least 20% of the national population. The laboratories selected should be mix of tertiary care (academic) hospitals and secondary care (nonacademic) general hospitals providing representative samples of hospitals and both urban and rural population (7,8). Including only special patients from tertiary care institutions like intensive care unit (ICU) patients, or patients with relapses, recurring infections and treatment failure, will give false high resistance proportion because these patients are not representative sample of the population being intensively under selective pressure of antimicrobials. Before submission of data to the national data manager, participating laboratories should check their data for adherence to the protocols and microbiological consistency with AST methods and clinical S/I/R breakpoints according to the EUCAST or CLSI guidelines (9,10).

Surveillance should be comprehensive collecting comparable and validated data on prevalence and spread of major invasive bacteria with clinically and epidemiologically relevant resistance. In European countries through EARS-Net and CAESAR there are currently 8 bacteria of interest : *Staphylococcus aureus*, *Streptococcus pneumoniae*, *Enterococcus faecalis* and *faecium*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Klebsiella pneumoniae* and *Acinetobacter spp.*

It is in the same time important to established surveillance networks in human and veterinary medicines and to put in place and improve the collection of data on consumption of antimicrobial agents in all sectors.

PREVENTIVE MEASURES

Increasing experience with these organisms is improving understanding of the routes of transmission and effective preventive measures. Although transmission of MDROs is most frequently documented in acute care facilities, all healthcare settings are affected by the emergence and transmission of antimicrobial-resistant microbes. The severity of disease caused by these pathogens varies by the population affected and by the institutions in which they are found. Institutions, in turn, vary widely in functional characteristics, ranging from long-term care facilities to specialty units (e.g., ICU, burn units, neonatal ICUs) in tertiary care facilities. Because of this, the approaches to prevention and control of these pathogens need to be tailored to the specific needs of each population and individual institution. The prevention and control of MDROs is a national priority - one that requires that all healthcare facilities, but also veterinary facilities, farms and food industry assume responsibility.

Preventive measures and priority actions of the European Community strategy against antimicrobial resistance would be: Key area Action

- Increase the importance of antimicrobial resistance information for the market authorisation process in human medicine, veterinary medicine and agriculture
- Support, at Community level, educational campaigns directed at professionals (clinicians, veterinarians, farmers) and the general public to avoid overuse and misuse of antimicrobial agents
- Fully apply the principle that antibacterial substances are available in human and veterinary medicine by prescription only and distributed in a controlled way in agriculture, and evaluate whether the prescription-only rule should be applied to all antimicrobial agents as a precaution
- Reinforce and promote prevention programmes of infections in human and veterinary medicine, in particular immunisation programmes
- Reinforce the residue monitoring system in food as regards methods of analysis, sanctions and reporting system

- Phase out and replace antimicrobial agents used as growth promoters in feed
- Review the use of the two authorised antimicrobial agents in food
- Ensure that GMOs which contain genes expressing resistance to antibiotics in use for medical or veterinary treatment are taken into particular consideration when carrying out an environmental risk assessment, with a view to identifying and phasing out antibiotic resistance markers in GMOs which may have adverse effects on human health and the environment
- Encourage the development of new antimicrobial agents
- Encourage the development of alternative treatments and vaccines
- Support the development of rapid and reliable diagnostic and susceptibility tests
- Encourage strongly the development of co-operation, co-ordination and partnership at an international level in particular via the existing international organisations
- Pay special attention to candidate and developing countries by helping them put in place the appropriate structures (11).

CONCLUSION

Prudent use of antimicrobial agents and comprehensive infection control practices are the cornerstones of effective prevention and control efforts aimed at reducing the selection and transmission of resistant bacteria. The already high percentages and increasing trends of antimicrobial resistance in Gram-negative bacteria in Europe illustrate the continuous loss of effective antimicrobial therapy against these microorganisms and emphasise the need for comprehensive strategies targeting all health sectors. The high resistance levels confirm the need for action and emphasize the importance of good clinical practice in diminishing the further development of AMR.

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G. SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF
COMMUNICABLE DISEASE EPIDEMIOLOGY

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Key words: surveillance, antimicrobial, resistance, prevention

ORAL PRESENTATIONS

1. HEALTH TOURISM – NEW ASPECT OF TRAVEL MEDICINE

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Introduction: Health tourism is a travel of people to other countries for health reasons, or due to the realization of medical treatment. The number of people who travel for medical tourism is very important, the global profits from these activities is estimated at about \$ 60 billion. Health tourism is growing with annual growth of about 20% and is a global challenge for the whole world.

Material and Methods: Analytical review of documentation, legislations, scientific papers regarding to ethical dilemmas and risks related to health tourism.

Results: Reasons for health tourism are different and there is almost no area of medicine for which people nowadays will not travel from one country to another. The health tourism includes all countries of the world, whether as countries from which it is traveled or to which people travel due to the realization of some health services. Sometimes people travel from undeveloped to developed countries in order to ensure treatments which, because of the undevelopment of technologies and unavailability of devices, can not be achieved in their own county. However, sometimes people travel from developed to undeveloped countries because of lower prices of services or more liberal laws.

Conclusion: Travelers around the world travel for many health reasons and meet different risks.

Key words: health tourism, travel medicine, risks

2. EPIDEMIOLOGICAL CHARACTERISTICS OF TUBERCULOSIS IN AUTONOMOUS PROVINCE OF VOJVODINA IN THE PERIOD 2006-2015

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Objective. Tuberculosis is an infectious disease, caused by complex *Micobacterium tuberculosis*. The disease has a worldwide distribution. The aim of this paper was to analyze chronological, topographic and demographic distribution of tuberculosis in Autonomous Province of Vojvodina in the period from 2006 to 2015.

Methods. Descriptive method was applied. The epidemiological characteristics were analyzed based on individual case reports and outbreak reports, obtained from the Registry of Communicable Diseases, kept at the Center for Disease Control and Prevention, Institute of Public Health of Vojvodina.

Results. During the observed period, 3126 individual cases of tuberculosis were reported, with 104 death cases. The average annual incidence rate was 15,6/100 000. The disease doesn't reveal seasonal character. It affects people of both sexes and all age groups, but more often older-aged population. In the 10-year period, tuberculosis was reported from all Vojvodina counties. The highest incidence rate was registered in county called Juznabanatski.

Conclusion. Although the incidence rate of tuberculosis in Vojvodina is low and reveals decreasing trend, the disease is still considered as a public health problem.

Key words: Tuberculosis, Vojvodina, epidemiology.

3. MEASLES OUTBREAK IN THE REPUBLIC OF SRPSKA FROM 2014 TO 2015

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Materials and methods: Data from applications, bulletins and reports on communicable diseases, outbreak registration and cancellation, and reports on immunization coverage were used. Descriptive epidemiology was used to describe the independent variables.

Results: A total of 4064 measles patients was reported in the Republic of Srpska from May 2014 to the end of August 2015. Patients were registered in 48 municipalities, and outbreaks were reported in 24 municipalities from all regions. Being in touch with the infected in the outbreak previously registered in the Federation of Bosnia and Herzegovina, the first measles patients were registered in the region of Istočno Sarajevo. The largest number of patients was registered in December 2014 (768) as the first large wave, and then in April 2015 (520) as the second wave. Out of a total number of patients, 54% of them are male and 46% are female, more patients from the urban area (73%) comparing to the rural one (27%). Analysis of vaccination status indicates that there are 41% of unvaccinated patients, 38% of patients lacking the evidence of being vaccinated, 11% of incompletely vaccinated and 10% of completely vaccinated patients. 287 patients (7%) were hospitalized in the outbreak. Complications registered include cases of bronchopneumonia, pneumonia, otitis, sinuzitis, two cases of encephalitis, and there were no lethal outcomes. 217 blood samples were taken for serology diagnostic tests, out of which 158 (73%) samples are IgM At positive. All the necessary measures have been taken for outbreak suppression with a special emphasis on additional MRP vaccination of children and the youth aged 7-19.

Conclusion: Lack of MRP vaccines during the war and the problems in supplying, procurement, delivery, as well as shortage of vaccines on the market after the war, in the Republic of Srpska, have led to the fall in MRP vaccination coverage causing the emergence of measles outbreak.

Key words: outbreak, measles, vaccine, coverage, measures.

4. SCABIES AS A NEGLECTED BUT STILL SIGNIFICANT EPIDEMIOLOGICAL PROBLEM IN VOJVODINA

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Method of the work: A descriptive-analytical method was used. The incidence is 1:100,000 inhabitants.

Results: In the reporting period, in the territory of Vojvodina, there were 21,996 cases of scabies in humans, with an average annual incidence rate of 113.9 / 100,000 and increasing trend in the incidence (91.3 / 100,000 in 2006 to 154.8 / 100,000 inhabitants and 2015 year).

Although scabies is endemic in Vojvodina, Serbia the average annual incidence rates at the individual districts level are different and are in the ratio of 4:1 (325.8 / 100,000 -South Banat vs. 91.4 / 100,000 – North Bačka District). Absence of criteria for detection of scabies outbreak contributes to the fact that only 2% of all patients were registered in outbreaks and the largest number of outbreaks has been reported within the family. However, the most common outbreaks were registered in the special institutions for children and adults with special needs, where it was registered almost half of all patients those reported in outbreaks.

The disease is usually registered in the age ≥ 14 years, while the lowest age-specific rate was registered in age ≥ 60 years.

The most significant increasing trend in the reporting period is determined by the age of 15-19 years ($y = 17.465x + 155.69$, $R^2 = 0.7756$) and the incidence of disease is increasing from September with the highest value in December.

Conclusion: In Vojvodina Scabies represent a significant epidemiological problem with increasing trend of disease in last ten years. Continuous education of the population especially among sch groups of population and herds, with appropriate treatment, may contribute to the control of this disease.

Keywords: scabies, outbreaks, surveillance

5. EPIDEMIOLOGICAL FEATURES OF CAMPYLOBACTERIOSIS IN THE POPULATION OF BELGRADE FOR THE PERIOD 2005-2015. YEARS

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Objective: The paper describes the epidemiological features of campylobacteriosis in Belgrade for the period 2005-2015.

Method: The incidence of campylobacteriosis were analyzed in this descriptive study. In analyzing the data, the crude an age-specific and standardized incidence rates were used. To assess trends in incidence joinpoint regression analysis was used.

Result: In total, 1,214 cases of campylobacteriosis were recorded during the observed time period. The highest average age-specific incidence rates in the age group ≤ 4 years were registered (98.4/100,000 men and 76.4/100,000 women). There was no statistically significant change of trend in the incidence of campilobacteriosis for any age group by gender. The average standardized incidence rate was 14.4 per 100,000 inhabitants. In the observed period there was an increase in the annual standardized incidence rate in the overall population of 1.61% (95% CI: -3.9 to 7.5, $p=0.5$, joinpoint=0). The average standardized incidence rates for urban municipalities was higher than for rural. Peak occurrence of campylobacteriosis was from September to October (23.4%).

Conclusion: Campylobacter is one of leading cause of bacterial gastroenteritis in Belgrade. There is a need for enhanced prevention of campilobacteriosis with focus on identified risk groups such as children.

Keywords: campylobacteriosis, incidence, trend, Belgrade

6. INCIDENCE OF LEISHMANIOSIS IN MONTENEGRO DURING THE PERIOD 1945-2014

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Objective: The paper describes the epidemiological features of campylobacteriosis in Belgrade for the period 2005-2015.

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Conclusion: For the 69 years of follow-up, there were 2-3 cases reported per year in average. Considering there are no effective forms of immunoprophylaxis, the basic measures in controlling laishmaniasis continue to be: vectors control, early detection and treatment of cases and the treatment and control of animal reservoirs.

Key words: Leishmaniasis, Epidemiology, Incidence, Montenegro

7. WHAT HAS CHANGED IN EPIZOOTIOLOGY, AND WHAT IN EPIDEMIOLOGY OF ANTHRAX

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Introduction: *Bacillus anthracis* has three different clinical manifestations: cutaneous, gastrointestinal and pulmonary anthrax, depending on the route through which this sporogenous bacillus entered human organism. Each of them could lead to the secondary bacteremia and anthrax caused meningitis. Cutaneous form, as solitary cases or in small outbreaks, most commonly occurred in the world, as well as in Serbia. During last two decades, epidemiological characteristics of bacillus anthracis infection have changed.

Objective: To show what has changed in epizootiology and epidemiology of anthrax in the USA and Europe in comparison with Timočka Krajina.

Material and methods: Through the analysis of epidemiological data, obtained from epidemiological questionnaire during epidemiological research of cases with cutaneous anthrax, as well as others exposed persons, we discovered an outbreak in village V.I. in August 1996 and another solitary case in September 2013 in village Z. near Zaječar. We compared our epizootiological and epidemiological data with USA and European research data, including ex SSSR data, through the period from 1979 up to September 2014. In our research we used descriptive method.

Results With precise and comprehensive epidemiological research, knowing anthrax epizootiology and epidemiology, we are able to ascertain the most probable mode of transmission and source of the infection, including other possible ones. In the other case we could assume with high probability what were the modes of transmission and what were the causes of the disease in two described cases of cutaneous anthrax in Timočka Krajina. In the first case, cutaneous form of anthrax developed after contact of non-intact skin with cow's flesh and skin, died from anthrax. In the other case cutaneous form of anthrax in single person, developed after contact of non-intact skin on the hands with spores during digging a deep hole in the ground on the edge of the village territory. In our country, although in long time intervals, cutaneous form of anthrax caused by contact of non-intact skin with anthrax spores whether from an animal who died from anthrax or by digging soil on so called "ukleta polja" still occurs. The most common form which still occurs in the world is inhalatory one, but recently inoculative anthrax sepsis has been found as another important form caused by I.V. inoculation of the anthrax spores along narcotics.

Conclusions: The biggest change in anthrax epizootiology is that animals in developed countries didn't get sick a long time ago from this zoonosis. In our country, animals who die from anthrax still could be found. Cutaneous form of anthrax caused by contact of non-intact skin with dead animal's flesh or with soil is very rare in developed countries in contrary to our country. In developed parts of the world epidemiology of anthrax form a specter of manifestation which ranges from with malice aforethought usage of anthrax in bioterrorism to inoculative sepsis after I.V. narcotics misuse.

Key words: Anthrax, malignant pustule, pulmonary anthrax, inoculative anthrax sepsis



POSTER PRESENTATIONS

1. ELECTRONIC REPORT ON MOVING OF CONTAGIOUS DISEASES MADE FOR THE FIRST TIME FOR HES IN 2015

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Introduction: Initial structure of electronic record of patients of EPR (Electronic Patient Record) has to be identical with existing “paper” form of medical records. It is used in accordance to the Law on health protection and European charter on patients’ rights. In this work, we are interested in “Annual report on moving contagious diseases in the area of Berane municipality in 2015” – relation between reports made in previous way in a Book of evidence of contagious diseases and the new one made in electronic way, made for the first time. It is expected to have them both identical. **Objective:** If there are any differences, we will find the reasons.

Materijal And Method: The number of registered ones in HES is 310, and in Electronic Institute 362. The difference is 52 (14,4 %). The electronic one is processed twice, that is the program register it in the kind and type of the same disease, so there are 361 registered ones, and the real difference is 56 and not 57.

Results: Why is there a surplus in the report of HES? Five registered ones in HES are sent to the Institute: three dog bites and two parotiditas. Eliminated surplus appeared due to irreverence of diagnostic criteria at two parotiditas. The bites are not registered by the program. Why is there a surplus in the report of HES? 56 registered ones are deployed as follows. Out of Berane there were 45 registered (80,35%; from what the Institute has 4 (8,88%) registrations); in Berane – 11 (19,64%).

Conclusion: There are less registered ones due to irreverence of the Regulation on the way of registration of contagious diseases. Registrations were not addressed to HES in the same time when they are addressed in the Institute. There are four times more such ones out of Berane.

Key words: electronic report 2015, contagious diseases, registration diseases

2. THE ROLE OF COMPULSORY IMMUNIZATION IN REDUCING THE INCIDENCE OF INFECTIOUS DISEASES

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The purpose of the paper is to show the incidence of infectious diseases before and after the introduction of compulsory immunization.

Material and method. For material used data from the Institute for Public Health Skopje. Applied retrospective method of working with data analysis from 2005 to 2015.

Results. In 2015 recorded cases of measles in 2014 were registered 116 cases. In the past ten years, a high number of cases registered in the epidemic in 2011 ($n = 701$). Infections caused by Hib register with individual cases in the past five years, except in 2014 when there were four reported cases. In 2015 registered a total of 52 ($I = 2,5 / 100.000$) cases of infectious mumps. In the past ten years, the lowest number of cases registered in 2006 ($n = 49$ MB = $2.4 / 100,000$), and the largest epidemic in 2009 ($n = 10.920$, MB = $535.2 / 100,000$).

Conclusion. The incidence of diseases of this group against which there is compulsory immunization in the past ten years has been significantly reduced compared to the average for the five-year period before the introduction of compulsory immunization.

Key words: compulsory vaccination, incidence, communicable diseases.

3. POST-EXPOSURE IMMUNIZATION AGAINST RABIES IN SERBIAN AREAS OF KOSOVO AND METOHILJA

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Objective: To describe the results of the post-expositional immunization against rabies and to emphasize the problem of prevention of rabies in Serbian areas of Kosovo and Metohija in a fifteen-year period.

Methods: Medical logbooks data for injured persons, of Institute of Public Health in Kosovska Mitrovica, have been used as a material for creating this scientific research. In this paper we used observational descriptive study, time series as a method of work.

Results: During the period from 2000-2015. year, in the territory of Kosovo and Metohija (the Serbian areas), the number of 961 patient has been examined due to injuries caused by animals, and immunization against rabies was carried out at 344 people (35.7%). In the reporting period, the incidence of injury has had an ascendant trend ($y = -6077.57 + 3.05x$; $p < 0.001$) and the average incidence rate amounted to 38.6/100000. Men are injured more frequently (63.7%) and immunized too (60.8%). The largest group of injured and immunized are patients aged 18-60 years. In more than 88% of immunized, dog inflicted injuries. The most common injuries (64%) were caused in the area of the lower extremities and 37.5% of immunized had one, 29.1% two and 30.5% three or more wounds.

Conclusion: During the reporting period, 35% of persons injured by animals has been successfully immunized. The largest number of injured by animals is the active population. The largest number of injuries was caused by stray dogs, which points to the need to regulate the problem of abandoned animals.

Keywords: rabies, post-expositional immunization, Serbian areas, Kosovo and Metohija.

4. MONITORING ON THE CORRECTNESS HEALTH OF SWEET PRODUCTS AND ICE CREAM IN THE REGION OF KICEVO BETWEEN 2006-2014y.

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Introduction: Sweets and icecream represent a good basis for the holding and reproduction to microorganisms and have a significant role in the spreading of infectious sicknes.

Objective: To assess the health risk of the occurrence of foodborne toxicoinfections at all infectious intestinal sicknesses,as well as to suggested measures to lower the possible risk.

Materials and Methods: Statistical data is processed, microbiological findings from swabs taken from the working surface, the hands of the staff, for accessories preparing serving and the sweet and microbiology,the findings of the sweets products and ice cream in accordance with standard methods. Applied is descriptive epidemiological and statistical methods to work.

Results: 70 inspections were made in the facilities. 11 production facilities on craftwork 8 (73%) did not respond to the sanitary-hygienic terms. From total of 76 swabs taken into consideration for control of purity, all are correctly executed. Sanitary surveys of 269 employees, registered with *Staphylococcus aureus* 21%. Analysed samples of sweets and ice cream- 4% are microbiological defective.

Conclusion: The hygiene in the facilities is not satisfactory. From 5 unlegal-three samples (60%)is isolated *Escherichia coli*.Narrated trend of reported caises to suffering from foodborne toxicoinfections. Therefore, it's recommends that constantly monitoring and regular educations on the workers.

Keywords: Sweet products, quality and control

5. CLINICAL AND EPIDEMIOLOGICAL CHARACTERISTICS OF HEMORRHAGIC FEVER WITH RENAL SYNDROME IN SOUTHEASTERN SERBIA

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Objectives: Aim of research was to determine epidemiological and clinical characteristics of hemorrhagic fever with renal syndrome (HFRS) in southeastern Serbia.

Material and methods: As a material we used medical documentation of 33 patients from southeastern Serbia that were diagnosed with HFRS in the period from 2001. to 2010. Patients were of both sexes, 23-70 years old and were treated in Clinic for infectious diseases in Nis. Descriptive epidemiological method and statistical methods for quantitative analyses were used.

Results: The highest cumulative incidence of patients with HFRS was in the Jablanica district (4.15/100,000), and municipality of Medvedja was the most affected (27.9/100,000). Disease was more often present in male patients (69.7%). HFRS was most often diagnosed in age group 20-40 years and mostly during summer months (72.73%). Majority of diagnosed patients came from rural areas and report agricultural activities in anamnesis. In all patients disease started with high fever and after 4 to 6 days oliguria/anuria appears. Severity of symptoms was not influenced by the virus that caused infection (Hantaan, Pumala, Seoul or Beograd).

Conclusion: Detailed epidemiological survey of patient with high fever and oliguria/anuria could be of great importance in early diagnosis and treatment of HFRS.

Key words: hemorrhagic fever with renal syndrome, epidemiology, southeastern Serbia

6. EPIDEMIOLOGICAL AND CLINICAL CHARACTERISTICS OF CHRONIC HEPATITIS B

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Introduction: Hepatitis B virus is primarily a hepatotropic virus that causes both acute and chronic form of hepatitis B. It is estimated that 2/3 of the world's population has been infected with hepatitis B virus at some point during their lifetime. Chronic hepatitis B is a global health problem. About 400 million people develop chronic hepatitis B worldwide and more than million people die every year due to chronic HBV infections, liver cirrhosis or hepatocellular carcinoma.

The aim of the paper was to analyze epidemiological and clinical characteristics of CHB.

Material and methods: The study enrolled 35 consecutive patients with CHB, treated at the Clinic for Infectious Diseases, Clinical Center Niš, in the period from May 2015 to May 2016. The sources of data collection were surveys and anamnestic data of patients with confirmed CHB. The method of descriptive epidemiology was applied. Student's *t* test, chi-square test, and Fisher's test with significance level $p < 0.05$ were used in data analysis.

Results: During the observation period, 35 consecutive patients were registered (24 male patients-69 %, 11 female patients- 31 %), mean age of 40.95 ± 12.83 years (min=15, max=62), (43.18 ± 12.66 years in males and 39.43 ± 13.87 years in females). Males were older than females for 3.75 years. Most patients were within the age group between 41 and 50 years (16 patients- 46 %); 46 % of them were males and 45% females. They were followed by individuals over 50 years of age (9 patients- 26%); 27 % of them were males and 25% females. Anamnestic data revealed the following routes of infection transmission: surgeries and dental interventions (9 patients-26 %), unprotected sex with unknown partners (5 patients - 14 %), unprotected sex with HBsAg positive partners (3 patients- 9 %), tattooing (2 patients- 6 %), accidental pick (2 patients- 6 %), hemodialysis (2 patients- 6 %); in 12 patients (34%) the route of transmission was not established. Confirmed clinical signs and symptoms in patients were: exhaustion (23 patients- 66 %), pain under the right rib arch (20 patients -57%), hepatomegaly (11 patients-31%), dyspepsia (10 patients - 29 %) and subicterus (10 patients - 29 %), splenomegaly (6patients -17 %). All the symptoms were more prevalent in male patients.

Conclusion: Due to CHB course and its severe complications, special efforts should be made regarding prevention and eradication of HBV infection.

Key words: chronic hepatitis B, epidemiological characteristics, clinical characteristics, prevention

7. EPIDEMIOLOGY OF SCABIES IN NISAVA AND TOPLICA DISTRICT

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Aim. To assess epidemiological characteristics of scabies in Nisava and Toplica District in the period from 2006 to 2015.

Materials and methods. Descriptive epidemiological method was used. Data sources were notification records of scabies cases and epidemics registered cases in Nisava and Toplica District, from 2006 to 2015. Crude incidence rates were calculated per 100,000 inhabitants.

Results: There were registered 3887 cases of scabies. An increasing incidence trend was registered in Nisava District ($y=4,40x+46.72$, $R^2=0.17$) and declining in the Toplica District ($y=-6,86x+148.41$, $R^2=0.36$). The average annual incidence rate was 78.87 ‰ (the highest in 2015 -143.57‰ and the lowest in 2013 - 56.39‰). The municipality of Prokuplje had the highest average annual incidence rate (149.98 ‰) and Svrlijig had lowest (11.98 ‰). The highest incidence rates were in the age group 5-9 years (1999.65 per 100,000) and 15-19 years (1970.95 per 100,000). The highest number of patients were registered in December (12.30%). During observed period, four outbreaks were registered (with 39 cases): two in Roma settlements, one in Clinical Center Nis (with 4 infected health workers) and one in the Home for secondary school students. Two epidemics started in 2014 are still going.

Conclusion: The increasing incidence trend of scabies was registered. It's important to provide intensive education among broad population as well as other preventive measures in order to decrease morbidity of scabies.

Key words: scabies, incidence, trend, epidemics

8. SEASONAL VARIATIONS IN C.DIFFICILE INFECTIONS AND INFLUENZA AND THEIR CORRELATION

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Aim: The study had two goals. First, to analyse the trend and seasonal character of C.difficile and influenza in Belgrade from 2011. to 2015. and second, to analyse the potential correlation between increased influenza incidence with increased C.difficile incidence.

Methodology: Data were collected from annual report regarding the work in prevention, combating and elimination of infectious diseases in Belgrade. Morbidity rates, arithmetic mean as a measure of central tendency, linear regressive model for analysing trend and seasonal variation of diseases and cross-correlation calculations are used for statistical data analysis.

Results: In Belgrade between 2011. and 2015. a significant increase of incidence of C.difficile ($p < 0.001$) was registered, with no significant statistical change in influenza incidence ($p = 0.189$). With C.difficile, no significant seasonal pattern was noticed, while influenza showed a significant increase of incidence in February ($p < 0.001$) and March ($p = 0.019$). During this period, there was no noticeable causal connection between increased influenza incidence and C.difficile incidence. Cross-correlations, with delay from 0 to 5 months, varied between -0.096 and 0.064 and as such statistically insignificant.

Conclusion: In Belgrade between 2011 and 2015, the incidence of C.difficile increased significantly with no noticeable seasonal pattern. Influenza incidence remained stable over years, with seasonal pikes in February and March. C.difficile morbidity does not occur as a consequence during observed time.

Key words: C.difficile, influenza, disease, seasonal character

9. THE WORK OF EPIDEMIOLOGISTS IN THE ANTI-RABIES STATION OF THE INSTITUTE OF PUBLIC HEALTH PIROT FROM 2006 TO 2015

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Introduction: Vaccines and human anti-rabies serum is possible to prevent the occurrence of rabies to the injured persons.

Objective: Show the work of epidemiologists in the anti-rabies station.

Material and methods: Retrospectively followed the work of epidemiologists from rabies virus infection.

Results: We have occurred 980 persons. The owners are known for 69.57 % of the domestic animals that were inflicted injury.

Of the domestic animals whose owners are known, 27.16% were regularly vaccinated against rabies.

At 44.18% of domestic animals was performed 10-day supervision of a veterinarian.

Under the 10-daily supervision is placed 51.88% of domestic animals of unknown owners, since they were captured by the animal hygiene services of municipal enterprises.

Of the 101 persons who were indicated for antirabic protection, 87.13% are fully protected, at 7.92% vaccination was discontinued due to the obtained negative results, and 4.95 % refused to take the vaccine.

Conclusion: Implementation of measures for combating rabies, especially vaccination of wild animals oral vaccine since 2010, has led to a significant improvement of epidemiological situation of rabies in the entire territory of Serbia and a significant reduction in the number of injured people from animals that needed antirabic protection.

Key words: antirabic protection

**SESSION: THEORETICAL AND PRACTICAL PROBLEMS
OF NON-COMMUNICABLE DISEASE EPIDEMIOLOGY****INTRODUCTORY LECTURE****OPPORTUNISTIC SCREENING FOR DEPRESSION IN PRIMARY HEALTH
CARE**Rančić Nataša^{1,2}, Petrović B.^{1,2}, Kocić B.^{1,2}¹ Univeristy of Niš, Faculty of Medicine Niš² Public Health Institute Niš

Introduction: According to the World Health Organization (WHO), depressive disorders are common mental disorders, affecting more than 350 million people of all ages worldwide (1). They are a leading cause of disability adjusted life years (DALYs), and a second leading cause of years lived with disability (YLDs) (2). Today, depression already is the second cause of DALYs in the age category 15-44 years (3).

The Global Burden of Disease (GBD) study (GBD 1990 Study) launched by the WHO in the 1990s showed that Depressive disorders account for 3.7% of total DALYs and 10.7% of total YLDs. GBD 2000 study (WHO 2001) showed that depression accounts for 4.46% of total DALYs and 12.1% of total YLDs. This clearly highlights a trend of increasing burden of disability secondary to depression (3).

The prevalence of depression in the general population varies between 3.0% and 11.0% and is twice as high in women as in men. This proportion varies between 15.0% and 30.0% in older adults, depending on location, socioeconomic conditions and the instrument used to measure it. Depression is seen as a significant public health problem, with worrying perspectives for the future (4)

The (WHO) estimates that the disorder will be the pathology with the heaviest global disease load by 2030, being more intense in low and middle income countries due to lack of diagnosis and treatment. Depression is the fourth most common cause of “disability-adjusted life years”, and it is estimated that by 2020, it will be second (5). The WHO estimates that in the European countries each 15th citizen shows depression symptoms (6).

According to the Serbian National Health Survey from 2013. mental health problems represent significant and growing up problem of public health. It was established that 4,1% of the population had depression symptoms. Symptoms of depression were present in a significantly higher percentage in women (5,3%) than men (2,9%), as well as in the population of the elderly and poorest citizens. The information that as many as 21,1% of the population aged 85 and over had depression symptoms (4,5% had severe depression symptoms) was worrying, but they failed to recognize them as such (only 8.6% stated that in the past 12 months they were depressed) (7).

Depression is associated with more impairment in occupational and interpersonal functioning in comparison to several common medical illnesses. The cost of depression, particularly the cost in lost work days, is as great as or greater than the cost of many other common medical illnesses. Depression also has a large impact on maternal and child well being. Childhood failure to thrive is a major risk factor for child mortality. Depressed mothers are more likely to cease breastfeeding.

Depression during pregnancy is strongly associated with low birth weight. Depression in women during pregnancy is common. Prevalence rates have been reported to be 7.4%, 12.8%, and 12.0% for the first, second, and third trimesters, respectively (9,10). Other studies

have shown that 10% to 16% of pregnant women fulfill the diagnostic criteria for MD, and even more women experience subsyndromal depressive symptoms (11).

Depressed men and women are 20.9 and 27 times, respectively, more likely to commit suicide than the general population. A 2000 meta-analysis of deaths by suicide concluded that there was a hierarchy in the lifetime prevalence of suicide among patients with affective disorders, with patients hospitalized for attempted suicide having an almost 20-fold greater prevalence than subjects who had never had any affective illness (12).

The risk of cardiac mortality after an initial myocardial infarction is greater in patients with depression and this risk is related to the severity of the depressive episode. A study of 896 patients hospitalized for myocardial infarction found a direct relationship between the severity of the depressive symptoms as measured by the Beck Depression Inventory Score at hospitalization and the risk of cardiac death over the following 5 years (13).

Similarly, a meta-analysis of 20 studies (14) has shown that clinical depression is a significant risk factor for mortality in patients with coronary heart disease both short-term (3–6 months; adjusted odds ratio 2.07) and long-term (6–24 months; adjusted odds ratio 2.61).

Another study evaluated long-term mortality risks measured at middle age among 12,866 men with a high risk for coronary heart disease. Greater depressive symptoms were found to be associated with significantly higher risk of all-cause mortality and a higher risk of cardiovascular death and, more specifically, stroke mortality (15).

Even the risk of death by all causes is increased in depressed patients who are twice as likely to die prematurely compared with the general population (SMR 1.9 men; 2.1 women) (16).

The outcome of depression can be significantly improved by early detection. A wide range of highly effective treatments including antidepressant medications (at a cheaper cost), somatic therapies and psychotherapeutic interventions is available for the treatment of depression. Antidepressant medications and supportive psychological interventions are effective in about 80% of patients.

Less than 25% of those affected (in some estimates less than 10%) by depression receive treatment. Barriers to effective care include the lack of resources, lack of trained providers, and the stigma. Nearly half of the patients with depression, as in diabetes, remain undiagnosed for years or inadequately treated. Large numbers of patients from rural areas remain under care of religious healers and may never receive correct treatment. Special diets, tonics, appetite stimulants and energy pills dominate the prescriptions. Stigma still is a significant barrier. The majority of patients do not receive evidence-based treatments (17).

Despite the fact that many patients with depressive disorders seek help in primary care, general practitioners have difficulties in diagnosing and treating depression. The point prevalence of major depressive disorder in general hospital setting care is higher than 10%. Concomitant depression increases the morbidity and mortality from concurrent medical illness. Depression increases the risk for cardiac illness, diabetes, hypertension, etc. Depressed patients have three times higher risk of developing myocardial infarction (MI) compared to people not having depression.

Mood disorders, as highly prevalent and lethal disorders, must command a greater share in the clinical curriculum. Depressive disorders can be easily diagnosed at the primary care level and do not require any special investigations or hi-tech equipment. They can be detected early and managed very effectively by a primary care doctor, with a wide array of effective and safe medications available at reasonable cost.

The challenge is to provide all primary care physicians with the requisite hands-on experience in this prevalent group of disorders. Emphasis on training in psychiatry during undergraduate medical training remains an issue of immediate attention (18-21)

According to the Serbian National Health Survey from 2013, mental health problems represent significant and growing up problem of public health. It was established that 4,1% of

the population had depression symptoms. Symptoms of depression were present in a significantly higher percentage in women (5,3%) than men (2,9%), as well as in the population of the elderly and poorest citizens. The information that as many as 21,1% of the population aged 85 and over had depression symptoms (4,5% had severe depression symptoms) was worrying, but they failed to recognize them as such (only 8.6% stated that in the past 12 months they were depressed) (5).

The objective of the paper was to present data about problem of detecting depression in primary care and to show first results of the opportunistic screening for depression which was conducted in the primary health care of Niš.

Methods: A cross-sectional study was done based on the Patient Health Questionnaire-PHQ-9 for categorization of population with depression symptoms (from mild, to the symptoms of severe depression). The questionnaire had nine questions, the participants circled one of the answers. Calculated a summary score for each subject and interpreted in relation to the scale of assessments. Summary score is shown by sex. The study was carried out in the Health Center Niš during 2015..

Questionnaire

The Patient Health Questionnaire (PHQ-9) is multipurpose, instrument for screening, diagnosing, monitoring and measuring the severity of depression. The PHQ-9 incorporates DSM-IV depression diagnostic criteria with other leading major depressive symptoms into a brief self-report tool. The tool rates the frequency of the symptoms which factors into the scoring severity index. Question 9 on the PHQ-9 screens for presence and duration of suicide ideation.

The diagnostic validity of the PHQ-9 was established in studies involving 8 primary care and 7 obstetrical clinics. PHQ scores >10 had a sensitivity of 88% and a specific of 88% for major depression. PHQ-9 scores of 5, 10, 15 and 20 represents mild, moderate, moderately severe and severe depression (7).

The PHQ-9 is brief and useful in clinical practice. The PHQ-9 is completed by patient in minutes and is rapidly scored by the clinician. The questionnaire can also be administered repeatedly, which can reflect improvement or worsening of depression in response to treatment.

The PHQ-9 has 9 scored questions and one non-scored (10-If you checked off any problems, how difficult have those problems made it for you to do your work, take care of things at home, or get with other people?). The 10th question screens and weight to the degree to which depressive problems have affected the patient's level of function.

Results

A total number of 80 questionnaires were distributed. Only 58 questionnaires were completed and the response rate was 73%. There were 19 (32,81%) men and 39 (67,2%) women. The average age of subjects was 66,2. Average summary PHQ-9 score was 7,1 (Min = 0 Max = 24). The total score on the scale 0-4, had 23 (39,7%). Score 5-9 had 25 (43,1%) and a total score over 10, registered in 14 (17,2%) of subjects.

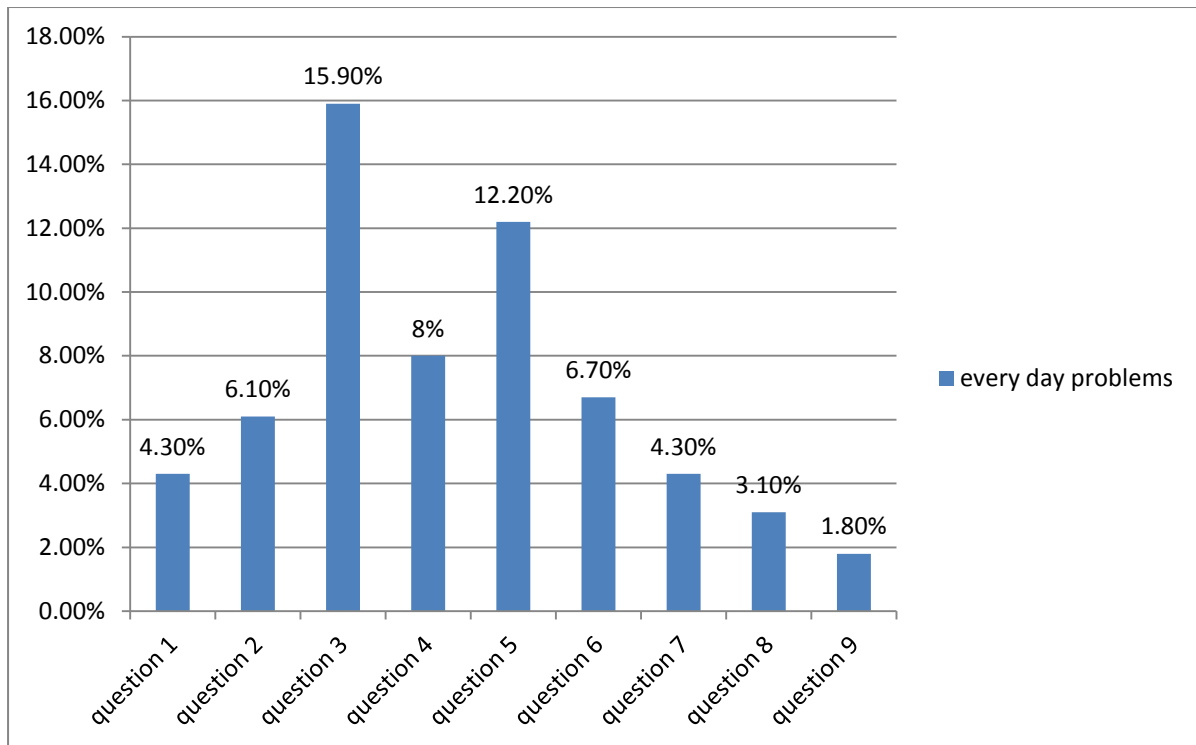


Chart 1. Distribution of answers by every day appearance

Legend: 1-question-little interest or pleasure in doing things; 2-feeling down, depressed or hopeless; 3-trouble falling asleep, staying asleep, or sleeping too much; 4-feeling tired or having little energy;5-poor appetite or overeating;6-feeling bad about yourself-or that yours a failure or have let yourself or your family down;7-trouble concentrating on things, such as reading the newspaper or watching television; 8-moving or speaking so slowly that other people could noticed. or, the opposite-being so fidgety around or restless that you have been moving around a lot more than usual; 9-thoughts that you would be better of dead or hurting yourself in some way

There were the most participants who had problems with sleeping, trouble falling asleep, staying asleep, or sleeping too much. On the second place were problems with poore appetite or overeating. On the third place were participants who feeling bad about themselves. There were the lowest number of participants with positive answer on the 9th question 1,8%.

Discussion

To our knowledge this is the first PHQ-9 questionnaire-based study of depression in adult population of the city of Niš. We presented the first results from the opportunistic sreening of depression among the patients in general practice of the Health Center Niš. A weakness of our study is that there were a small number of participants. Response rate was 73%. There were 2 times more women with depressive sytomes than men. Average summary PHQ-9 score of all participants was 7,1 which indicates that participants had minimal depressive symptoms.

According to the presented results there were about 60% of participants with mild or severe depressive symptoms. There were the most problems with sleeping, trouble falling asleep, staying asleep, or sleeping too much. More than 15% of particiopans had problems with sleeping, trouble falling asleep, staying asleep, or sleeping too much. About 12% had poor appetite or overeating and 6,7% feeling bad about themselves, abou 6,2% felling down, depressed or hopeless.

The prevalence for screening studies for depression in general practice is usually low (8% for major depression); hence the likelihood ratio for a negative test does not need to be low to rule out depression when the test is negative (in this sample a patient with a negative test would have a 0.3% chance of being depressed) (8). Sleeping problems and eating disorders, are well-known depressive symptoms (9).

Depression causes significant suffering and is commonly seen in primary care (9) Because primary care providers sometimes fail to identify patients as depressed, systematic screening programs in primary care may be of use in improving outcomes in depressed patients (10,11). Conclusion: Depressive mental disorders are important and under recorded health problem in the population of the city of Niš, especially in women and in older persons. In order to achieve better diagnosing of depression and optimizing treatment of sick persons a screening for depression in general practice is needed. The PHQ-9 questionnaire is brief and easy to administrate and to fill in. It is recommended to use for opportunistic screening in primary care institutions. Further research is necessary.

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H. SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF
NON-COMMUNICABLE DISEASE EPIDEMIOLOGY

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ORAL PRESENTATIONS

1. HPV VACCINE-PREVENTION OF THE CERVICAL CANCER

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Introduction. Vaccines that prevent viral diseases are widely recognized by health authorities and the medical community as a major tool for achieving public health success.

Material and methods: Analytical review of the literature.

Results: After Harald zur Hausen in the 80s discovered the human papillomavirus (HPV) 6 and the HPV 18, started three decade accumulation of strong and consistence evidence that HPV infections are a necessary cause of more than 99% of cervical cancers. Cervical cancer is the fourth most common cancer in women and the second largest cause of mortality due to cancer. From 2006 are a bivalent HPV, composed of two antigens only :HPV 16 and HPV 18, and a quadrivalent (HPV 6, 11, 16 and 18) vaccine registered, and since 2015 is the nonavalent vaccine (HPV 6, 11, 16, 18, 31, 33, 45, 52 and 58) also on the market (Europe). The main effector of the protection is believed to be the IgG antibody.

The number of clinical trials were able to show the efficacy and safety of the HPV vaccines and are able to prevent up to 90-100% of the new HPV 16 and 18 infections. These trials resulted in the use of the vaccines in the adolescence women as the main target group. This recommendation, though often under discussion, is supposed to be expanded to male adolescence as well. However, even highly immunogenic, safe and effective vaccines are now available to control HPV-related disease not all of the countries around the world implemented it in the national vaccination programs. **Conclusion:** Implementation of the HPV vaccination is of the high importance in preventive medicine and show the cost effectiveness on the long term.

Key words: HPV, Vaccine, Prevention, Cervical Cancer

2. POPULATION-BASED CANCER REGISTRY AT THE INSTITUTE OF PUBLIC HEALTH OF BELGRADE IN THE PERIOD FROM 1970 TO 2015

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Introduction. Population-based Register of Malignant Neoplasm is important source of data on cancer patients, and the main source of data for evaluation of population health status, healthcare planning and programming as well.

Material and method. Analysis of population cancer registry using appropriate statistical tests.

Discussion. In population-based Cancer Registry since 1970 to 2015, there have been 200277 cancer patients, out of whom 102075 persons (51%) are no longer registered. The incidence per 100000 inhabitants has increased from 98 in 1970 to 754,5 in 2014. The average patients' age at the time of registration is increasing. The most common malignant neoplasms in men are cancer of trachea and lungs, malignant skin tumors and prostate cancer. In women- breast cancer, skin cancer and tumor of the uterus. The main causes of death in men are malignant tumor of the trachea and lungs, prostate and colon cancer, and in women breast cancer, trachea and lungs cancer and colon cancer.

Conclusion. The registration of malignant neoplasms from medical institutions is insufficient, incomplete and untimely. The Register is updated with data from Death certificates and individual reports of hospitalization..

Population-based register should provide information on cancer patients in specific area and period of time. The calculated incidence represents a reporting incidence rather than the disease incidence. From Register data we can obtain registration length and seldom actual survival rate.

Key words. Population-based Register, Malignant Neoplasm, incidence , diagnosis

3. EPIDEMIOLOGIC CHARACTERISTICS OF THE BLADDER CANCER IN THE SREM COUNTRY IN THE PERIOD 2006-2011

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Introduction: Incidence, prevalence and mortality rates of bladder cancers are increasing worldwide especially among males. Bladder cancer is increasingly important health problem in Vojvodina province.

The aim of study was to analyze epidemiological characteristics and trends of the bladder cancer in the Srem county in the period 2006.-2011.

Material and method: In this study we used a descriptive epidemiological method . Data on incidence and mortality were collected and analyzed from the Cancer Registry of Srem county.

Results:We analyzed data which indicated a rise in the incidence and the decrease in mortality of bladder cancers in the Srem county in the period 2006.-2011. The highest incidence and mortality rates of bladder cancer were registered in the municipality of Šid. During the observed period in the Srem county, incidence and mortality rates of bladder cancer were four times higher among males.

Conclusion: The rising trend in patients with bladder cancer can be explained by greater exposure to risk factors (smoking) and various cancerogens during observed period. Decline in mortality from bladder cancer was a false view of the trend because of dynamics in entering data into the Cancer Registry, which was most intensive in the period 2006-2007. Due to irregular and insufficient reporting, the obtained data should be interpreted with caution.

Key words: bladder cancer, incidence, mortality, Srem county

**4. PHYSICAL ACTIVITY AND LIFE PHILOSOPHY ASSOCIATED WITH
CORONARY ARTERIAL DISEASE IN FEMALE PATIENTS IN MENOPAUSE**Taushanova Biljana¹, Petrovska N², Orovcane N¹, Zafirova B¹, Pavlovska I¹¹Institute of epidemiology and biostatistics, Faculty of Medicine, University Sts. Cyril and Methodius, Skopje, Macedonia²Primary School "Vuk Karadzic", Kumanovo, Macedonia

Introduction: Coronary\ischemic heart disease starts with damaging of internal plast of the coronary arteries. This leads to insufficient blood flow through the blood vessels and metabolic disorder of the myocardium

Objective: The objective of the study is to test the significance of some risk factors, such as type of physical activity (proffesion connected with physical activity, sitting, using the lift, steps, going by feet to the place of work, riding bike, sporting, recreative walking) and life philosophy associated with coronary arterial disease of women in menopause.

Material and methods: Case-control study was performed on 200 respondents (female patients older than 45 years in menopause) and on the base of presence/absence of the diagnosis of coronary arterial disease they were divided into 2 groups: patients who have coronary disease and control group.

Results: From 200 recipients, 78 (39%) had physical activity, 122 (61%) had not physical activity. From 78 who had physical activity, 29 (14,5%) belong to the experimental group, 49 (24,5%) belong to the control group. ($p<0,05$). ($OR=0,425$);

The statistical significance between the experimental and control group was confirmed in risk factors such as proffesion connected with sitting ($p<0,05$), ($OR=2,356$), using the lift ($p<0,05$), ($OR=0,087$), riding bike ($p<0,05$), ($OR=2,196$).

From 200 recipients, 59 (29,5%) have high pesimistic life orientation, 17 (8,5%) have medium pesimistic, 61 (30,5%) are not orientated, 46 (23,0%) have medium optimistic life orientation and 17 (8,5%) have high optimistic. (χ^2 test=56,075>3,8941/df=1, $p<0,05$).

Conclusion: The survey implicated that risk factors (proffesion connected with sitting, using the lift, riding bike), ($p<0,05$), play very important role in the occurrence of coronary arterial disease of women in menopause. A large percentage (61%) of women in menopause of both groups does not have physical activity. The negative life philosophy and pessimism affect the occurrence of coronary arterial disease of women in menopause.

Key words: women in menopause, coronary arterial disease, physical activity; life philosophy/orientation.

POSTER PRESENTATIONS

1. EPIDEMIOLOGICAL CHARACTERISTICS OF COLORECTAL CANCER IN THE SREM COUNTY DURING THE PERIOD 2009-2013

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Objectives: To analyze epidemiological characteristics and trends of the colorectal cancer in the Srem county in the period 2009-2013.

Material and method: In this study we used a descriptive epidemiological method. Data were collected and analyzed from the Cancer Registry of Srem county.

Results: Analyzed data indicated that ASR (W) 35.54/10000 are similar to rates in Central Serbia. During the observed period in the Srem county, incidence and mortality rates of colorectal cancer were stable, with a slight decrease. The highest incidence and mortality rates were registered in the municipality of Stara Pazova. Age-specific incidence and mortality rate are highest in the age group of 74-75.

Conclusion: The stable trend in patients with colorectal cancer can be explained by constant exposure to risk factors and various cancerogens during observed period. Due to irregular and insufficient reporting, the obtained data should be interpreted with caution.

Key words: colorectal cancer, incidence, mortality, Srem county

2. SOME HISTOLOGICAL CHARACTERISTICS OF LUNG CANCER

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The objective of this study is to investigate the existence of eventual causal associations among some variables and risk-factors with the localization, as well as with the histologic forms of lung cancer (LC).

Methods: Total of 185 individuals diseased from LC was included in this study. Disease diagnosis and its pathohistologic verification were done by biopsy analysis, taken within the process of bronchoscopy. Eventual existence of an association, i.e. determination of the significance in the difference analyzed among separate statistical series has been tested by Pearson's χ^2 test and Kolmogoroff-Smirnoff test (K-S test) for one and two samples.

Results: The structure of the individuals according to histological characteristics showed the greatest representation of squamous cell carcinoma (SQC)-51,4%. Then the small cell (SCLC) and adenocarcinoma (ADC) followed with 24,9% and 18,9%, respectively. There was a statistically significant difference among separate histological forms of cancer (K-S test $DN=0,33; p<0,05$) in the diseased. The most frequent form in men was SQC(53,2%). The SCLC and ADC followed with 25% and 16,7%, respectively. The habit of cigarette smoking was present in 52,3% of the diseased with SQC. In women, the first place was taken by SQC (41,4%). Then followed ADC (31%) and SCLC (24,1%).

Conclusion: The LC is multifactorial disease for which development, besides smoking, as a main determinant, in mutual interaction are the genetic and other factors of the surrounding and the way of living.

Key words: lung cancer, histological type, smoking cigarettes.

3. INCIDENCE TREND OF OVARIAN CANCER IN THE NIŠAVA DISTRICT

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Introduction: Ovarian cancer is the seventh most common cancer in women worldwide and it causes more deaths per year than any other cancer of the female reproductive system. The objective of the paper was to determine and to analyze incidence trend of ovarian cancer in Nišava District. **Method.** Descriptive study was done. Data about all cases of ovarian cancer registered in female population in Nišava District were extracted from the Population Cancer Registry from 2004 to 2013. Crude and age-adjusted incidence rates were calculated. Method of direct standardization was performed and World population was used as a standard. Data about population obtained from census 2002 and 2011. Trend lines were estimated using linear regression. **Results:** There were 426 new cases of ovarian cancer. Average annual crude incidence rate was 22.3/100,000 and average annual age-adjusted incidence rate was 13.1/100,000. Ovarian cancer represented 5.1% of all new registered malignant diseases in females. Ovarian cancer didn't registered before the age of 15. The age-specific incidence rates of ovarian cancer showed a statistically significant increasing trend with aging ($y=2.463+5.051x$, $R^2=0.430$). An increasing trend based on crude incidence rate was registered ($y = 0.109x + 21.46$, $R^2 = 0.010$) and increasing incidence trend based on age-adjusted incidence rate was noted too ($y = -0.072x + 13.64$, $R^2 = 0.008$). **Conclusion:** The increasing ovarian cancer incidence trend implies the need for more effective measures of prevention, screening and early diagnosis, as well as ovarian cancer treatment in Nišava District.

Key words: ovarian cancer, incidence, trend

4. THE HEALTH-RELATED QUALITY OF LIFE IN STROKE SURVIVALS

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Introduction: Stroke is the third most common cause of death and the second common cause of physical impairment or disability.

The objective of the paper was to assess the health-related quality of life (HRQOL) six months after the stroke onset in stroke survivors.

Method: Prospective cohort study was done. Study involved 136 stroke survivors aged 30-79 from the Nishava District who had inpatient rehabilitation. Functional status was assessed by Barthel Index. HRQOL was assessed by the general questionnaire Medical Outcomes Study 36-item Short Form (SF-36). The observed period was January the first in 2011 to August 15th in 2013.

Results: The average age of stroke survivors was $63,72 \pm 8,73$. Men represented 48,5% of all stroke survivors and women represented 51,5%. Ischaemic brain damage had 105 (77,2%) of stroke survivors and hemorrhagia had 31(22,8%). All eight domains of SF-36 were strongly decline at admission. Six months after the stroke onset five domains increased statistically significant except domains vitality, bodily pain and mental health. **Conclusions:** During the six months of follow up a continuously improvement of HRQOL was determined. A strongly correlation between BI scores and physical and social domains, role emotional, mental and general health was found.

Key words: stroke, inpatient rehabilitation, Barthel Index, health-related quality of life

5. SELECTED NONCOMMUNICABLE DISEASES ASSOCIATED WITH ACUTE MYOCARDIAL INFARCTION RISK

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Introduction. Numerous epidemiological studies have demonstrated the importance of prevention of risk factors for acute myocardial infarction (AMI).

Aim. Examine the relationship between earlier diseases patients (from a personal history) in our environment, the city of Nis with AMI.

Materials and methods. The paper used descriptive and analytical epidemiological method. The study was conducted as case-control study, included 310 participants, 110 men and 45 women, aged 30-65 years, from the city of Nis, matched with respect to sex and age (± 2 years).

Results. By gender, in both groups were 110 male and 45 female subjects. The groups were similiar by gender ($p=1.000$) and by age ($t=1.208$, $p=0.228$). In comparison with cases, the control group significantly less reported diabetes, stroke and other cardiovascular diseases (CVD) ($p<0,001$). Diabetes mellitus affects 23.20% of patients with AMI and 3.90% from control group, stroke affects 5.80% of patients with AMI and 3.90% from control group and from others CVD affects 45.20% of patients were with AMI and 17.40% from control group.

Conclusion. The results obtained in the study have shown that patients with previous history of noncommunicable diseases are at risk in AMI development, which is important for future epidemiological studies and should be reflected in the improvement of preventive strategies of this serious disease.



6. INCIDENCE OF TYPE 2 DIABETES IN THE MUNICIPALITY OF BIJELO POLJE AND RISK FACTORS

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Introduction: Diabetes is one of the most common chronic non-communicable diseases and is a major public health issue. The World Health Organization (WHO) and the International Federation for Diabetes (IDF) estimates that in 2014 year, 422 million people in the world suffer from diabetes. Public Health Institute of Montenegro estimates that about 50000 people in Montenegro suffer from diabetes.

Objectives: Our objectives were to determinate risk factors and incidence of diabetes type 2 in municipality of Bijelo Polje

Methods: We use datas from register for diabetes. Descriptive method was used.

Results: According to datas from 2013, 2014 and 2015 year, 219 patients are total registrated. Incidence is 22/10000(2013); 15,61/10000(2014) and 9,92/10000(2015). The most common risk factors are obesitas(24.4% have a BMI higher than 30, and 53.9% have a waist circumference more than 91), physical inactivity (31.1%), smoking (11.4%), positive family history (13.2%). Complications of diabetes type 2 in the moment of diagnosis had 4.56% of patients.

Key words: Diabetes type 2, incidence, risk factors,

7. THE PSYCHOSES IN MUNICIPALITY PROBISTIP 1990-2010 YEAR

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Material and method: Individual applications for non-communicable diseases were used from P.H.O. as also data from I.P.H.-Skopje department of social medicine. A comparison has been made with R.Macedonia for the period of 2000-2007y. from the data that were given by I.P.H. An analytically-descriptive method was used. The morbidity (MB) is shown in a scale of 1:10000 people.

Results: In the given period in Probistip there are total of 91 registered cases of psychoses with MB-56.1/10000. For the period 1990-2005y. there were 64 people diseased with MB-39.5/10000 and in the period 2006-2010y. there were 27 diseased with MB-16.6/10000. The most common diagnosis was F20.9-SCH eith 38 diseased and MB-23.4/10000 or 42% from all diseased. The highest MB found is in the age group over 60y. with 36 diseased and MB 206/10000. There were 65 diseased from the female gender with MB-79.3/10000 and there were 36 males diseased with MB-30.7/10000 .The most common profession are the housewives with 37,3% while 56% of the diseased are from the city.

Conclusion: In R.Macedonia in 2000-2007y the MB was 76.5/10000 and higher in comparison with the one in Probistip. The paranoia-F20.0 whas the most coomn diagnosis .In R.Macedonia the most common age group was 35-44y while in Probistip was th age group over 60y. The female gender got sick more often both in Probistip and in R.Macedonia.

Key words:Psychoses, morbidity, diagnosis, cases

8. THE IMPORTANCE OF PSYCHOLOGICAL AND PSYCHIATRIC SERVICES IN THE TREATMENT OF TENSION HEADACHES IN ADOLESCENCE

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Introduction: Headaches are one of the most common symptoms in medicine. According to the classification from 1988 (IHS) headaches can be divided in thirteen groups, among which is tension headache. Tension-type headache (G 44.2) is the most common type of headache in adolescence with a prevalence of about 40%. It can have episodic and chronic course. Our goal was to indicate the tendency that adolescents with tension headaches usually go to the doctors of multiple specialities due to clinical examination and additional tests (laboratory analysis, Fundus examination, ORL and cardiological examination, EEG, magnetic resonance imaging of the brain) and that a psychological and psychiatric assessment is often the last one in the medical tests. However, if it is known that tension headache is in comorbidity with certain psychiatric disorders, the role of the psychiatrist in the diagnosis and treatment of tension headaches is gaining in importance. The most common comorbid psychiatric disorders are Adjustment disorder (F43.2), Depressive episode (F 32), Mixed disorders of conduct and emotions (F92), Undifferentiated somatoform disorder (F45.1) and Disorders due to psychoactive substance use (F10). **Conclusion:** Multidisciplinary overview of tension headaches contributes to the rapid diagnosis and planning treatment for every adolescent in particular.

Key words : tension headaches, adolescence, comorbid

9. EPIDEMIOLOGY OF MUSCULOSKELETAL DISORDERS IN PRIMARY SCHOOL CHILDREN IN BOSNIA AND HERZEGOVINA

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Introduction: Musculoskeletal disorders represent a significant problem of modern society which are more pronounced in young people and school children. Etiology of these disorders is found in inadequate ergonomic conditions, too heavy school bag, school furniture inadequate to age, poor posture, sedentary lifestyle, reduction of physical activity and lack of exercise. **Material and methods:** This cross-sectional study included 1315 pupils aged 8- 12 years. As a method was used “cluster sample” in the selection of subjects. The survey was conducted by questionnaire containing information on the demographic and individual characteristics of participants (age, gender, class), the manner and style of life and the performance of school tasks, followed by standardized Nordic questionnaire. The following parameters were measured: body height and weight for each student, and the weight of full and empty school bag that students that day brought to class. **Results:** The incidence of musculoskeletal pain regardless of localization was 48%. There is a statistically significant correlation between acute pain in the right shoulder and total weight of school bags, duration of caring the bag in school and time of wearing bag from school to home but not with the manner in which school bag was carried. Acute pain in the right shoulder and acute neck pain were significantly associated with the duration of sitting in school or in front of a computer at home. Acute pain in the shoulder negatively correlated with BMI percentile value of the respondents. Acute pain in the neck is also significantly associated with the weight of a full school bags, as well as time spent sitting at home doing homework. Acute back pain is statistically significantly correlated with the weight of school bags and duration of sitting periods in school. **Conclusion:** The prevalence of musculoskeletal pain, particularly chronic pain in school children aged 8-12 years is high. Weight of school bags, manner in which the bag is carried to and from school, duration of carrying bags, time spent sitting in the school and in front of the computer, duration of sitting and posture during homework, body mass index are ergonomic reasons for the development of musculoskeletal pain.

Key words: musculoskeletal pain, school age children, ergonomic factors.



SESSION: CURRENT CHALLENGES IN HEALTH CARE SYSTEM

INVITED LECTURES

PRIMARY HEALTH CARE: MEANING AND OPPORTUNITIES

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HUMAN RESOURCES IN SERBIA AND OTHER EUROPEAN COUNTRIES HEALTH SYSTEMS

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The basic idea was to scan the health systems of European countries, and to compare the similarities and differences that exist between them, with an emphasis on human resources involved. Since Germany is a country where are constantly leaving most of our health workers (no visible indication that this trend will soon stop), and that the Serbian health system is in a serious crisis (and "the lagging"), it will give us the German model of health care best to serve as a point of reference for this review.

The Federal Republic of Germany is in central Europe, with 81.8 million inhabitants, making it by some distance the most populated country in the European Union (EU). Germany is a federal parliamentary republic consisting of 16 states (*Länder*), each of which has a constitution reflecting the federal, democratic and social principles embodied in the national constitution known as the Basic Law.

Several trends in population age distribution have been observed in recent decades and are expected to become more pronounced in the future. In both the west and the east, the share of the population below 15 years of age, for example, decreased from 24.5% in 1970 to 13.8% in 2010. Between 1970 and 2011, the share of those 65 years of age or older increased from 13.9% to 20.7%. Finally, the share of population 80 years of age or older increased to 5.3% in 2011 and is expected to increase to 14% by 2060.

Economic context

Germany is a member of the G8 group of leading industrial nations. In 2012, Germany's GDP amounted to more than €2.6 trillion, or approximately €32 554 per capita (one of the highest in Europe). Due to the increasing unemployment rate in other countries and the simultaneous decline in Germany (to 7.7% in 2010 after 8.2% in 2009), since 2009 the German unemployment rate has been below international average. In 2012, the unemployment rate was 6.8%, ranging in the eastern part of Germany (average, 10.7%) between 8.5% in Thuringia and 12.0% in Mecklenburg-West Pomerania. In the western part of the country (average, 5.9%), the unemployment rate varied between 3.7% in Bavaria and 11.2% in Bremen. There is also a north–south divide in unemployment, with a lower rate in the south part of Germany. The size of the labour force as a share of the total population decreased rose to 51.9% in 2012. The percentage of individuals subject to mandatory social insurance contributions rise to 35.4% in 2012.

Health status

In addition, a regular nationwide survey known as the Microcensus gathers subjective data on the perceived health status of a representative sample of the German population. According to the 2009 survey, approximately 85.4% of respondents regarded themselves as healthy, 14.6% as sick or injured due to an accident. In total, 85% of children under the age of 5 years were considered healthy. The share of those who regarded themselves as healthy was largest among 15 to 20 year olds (91%) and decreased with advancing age, falling to 79% among 70 to 74 year olds and 71% among those over 74.

Life expectancy

By 2010, life expectancy at birth in Germany had reached 78.1 years for men and 83.1 years for women. For both genders, this indicator has remained below the EU15 average but the difference has halved since 1990 (to 0.4 years for men and 0.8 years for women in 2010). According to WHO data, disability-adjusted life expectancy in 2007 was 71.1 years for men, 74.6 years for women and 72.8 years for both genders combined, ranking just below the EU15 average of 73.0 years.

Among adult women of all ages, the all-cause standardized death rate per 1000 women decreased from 6.7 to 4.4 between 1990 and 2011, remaining consistently below the rate observed among all adult men, which fell from 11.2 to 6.7 per 1000 men during this same period – equally halving about the difference to the lower EU15 average. Among women under the age of 65, the all-cause standardized death rate also remained considerably lower than among men in the same age group, falling from 1.9 to 1.2 per 1000 women and from 3.9 to 2.3 per 1000 men between 1990 and 2011. The rate of infant deaths also decreased, falling from 7.1 to 3.4 per 1000 live births between 1990 and 2010 (i.e. to slightly below the EU15 average of 3.6). The reasons for the differences in life expectancy in the two parts of Germany are complex and not fully understood.

Taking into account both sexes, in Serbia the average life expectancy is 73.7%.

Mortality

In 2011, a total of 852 328 deaths versus 662 685 live births were recorded.

The two most common causes of death by far in Germany are diseases of the circulatory system and malignant neoplasms, followed by diseases of the respiratory system, mental disorders and diseases of the nervous system, and diseases of the digestive system.

In total, the mortality rate decreased between 1990 and 2011. A considerable improvement can also be observed when looking separately at individuals aged 0 to 64 years and those older than 65 years. Nevertheless, diseases of the circulatory system still cause approximately 36% of all deaths in Germany. Mortality from malignant neoplasms also decreased, particularly with regard to cervical and breast cancer. Approximately 29% of all deaths in Germany can be attributed to malignant neoplasms. With regard to deaths from external causes, the most notable decline has occurred among those attributable to transport accidents (mainly motor vehicle traffic accidents). An increase can be observed, however, in the age-standardized death rates for mental disorders and diseases of the nervous system and sensory organs. In comparison, for almost 60% of Serbian patients cancer is a fatal disease, more than in any of the 34 European countries for which such data are displayed.

Morbidity

Most indicators of morbidity and health-related lifestyle improved considerably between 1990 and 2009/11. Although alcohol consumption (11.7 litres of pure alcohol per capita) in 2009 and the share of regular daily smokers (21.9%) in 2009 were both above the EU15 average, both have declined since 2000. In 2009, Germans ate almost 25% fewer fruits and vegetables (176 kg per capita) than the EU15 average (231 kg per capita).

Dental diseases offer an example of success that can likely be attributed to preventive efforts. Whereas 12-year-old children in Germany had one of the highest index scores (4.1) for decayed, missing and filled teeth among the EU15 countries in 1992, the score fell to 1.2 by the year 2000 and to 0.7 by 2009.

Another notable improvement was the decline in the incidence of clinically diagnosed AIDS cases, which fell from its 1990s peak of 2.6 per 100 000 population in 1994 to 0.3 per 100 000 population in 2011.

I. SESSION: CURRENT CHALLENGES IN HEALTH CARE SYSTEM

According to the latest WHO data, the incidence of cancer was above the EU15 average in 2008 (572.1 vs. 518.1 per 100 000 population); when taken together with the low death rate, this indicates effective treatment.

Since 1993 the number of hospital discharges has been increased considerably for most of the considered morbidity groups, such as diseases of the circulatory system (by 32%), malignant neoplasms (29%) and diseases of the digestive system (25%).

Immunization rates

In 2005, the immunization rate for tetanus among infants was 90.4%, which was slightly below the EU average of 94.2%. By 2009, there had been an enormous increase in the immunization rate for tetanus, up to 99% compared with 96.7% in the EU. Among infants, the immunization rate for hepatitis B in 2011 was 87%, which was higher than the EU average of 85.8%. In 2011, the share of children vaccinated against measles in Germany (96%) was somewhat higher than the EU average of 93.4%. Looking more closely at immunization rates for measles, a total of 96.6% of children in 2011 had received their first measles immunization by the time of school entry; there were, however, clear differences in the immunization rates between the western (96.4%) and eastern (97.8%) parts of the country.

In Serbia, the general vaccination coverage is close to 95%.

Overview of the health system

A fundamental facet of the German political system – and the health care system in particular – is the sharing of decision-making powers between the *Länder* (federal states), the federal government and legitimized civil society organizations. In health care, governments traditionally delegate competences to membership-based, self-regulated organizations of payers and providers. Their knowledge and motivation are actually involved in financing and delivering health care covered by statutory insurance schemes.

In Germany, SHI (Social Health Insurance) is the major source of financing health care, covering 70 million people or 85% of the population in 2012; the population insured is made up of 35% mandatory members (without pensioners), 18% dependants of mandatory members, 21% pensioners, 2% dependants of pensioners, 5% voluntary members and 4% dependants of voluntary members.

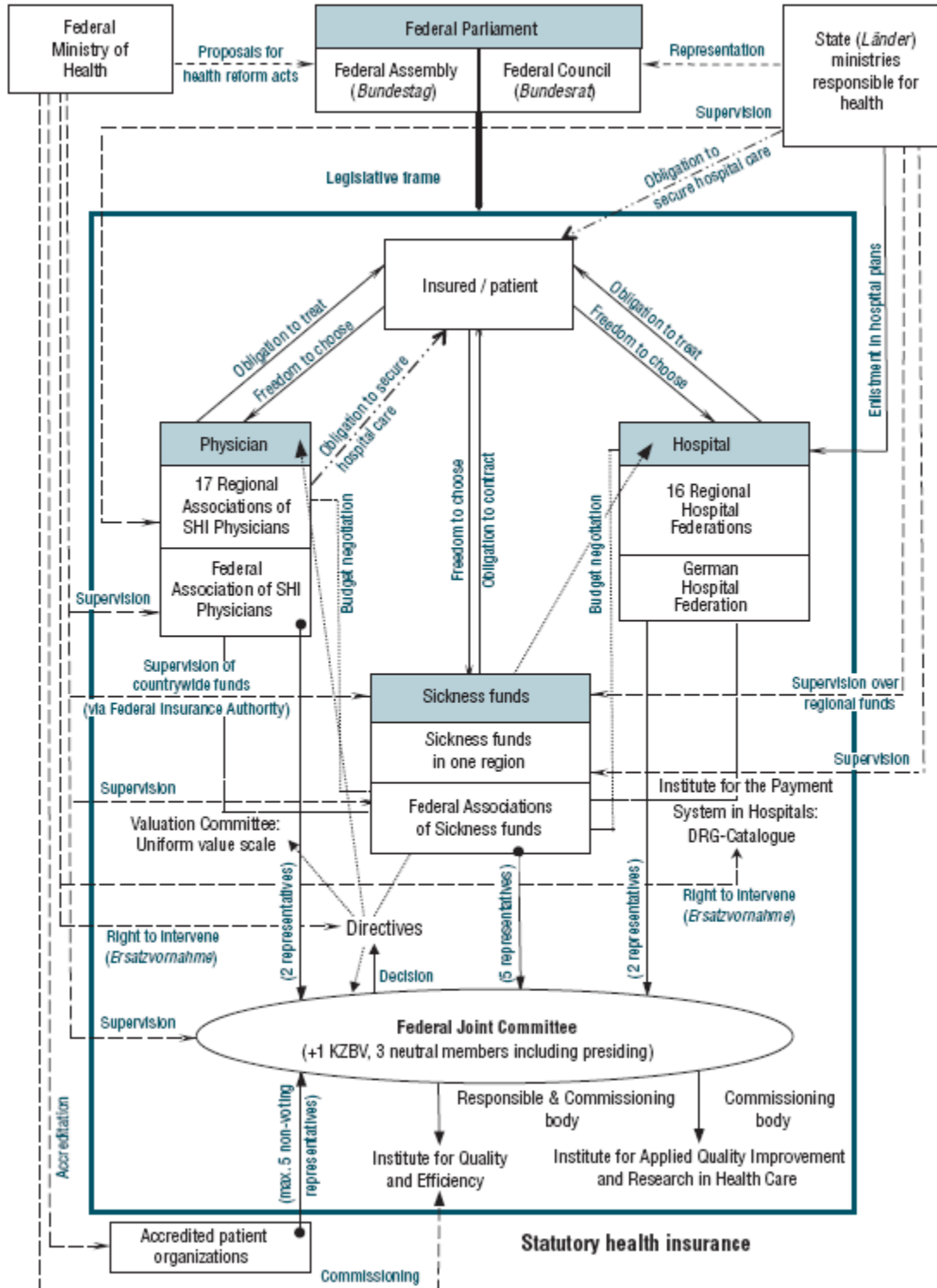
In joint committees of payers (associations of sickness funds) and providers (regional associations of SHI physicians or dentists, or single hospitals), legitimized actors have the duty and right to define benefits, prices and standards (federal level). Corporatist actors on the payers and providers side negotiate horizontal contracts and control and sanction their members (regional level). The vertical implementation of decisions taken by senior levels is combined with a strong horizontal decision-making and contracting among the legitimated actors involved in the various sectors of care. All major actors in the German health care system and their most important interrelationships are shown in **Fig. 1**.

Beyond the established decision-making corporatist organizations, other organizations have been given formal rights to contribute to decision-making bodies by consultation (e.g. nurses and allied health professions), participation and proposals (patient organizations) or becoming a deciding and financing partner at the table (PHI for case payments in hospitals). The social courts form a separate group of actors and will be dealt with separately after the federal, state and corporatist levels. In addition to these two sectors, the public health sector was considered to be the “third pillar” of the health care system for a long time (**Fig. 2**).

PHI (Private Health Insurance) is mandatory for certain professional groups (e.g. civil servants), while for others it is under certain conditions an alternative to SHI (self-employed

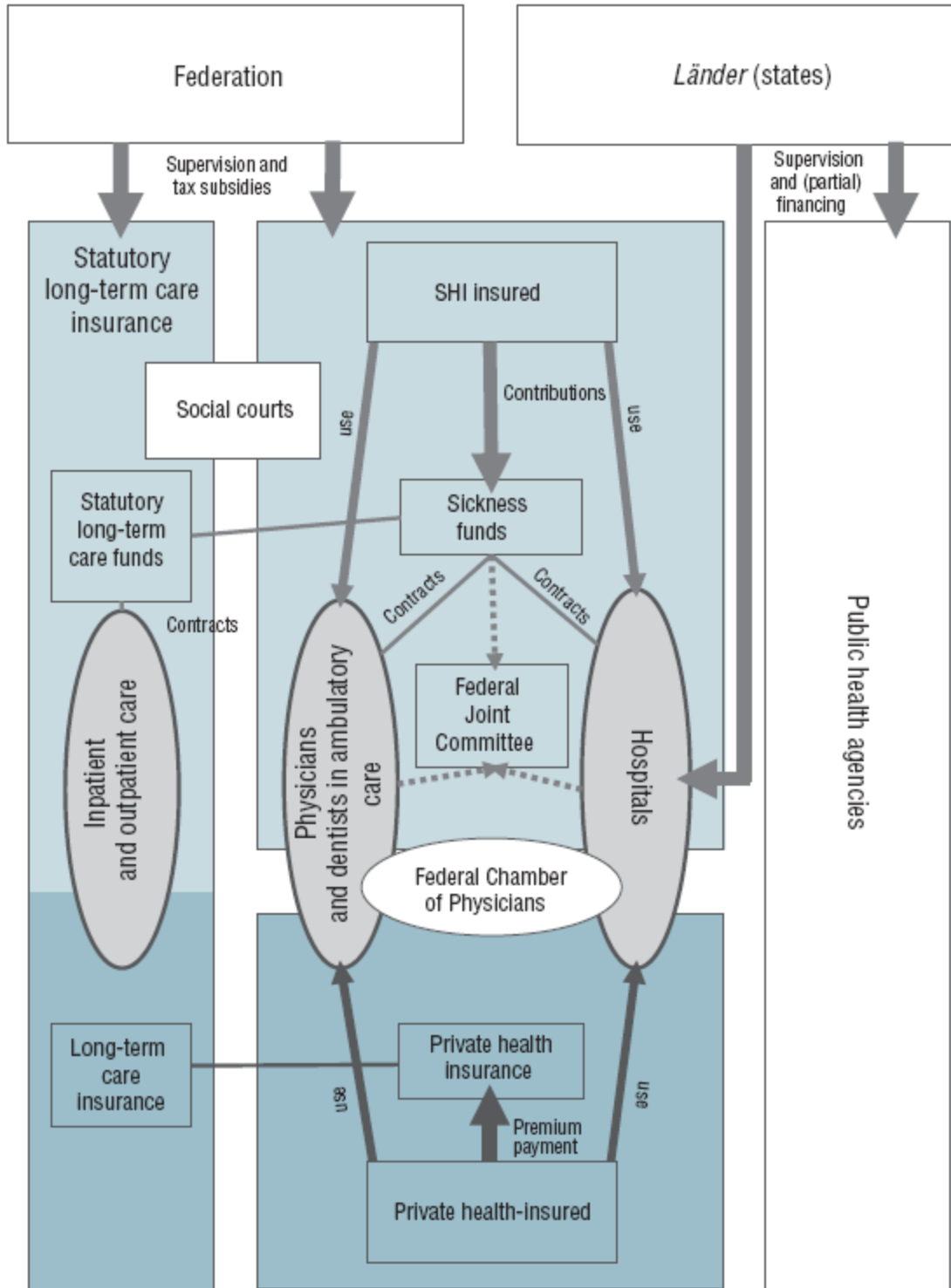
and employees above an income threshold). In 2012, around 8.9 million people (10.9% of the population) were covered by substitutive PHI.

Fig. 1. Organizational relationships of the key actors in the German health care system, 2014



Source: Based on Busse & Riesberg, 2004. Note: KZBV: Federal Association of SHI Dentists.

Fig. 2. Organizational relationship between SHI and PHI, for long-term care as well as the public health service, 2014



Health expenditure

Germany spends a substantial amount of its wealth on health care. According to the Federal Statistical Office, which provides the latest available data on health expenditure, total health expenditure was €300.4 billion in 2012. This corresponds to 11.4% of GDP. The health expenditure calculation is based on the OECD System of Health Accounts.

The way of collecting data is similar; however, the figures reported by the Federal Statistical Office, OECD and WHO vary occasionally. According to OECD data, real growth of per

capita health expenditure in Germany averaged 2.1% annually between 2000 and 2009. Per capita health expenditure grew at an average of 4.1% annually among all OECD countries during this period, which is relatively high considering average yearly GDP growth rates. When interpreting these data, it is important to keep in mind that some countries with comparatively high rates of growth in health expenditure, such as Slovakia (10.9%) or the Republic of Korea (9.3%), had very low expenditure in the 1990s. In contrast, expenditure in Germany or France was already high, and in the last years of that period was subject to diverse cost-containment measures. Against the background of the global economic crisis and compared with all other OECD countries except Japan and Israel, Germany's per capita health expenditure growth did not decrease and kept constant between 2009 and 2011 (3.2%). The OECD average during this period was 0.2%.

According to WHO, which has lower estimates for health care expenditure, Germany ranked at the fifth place (11.1% of GDP) among European countries in 2011, just behind the Netherlands (12.0%), France (11.6%), the Republic of Moldova (11.4%), and Denmark (11.2%), and followed by Switzerland, Austria and Belgium. The EU15 average was 10.3% and new EU Member States 6.9% (**Fig. 3**).

Between 1996 and 2011, out-of-pocket expenditure as a share of total expenditure increased from 11.3% to 13.7%. In terms of sector, the largest category of expenditure in 2011 was associated with pharmacies (€8.0 billion), followed by hospital/day care (€7.2 billion), health trade professions and retail (€7.2 billion) and physician practices (€3.9 billion).

Physical resources

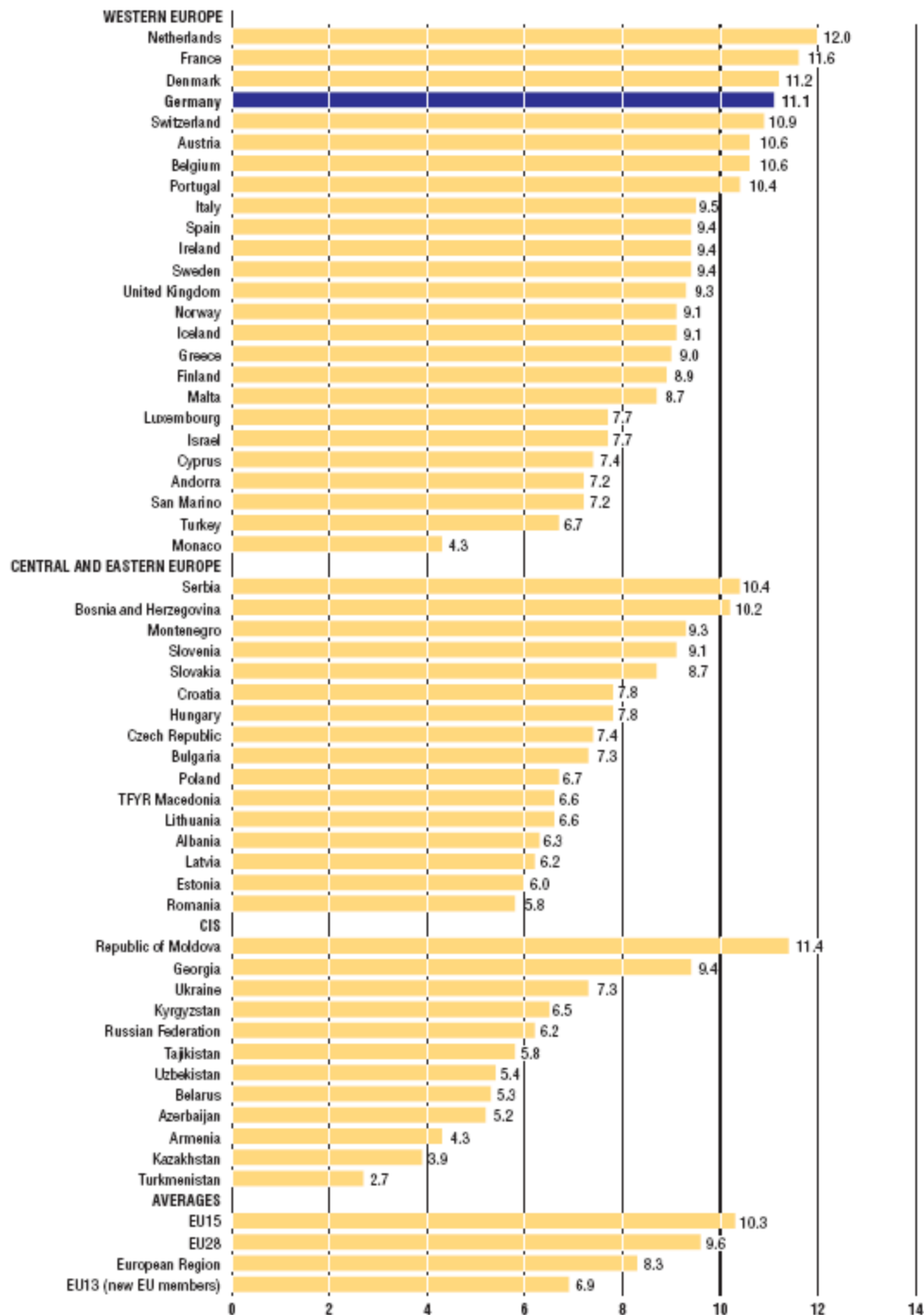
Since the late 1990s, public investment in hospitals has declined continuously, from €3494 million in 1998 to €2724 million (or €5433 per bed) in 2012. This represented a real decline of 22%. The share of public investment in hospitals has decreased continuously from 0.24% of GDP in 1991 to 0.10% in 2012. Of the public investment in 2012, hospitals in the western part of the country received 83%, and hospitals in the eastern part 17%.

In 2012, there were 2017 hospitals with 501 475 beds (6.2 beds per 1000): 601 were publicly owned, 719 were private non-profit and 697 were private for-profit hospitals, with bed shares of 48%, 34% and 18%, respectively.

The 264 psychiatric hospitals had 43 101 beds (9%) and the 1692 general (or acute) hospitals had 458 374 beds (91%); in addition, there were 61 pure day or night hospitals – officially without beds. The beds in general (acute) hospitals were divided into 9% (of total beds) in the 34 university hospitals, 80% in the 1392 hospitals enlisted in state hospital requirement plans, 1.4% in 79 hospitals additionally contracted by sickness funds and 0.8% in 187 hospitals without such contracts (i.e. purely for privately insured and self-paying patients).

In addition to acute care, 1212 institutions with 168 968 beds (2.1 beds per 1000) were dedicated to preventive and rehabilitative care in 2012.

In 2011, there was a total of 18.3 million hospital admissions in Germany, which represents a slight increase of 2% compared with the previous year. The average length of stay decreased steadily between 1991 and 2011, falling from 12.8 to 7.7 days. This explains why the bed occupancy rate in Germany has not increased despite the shrinking number of hospital beds. Between 1991 and 2011, the bed occupancy rate fell 6.8 percentage points, from 84.1-77.3%. Capital investment in high-cost medical equipment is financed by the *Länder* for hospitals that are included in the hospital requirement plans. In 2012, hospitals in Germany had over 11 305 high-cost medical devices, including 1463 computed tomography scanners and 5404 dialysis machines.

Fig. 3. Health expenditure as percentage of GDP in the WHO European Region, 2011

Source: WHO Regional Office for Europe, 2013. Notes: CIS: Commonwealth of Independent States; TFYR Macedonia.

Information and communication technologies in the health care sector are ascribed increasing importance with regard to efficient utilization of resources, improvement of service quality and an increased patient orientation. Within the framework of the action plan “eEurope” for the promotion of the development of the information society in the EU, the initiative

“eHealth” was started in 2004 for the health sector. In this context, the EU Member States are required to develop international standards for the exchange of health data.

In Germany, the introduction of the electronic health card (eGK) is supported by the Federal Ministry of Health in the context of the development of electronic health services. Since 1995, individuals insured in the SHI possess an electronic health insurance card on which the individual’s administrative data are stored for billing purposes. Through the SHI Modernization Act of 2004, the future development of the insurance card into an electronic health card was resolved.

Human resources

Health care is an important employment sector in Germany, with 4.9 million residents working in the health sector, accounting for 11.2% of total employment at the end of 2011. Between 2000 and 2011, the number of people working in the health sector increased by a total of 600 000, or 14.6%. Of the 4.9 million residents working in the health care sector, 3.3 million were in health care, 244 000 were in health industries and 1.4 million in other professions such as cleaning and kitchen staff in hospitals. A total of 2.0 million worked in inpatient care or day care and 2.2 million in ambulatory care. Another 0.04 million worked in health protection, 0.06 million in emergency services, 0.19 million in other facilities, and 0.2 million in administration.

Of a total of 459 021 physicians in 2012, 348 695 were active. Of all active physicians, 174 829 practised in hospitals, 144 058 in ambulatory care (about 123 000 as SHI-accredited physicians, about 21 000 as employed physicians in SHI physician practices). Another 29 808 physicians worked in the public health care sector, administration, government or other sectors (e.g. pharmaceutical industry). According to WHO data, which exclude the latter two groups, 382 physicians per 100 000 were practising in 2011. The density of physicians was slightly above the EU15 average and substantially higher than the EU13 average, but below the averages in Austria and Switzerland.

Whereas the number of physicians in general has increased continuously in recent years, the number of qualified GPs has decreased, both in relation to the population and especially in relation to all physicians. However, since an increasing number of internists and paediatricians followed incentives to focus on practising primary care, the ratio of “family physicians” to practice-based specialists is currently 1 to 1.

As a result of the EU enlargements in 2004 and 2007, growing migration of health professionals to Germany had been expected. In fact, the number of foreign health workers has grown constantly since 2000 and reached its peak in 2003, therefore before the enlargements. The extent of migration to Germany is relatively small compared with that to other destination countries in the EU. Microcensus data from the Federal Statistical Office show that in 2008 the share of foreign health professionals among all health professionals working in Germany was 6%. Of these foreign health professionals, about 15% were born in Germany and around 57% had been trained in Germany as well.

In 2012, the Federal Chamber of Physicians registered 32 548 foreign doctors, that is a 14.8% increase over the previous year. Of these, 18 254 (56%) came from EU Member States, 5616 (17%) from other European countries, 1586 (5%) from Africa, 5886 (18%) from Asia, 337 (1%) from North America, 597 (2%) from Central and South America, and 27 (0.1%) from Australia. The majority of foreign doctors worked in hospital (69%), with only 11% working in ambulatory care. The reason for this imbalance might be the higher investment costs for practice-based physicians and the strict legal framework. Reliable data on the number of German physicians working outside the country are hard to find. However, it can be assumed that the outflow of doctors has increased since 2000. Approximately 1% of all active medical doctors left Germany in 2008 to work abroad. The most popular destination countries were

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Switzerland, Austria, the United States, the United Kingdom and Sweden. Reasons for leaving Germany are poor working conditions and payment.

The training of health care professionals is a shared responsibility of the federal government, *Länder* governments and professional associations. National standards for curricula and examinations were introduced in 1871 for medical studies, in 1875 for faculties of pharmacy and in 1907 for nurse training.

Primary professional education and registration

Primary training of non-academic and academic professionals is basically free of charge in Germany. However, private schools with course-based training for therapeutic professions demand fees. Participants of practice-based training in health care institutions, such as nurses in training, receive a basic income. University education is financed by the *Land* and, in some cases (depending on the *Land*), also through tuition fees, while practice-based training at hospitals has basically been funded by sickness funds since 2000 as part of their financial contracts with individual hospitals. The responsibility for financing nursing schools used to be the state government's but was shifted largely to sickness funds in 2000. It is funded through an "apprenticeship surcharge".

Many German universities offer degrees in medicine, dentistry and/or pharmacy. There are also many publicly financed facilities for the primary training of nurses and child nurses, elderly carers, who are trained on the job with additional blocks or days for course-based learning. At the same time, schools for physiotherapists, masseurs, midwives, dieticians and speech and language therapists are often private and require fees (approximately €300 to €700 per month). Primary training of most non-academic health professionals requires an advanced degree after secondary school and usually takes three years.

Secondary professional training (specialization) and continued education

Specialization usually takes two or three years in non-academic health care professions and four to six years in academic professions. Medical and veterinary graduates are obliged to specialize if they want to work as SHI-accredited physicians in private practice, while specialization is optional for the other health care professions. The different *Länder* in Germany recognize a maximum of 8 specialties in pharmacy, 3 in dentistry, 48 in veterinary medicine, 7 in psychology and 12 in nursing. The number of medical specialties increased from 14 in 1924 to 37 in 2008, supplemented by another 52 subspecialties or additional qualifications. Based on decisions of an assembly of physician representatives from the assemblies of the regional associations of SHI physicians, the Federal Chamber of Physicians issues a model advanced training regime that is further detailed by the state-level chambers of physicians. For each of these qualifications, a minimum length of training as well as a catalogue of procedures and skills is detailed in the training regime. Subsequent to the advanced training period, physicians must pass an examination administered by specialists in the target qualification.

Public health was an exclusively medical specialty until 1989, when postgraduate courses were gradually introduced at universities, predominantly in medical faculties. The two-year part-time courses are partly free of charge and partly require tuition fees. Quality management is another part-time qualification that has been introduced in recent years at five physicians' chambers, private institutions and some polytechnics.

Professional chambers of physicians, psychologists, dentists and pharmacists are responsible for regulating, promoting and supervising the continuing education of their members. Since 2004, continuing education has been made obligatory for all health care professionals active in ambulatory care for SHI-covered people. Evidence of appropriate professional development has to be presented every five years.

Financial protection and equity in financing

The general obligation for all people resident in Germany to have health insurance introduced by the Act to Strengthen Competition in SHI has applied since January 2009. All members of the SHI system and their family members have the same entitlement to the services and benefits they need irrespective of their insurance status, the amount of contributions paid or the duration of insurance. The services and benefits provided by the statutory sickness funds include prevention, early recognition and treatment. Although co-payments apply for benefits provided by the sickness funds, overall private health expenditure in Germany is relatively low. The co-existence of SHI and PHI in the German health insurance system creates substantial problems. People in above-average health and those on above-average incomes switch to PHI, thereby jeopardizing the financial viability of SHI. Empirical studies have shown that people insured privately have a significantly higher average income than those with SHI and are also, on average, healthier.

Health outcomes, health service outcomes and quality of care

Scientific studies of the causes and effects of inequality in health care in Germany have gained increasing importance in recent years. The health and life expectancy of the German population is largely influenced by social circumstances and level of education, individual lifestyles and harmful environmental factors.

Health is impaired by unemployment and circumstances threatening impoverishment; a low awareness of the importance of health; harmful effect of air pollution and noise; tobacco and consumption of alcohol, as well as harmful eating habits and a lack of exercise; overweight; high blood pressure; and fat metabolism disorders. These determinants, which are of particular significance for chronic disorders, also reveal numerous possibilities for prevention and health enhancement.

The quality of medical care in individual countries is often measured on the basis of empirical surveys or quality indicators. In the case of empirical surveys such as that of the Eurobarometer survey conducted by the European Commission, which studies how the quality of care provided by GPs and specialists as well as by hospitals is assessed, Germany's rating is average. In contrast, Germany scores significantly better for the question regarding the frequency of errors in treatment. As the data are based on the subjective assessment of the individual interviewee and are influenced by differing cultural attitudes and assessments, the extent to which they reflect the quality of health care actually achieved in the country in question is, however, questionable. Another measure to assess the quality of health care is the concept of "amenable mortality". This indicator reflects premature deaths that should not occur in the presence of timely and effective health care.

The indicators relate to certain disease-specific mortality rates, and morbidity for certain diseases, and also include some process-orientated indicators such as immunization rates and data on behaviour patterns of the population in question that are relevant to health.

Germany scores comparatively well in the medical care of patients who have suffered a stroke. In 2011, Germany had a relative low case-fatality rate (6.7% within 30 days after admission) for adults aged 45 and over hospitalized following an ischaemic stroke. Although 10 countries had lower rates, Germany was, according to the report, below the OECD average of 8.5%. In contrast, when looking at the hospital mortality rates within 30 days after admission for an acute myocardial infarction, the results for Germany are sobering. The age- and gender-standardized rate was 8.9%, thus significantly above the OECD average of 7.9%. The figures are lower, in some cases substantially, than in Germany in all selected comparable countries: Austria, Denmark, France, Italy, the Netherlands, Switzerland, the United Kingdom and the United States.

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In an international comparison, the German health service is seen as being efficient but expensive. Total expenditure on health amounted to 11.3% of GDP in 2011, which is 2 percentage points above the average of the OECD countries (9.3%). At the same time, with per capita health expenditure of US\$ 4495 (in purchasing power parity), Germany ranks seventh among OECD countries. The German health system has comparatively large human, infrastructural and technological resources at its disposal, which are well able to meet the expectations and needs of the population and the patients.

Germany has the second largest number of hospital discharges (244 per 1000 inhabitants compared with an OECD average of 156). Apart from this, the average length of stay of 9.3 days is well above the OECD average of 8.0. With 3.8 practising doctors per 1000 population, Germany has a higher density of GPs than the average in the OECD (3.2). With a share of 41.9% specialists, the figure for Germany is substantially higher than the OECD average of 29.6%. With 9.4 doctor visits per capita in 2011 (the actual number of visits is probably higher), patients in Germany consult a physician more frequently than the OECD average (6.7 consultations per capita).

The gross income of a physician in private practice in Germany is, after deduction of the costs of the practice, 2.7-fold of the average wage, making it the highest in the OECD countries reviewed. The income of a specialist physician in private practice is five-fold of the average income and is only exceeded by the Netherlands and Belgium.

Despite the comparatively good supply of physicians and nurses, the quantitative proportion of doctors to nurses is less ideal. There are more nurses per physician (3.0) in Germany than the OECD average (2.8) and also recruitment and training of nurses is lower than that of physicians. For every 1000 nurses in Germany, only 24.4 newly graduated nurses enter the profession in Germany each year; the OECD average is 53.7. Unlike physicians' income, pay in the nursing profession is only the OECD average. If the number of qualified nurses does not increase in future, requirements will not be met as the present members of the profession retire. The situation will be further aggravated if the increasing need for care of elderly patients and those with chronic diseases is taken into account.

The efficiency of the German health service is diminished by high costs arising from the large number of hospital beds, heavy expenditure on pharmaceuticals and relatively high physicians' fees. Apart from this, there is a need to improve coordination between the individual care sectors. If the resources spent on health are compared with the health status of the population, it can be seen that in some countries people "are healthier" and "live longer" even though costs are lower; in other words, the health services in these countries are more efficient than that in Germany.

Provision of services

A key feature of the health care delivery system in Germany is the clear institutional separation between (1) public health services, (2) primary and secondary ambulatory care and (3) hospital care, which has traditionally been confined to inpatient care.

Public health is principally the responsibility of the *Länder*, covering issues such as surveillance of communicable disease and health promotion and education. Historically, the *Länder* have resisted the influence of the federal government on public health, and although some elements of public health have been included in SHI in recent decades (such as cancer screening), and other interventions have separate agreements (e.g. immunizations), a "prevention act" at federal level intended to consolidate and clarify responsibilities in this area in 2005 was ultimately rejected by the Federal Assembly.

These services are provided by roughly 350 public health offices across Germany, which vary widely in size, structure and tasks.

Primary prevention and health promotion were made mandatory for sickness funds in 1989, eliminated in 1996 and reintroduced in modified form in 2000. The sickness funds are given a benchmark of €2.78 per insured individual for primary prevention measures and occupational health promotion. In 2010, the sickness funds spent approximately €300 million on primary prevention and occupational health promotion. Between 2000 and 2010, spending on primary prevention increased from €1.10 to €4.33 per person covered by SHI. In 2010, around 12 million people – many more than in the previous year – received preventive and health promoting activities from their sickness funds. In particular, setting-based measures were expanded. In 2010, more than 30 000 institutions (up from 14 000 in 2007) – especially kindergartens, schools and vocational schools – were supported by targeted activities in the areas of exercise and healthy eating, thereby reaching 9 million people. Individual courses have also been increased; utilization of these increased steadily between 2002 and 2009, with a slight decrease in 2010. With 52%, exercise courses have remained most popular. Since 2000, the functions of public health services in controlling communicable diseases have been reorganized according to the Infection Protection Act. The surveillance procedures were streamlined and essentially centralized at the Robert Koch Institute to better evaluate and inform the public about infectious diseases and to cooperate with European disease-control agencies. Besides supervising hygienic standards in hospitals, public health offices also check hygienic standards in practices of ambulatory care physicians, dentists and other health professionals. Hospitals and ambulatory surgery facilities are now required to report nosocomial infections and multiresistant microbes, with recommendations for improving the situation.

Primary/ ambulatory care

Ambulatory health care is mainly provided by private for-profit providers, including physicians, dentists, pharmacists, physiotherapists, speech and language therapists, occupational therapists, podologists and technical professions. Acute care and long-term care are commonly provided by non-profit or for-profit providers employing nurses, assistant nurses, carers for the elderly, social workers and administrative staff.

Patients have free choice of physicians, psychotherapists (since 1999), dentists, pharmacists and emergency room services. Although patients covered by SHI may also choose other health professionals, access to reimbursed care is available only upon referral by a physician. About half of all SHI-affiliated physicians work in primary care. Family practitioners are not gatekeepers in Germany, although their coordinating competences have been strengthened in recent years. According to data from the Federal Association of SHI Physicians for 2012, 141 038 of the 348 695 active physicians worked in ambulatory care. Of these, a minority of 5641 (4%) practised solely for private patients, while 121 189 worked as SHI-accredited physicians and a further 9 193 as salaried physicians. The practice premises, equipment and personnel are financed by the physicians.

Specialized ambulatory care/ inpatient care

German hospitals have traditionally concentrated on inpatient care; sectoral borders to ambulatory care were strict. Only university hospitals had formal outpatient facilities although some heads of departments had a right to treat patients on an ambulatory basis in other hospitals. Day surgery and ambulatory care before and after hospital inpatient care have become other fields of increasing activity. Also, participation in integrated care models (since 2000) and DMPs (since 2002) offers new opportunities to become active in ambulatory care. Since 2004, hospitals may provide ambulatory care services to certain groups of people with highly specialized treatment needs.

DMPs (Disease Management Programs)

An aspect with relevance for the coordination of services provided by family physicians and specialists was the introduction of structured treatment programmes, so-called DMPs in 2003. These were intended to organize the treatment and care of chronically ill patients across the boundaries of the individual service providers, thus providing care more in line with requirements and in a more efficient manner. Health care services for patients registered with one or several DMPs are provided using evidence-based guidelines and across the boundaries of the individual service providers. In contrast to integrated care, which is aimed at cross-sector patient care, DMPs primarily aim at coordinating services at the ambulatory care level.

Emergency care

Ambulatory physicians provide the major part of urgent care during regular practice hours or during after-hour services in their practice (and, if necessary, refer patients to other health care providers for subsequent treatment). Home visits are provided by the vast majority of family physicians as part of their regular work and in rural areas also outside regular hours. Only a few specialists offer home visits.

After-hour services are coordinated by the regional associations of SHI physicians. They include telephone counselling, practice visits and home visits. Increasingly, after-hour services are also offered by ambulatory physicians at hospitals in the interests of efficiency and good hospital–community relations. In rural areas, individual ambulatory physicians also take part in emergency physician services in close cooperation with rescue organizations. However, their role in emergency services has been decreasing.

Pharmaceutical care

Germany is the third largest producer of pharmaceuticals in the world after the United States and Japan. Pharmaceutical policy seeks to balance targets of health care and industrial policy. Health care policy is primarily concerned with safeguarding quality and safety, improving health and containing costs for the SHI system. At the same time, industrial policies seek to protect national labour markets and industries and their international competitiveness.

Rehabilitation/ intermediate care

The objective of rehabilitation measures is to avert, eliminate, alleviate, counterbalance and prevent the worsening of a condition, or to relieve the consequences of disablement or the need for constant care. If treatment on an ambulatory basis is not sufficient to achieve these goals, the services are provided in an inpatient rehabilitation facility. Insured people are liable to a co-payment of €10 per day to a maximum of 28 calendar days per year.

Long term care

Long-term care is dominated by statutory long-term care insurance since it was introduced in 1994 following a 20-year debate about how to secure financing and access to long-term care in an ageing society with an increasing burden on municipalities to support elderly care. Significantly, these services were not entitlement-based on an insurance relationship but subject to a means test and, therefore, only paid if the individual or family members could not afford to pay. PHI schemes also offered insufficient nursing benefits.

Starting in 1995, all members of statutory sickness funds (including pensioners and the unemployed) as well as all people with full-cover PHI were declared mandatory members. This was the first introduction of mandatory membership for PHI – making it the first statutory insurance with nearly population-wide membership. In 2013, 69.9 million (87%) were covered by mandatory statutory long-term care insurance and about 9.5 million (11.5%) by mandatory private long-term care insurance.

Palliative care

The report “Law and Ethics of Modern Medicine” by the Bundestags-Enquete-Kommission stated in 2004 that between 25% and 30% of dying people died at home, about 43% in acute hospitals, about 15% to 25% in nursing homes, about 1% in inpatient hospices, and 3% to 7% in other places. About 3.6% of those dying at home were supported by ambulatory hospice structures, mainly by volunteers.

Most dying patients are cared for by regular health care providers, and their care is financed as part of general health care or long-term care arrangements. Systematic training in palliative medicine is only a relatively recent development in Germany. For many years, palliative medicine played an insignificant role in medical schools and was not an examination subject.

Mental health care

During the process of “dehospitalization”, the number of hospitals providing care only for patients with psychiatric and/or neurological illness was decreased substantially until the end of the 1990s. Acute psychiatric inpatient care was shifted to a large degree to psychiatric wards in general (acute) hospitals. Whereas the number of psychiatric beds in West Germany totalled some 150 000 in 1976, this had been reduced to 69 000 by 1995 and to 40 165 by 2009 in reunified Germany. During the same period, the duration of stay in hospitals with departments for psychiatry, psychotherapy and/or neurology decreased from an average of 152 days in 1976 (West Germany) to 44 days in 1995 and 25 days in 2007 (reunified Germany). In 2009, 409 hospitals (out of a total of 2084) had a department for psychiatric and psychotherapeutic care.

Dental care

The insured are entitled to the prevention, the early detection and the treatment of diseases of the teeth, the mouth and the jaw. Therefore, prophylactic treatments and basic dental care are covered by the sickness funds.

Complementary and alternative medicine

In 2002, the Robert Koch Institute published a special report on the use of alternative methods in medicine as part of their health monitoring. According to this, naturopathy, phytotherapy, homeopathy, acupuncture, autogenic training and chiropractic are the most commonly used therapies in Germany.

Complementary and alternative medicine is generally not included in the SHI benefits package. From 2006, the Federal Joint Committee has recognized only acupuncture as a reimbursable treatment method for patients with chronic pain of the knee joint (gonarthrosis) and the lumbar spine.

Health services for specific populations - Social care

Social care is delivered by a broad variety of mainly private organizations that complement family and lay support for the elderly, children with special needs, mentally ill and the physically or mentally handicapped. Looking at the number of employees, geriatric care has the largest share (26%). Health assistance (24%) takes second place, followed by youth and children’s welfare (21%), assistance for the disabled (19%), assistance for families (4%), assistance for people in special social situations (2%), institutions for education, training and further training (1%) and other assistance (3%).

Social care for physically and/or mentally disabled (6.9 million people in 2007, 8% of the population) is characterized by well-equipped and highly specialized institutions and schools.

Conclusions

Health care is an important employment sector in Germany, with 4.9 million people working in the health sector, accounting for 11.2% of total employment at the end of 2011. According to the WHO Regional Office for Europe's Health for All database, 382 physicians per 100 000 were practising in primary and secondary care. Thus, the density of physicians in Germany was slightly above the EU15 average and substantially higher than the EU28 average; the relative numbers of nurses and dentists are also higher than the EU average.

In international comparison, the German health care system has one of the most comprehensive benefit catalogues and one of the highest levels of supply quality. Furthermore, the services are associated with comparably low cost-sharing. As, furthermore, the per capita expenditure for health care in Germany is only in the upper middle range, the German health care system has a relatively high level of efficiency in a comparison of the costs with the available resources and the benefits provided.

In Serbia, 2.9 physicians as well as 5.8 nurses per 1 000 population were practising in health care in 2015. Serbia in the relative amounts spent extremely on health system, as many as 12% of GDP (the only countries that spend more are France with 12.5% and Greece with 13%). That's a lot more than some large countries such as Russia or Turkey, and it is precisely in these countries we sometimes send patients to treatment.

How to explain the paradox that, in relation to the other, we invest more and get less? Comparable countries like Bulgaria and Romania, although per capita (both in relative and absolute terms) consume much less, have better indices.

The Serbian health care system shows areas in need of urgent improvement when compared with other countries. This is demonstrated by the low satisfaction figures with the health system in general; respondents see a need for major reform more often than in many other countries. If the outcomes of individual illnesses are analysed - more emphasis could, therefore, be placed on the improvement in quality of medical services.

One of the current proposal is the introduction of competition in terms of ways by financing health insurance in order to stimulate entrance of private health sector into the system, but also to force public health facilities to improve their quality.

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CURRENT CHALLENGES IN HEALTH CARE SYSTEM: INSIGHT INTO UROLOGIC DISEASES

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It is certain that overall challenges in health care system comprise, in the first instance, the tumoral diseases. Unfortunately, with the deepening of economical crisis, the burden of our health systems does not regard just the survival or quality of life of our patients, but also the high costs imployed in treating various conditions. This is why, one of the most important challenges in the medical world today is to coordinate the patient benefits with the costs in health care system they comprise.

Given the hugh prevalence and incidence of the prostate and bladder cancer in the family of all cancer diseases, we have the oblige to speak about the diagnostic and therapeutical problems regarding those conditions and how they influence the health care system.

By surpassing the lung cancer, the prosate cancer has become the most common cancer in elderly male in Europe and US, with total estimated costs in Europe of 8.4 billion euros which accounted in 2009 for 11 % of all health care cancer costs. Those numbers are certainly due to the discover of PSA as a primar tumor marker for prostatic cancer. Given that PSA does not distinguishe between agressive ant not agressive disease, the challenge is to find more precise and specific markers in prevention and diagnosis of prostate cancer. The research is doing progressions but we have still long way to go. That is why that nowadays the intelligent and selected prevention should be used to optimize general welfare of patients and in the same time to reduce the costs.

The bladder cancer rappresents the ninth most diagnosed cancer worldwide with 380 000 new cases each year and 150 000 deaths per year with total costs of 4.9 billion dollars in EU in 2012. Although the prevalence of prostate cancer is three times greater, the health care costs for prevalent cancer is higher for bladder than for prostate cancer, beeing the estimated health care costs of bladder cancer per patient higher than prostate cancer across all disease phases. Having in mind that the delay in surgery more than 12 weeks for muscle invasive cancer leads to advanced pathological stage and decreased survival, it becoms important to increase the state of mind of patients not to delay the physician visit after first symptoms.

The cancer diseases are not all of the problem for health care system. Although not life threatening, urinary incontinence in women and erectile dysfunction in men represent a great deal of burden for every national health care system.

Various studies proved that appropriate diagnosis and treatment of urinary incontinence may lower National Health service costs and improve the benefits of treatment and quality of life. Thus, applying economics to medical practice does not necessarily mean that less should and could be spend – resources should be allocated to treatments that maximaze social welfare.

Millions of pepople are ready to pay for medical treatment for erectile dysfunction even though their health care systems do not cover the costs and all of it without curing the pathology but just the syptoms. New tretmant options could be offered in order to reach a durable solution by reducing costs. This is an insight of what the urologic field can and should offer to ameliorate the healath care system world wide.



ORAL PRESENTATIONS

1. WASTE MANAGEMENT CURRICULA DEVELOPMENT IN PARTNERSHIP WITH PUBLIC AND PRIVATE SECTOR- ERASMUS PROJECT

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The WaMPPP – *Waste management curricula development in partnership with public and private sector*, has to respond to the urgently needed capacity build-up for the growing waste management (WM) industry.

Accordingly, the project is prepared with two aims:

1. To enhance education and training of current and future workforce in Serbia in the field of WM, thus contributing to capacities of both vocational HE and the growing WM industry
2. To raise the awareness in society about the importance of the overall WM process and its possibilities in the development of society and reduction of poverty.

Project Partners:

P1 - College of Applied Technical Sciences Niš – VTSNIS

P2 - The School of Higher Technical Professional Education in Novi Sad – VTSNS

P3 - The college of applied technical science Arandjelovac – CATAR

P4 - The School of Electrical Engineering and Computer Science of Applied Studies (VISER)

P5 - College of Vocational Studies – Belgrade Polytechnic – POLYBG

P6 - The Technical University of Crete – TUC

P7 - “St. Kliment Ohridski” University Bitola – UKLO

P8 - Faculty of Mechanical Engineering, University of Maribor – FS UM

P9 - Technical University of Ostrava – VSB TUO

P10- Alexander Technological Education Institute of Thessaloniki – ATEITH

P11- Jugo-Impex EER d.o.o – EER

P12- PWW d.o.o Niš – PWW

P13 - Public Health Institute Niš – PHI



2. CHANGES IN CAPACITY PROVISION IN GENERAL HOSPITALS IN THE PROVINCE OF VOJVODINA IN THE PERIOD 2005-2014

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Objectives: The main objective was to analyze changes in bed and workforce provision and use of 9 general hospitals in the Province of Vojvodina in the period 2005-2014.

Materials and methods: We used data from health statistics records.

Results: In the period 2005-2014 the total beds capacity in general hospitals in Vojvodina was decreased by 630 beds (12.9%), which was registered in all districts (except Mid Banat district which increased by 31.9%) but adequate supply was maintained except in district of Srem where it is low - 1.7 bed/1.000 inhabitants. The number of doctors increased by 16.8% in all districts except the North Banat district (ranging from 6.4 to 38.5%) and the number of nurses increased by 4.2% (ranging from 3.4% to 22.4%). Provision with doctors/100 beds increased but still varies considerably between hospitals, ranging from 11.6 to 28.1, while the number of nurses from 47.0 to 97.3. The average length of stay was reduced from 8.6 to 6.8 days, and noted in all hospitals. Bed occupancy increased in only 4 of 9 hospitals and in 2014 it was from 44.6% to 74.0%.

Conclusion: The analysis indicates significant differences in workforce provision and also in the use of general hospitals.

Key Words: hospital health care, hospital beds and workforce provision, health care utilization

3. PREDICTORS OF JOB SATISFACTION OF HEALTH PROFESSIONALS

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Introduction: Job satisfaction includes overall attitude that employees have in terms of job performed. Measuring job satisfaction and motivation of employees is an integral part of managing an organization.

Objectives: Evaluation of the degree of health professional's satisfaction, in health institutions in Nisava District, through identifying the main predictors of job satisfaction.

Methods: Research method is cross-sectional study conducted in 15 health institutions Nisava District in 2014. After checking the completeness and accuracy of data, target group of employee satisfaction in health care institutions was reduced to 3,736 employees. The study used an anonymous survey defined by the Republic Commission for the quality, the Ministry of Health of the Republic of Serbia. In order to establish a more comprehensive analysis of the links between job satisfaction and quality of work, the various factors of satisfaction are grouped into 5 groups: structural, communication, motivation, organization, resulting. In order to determine predictors of job satisfaction, a standard multiple regression has been used.

Results: Predictors that were singled out is organizational indicator ($\beta=0,491$, $p < 0,001$), then the motivation indicator ($\beta=-0,231$, $p < 0,001$), communication indicator ($\beta=0,050$, $p=0,018$). Structural indicator was not statistically significant predictor ($p=0,477$). The most important predictor of satisfaction at all levels of the health care organization singled out the organizational indicator. The strongest predictor of satisfaction with the doctors, but also for other health workers singled out the organizational indicator.

Conclusion: Organizing indicator is singled out as the most important predictor of job satisfaction.

Keywords: predictors of job satisfaction, health workers



4. SOCIO-DEMOGRAPHIC PROFILE OF WOMEN WHO HAVE GIVEN BIRTH IN NIŠ DURING THE PERIOD BETWEEN 2006-2015

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Introduction: Delay of the first delivery in a large number of countries in the last three decades has become a common feature of the fertility patterns of modern society.

Many authors argue that the delay of fertility represents the "second demographic transition", and some have suggested that the delay process itself should be defined with a special term "third transition".

Nowadays, it is common for women to have children at an older age. Several factors may influence the decision of mothers when planning their first child - educational, social and economic status, and increasingly, the treatment of infertility.

Objective: Analysis of social and demographic structure of new mothers in Nis in the period from 2006 to 2015.

Source: Birth reports - data for the period from 2006 to 2015

Results: During the observed period of ten years, the new mothers in Nis have become increasingly more educated, more independent and older (average age increased by 2.3 years from 26.6 ± 5.2 in 2006 to 28.9 ± 5.6 in 2015). Structure of age groups is also changing significantly due to the decrease in women younger than 30 becoming mothers and increase in the older ones who give birth. Birth order has not changed significantly (90% are the first and second child, and only 10% a third or more children). 21-25% of new mothers constantly live in common-law marriages. The age structure of common-law marriages has changed significantly - the number of mothers younger than 20 is falling and the number of those over 30 is rising.

Conclusion: Socio-demographic picture of our new mothers at the beginning of the 21st century is definitely changing. It remains an open question which changes are their personal choice and which are the result of imposed circumstances in which they live.

Key words: age of new mothers, birth order

5. THE HEALTH PROFESSION RISK

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Aim: Observation and prevention of risk factors within stationary health care.

Methodology: The research was conducted as a cross-sectional study with two standardized questionnaires:

1. COPSQ - a questionnaire for an evaluation of the psychosocial factors of the work environment

(National Research Center for the Working Environment (NRCWE), Copenhagen, Denmark)

2. WAI - a questionnaire for an evaluation of the Work Ability Index.

(Work Ability Index, The National Institute for Health and Welfare, Finland)

A total of 815 health workers have been tested including medical doctors and nurses from Clinical Center Niš, Special Hospital Sokobanja and General Hospital Aleksinac.

Results: The analysis shows that the average value of the WAI was 8.63 ± 1.61 , the highest among health care workers from SH Sokobanja (8.91 ± 1.15), the differences compared to those from CC Niš ($8.58 \pm 1, 70$) and GH Aleksinac (8.60 ± 1.83) were not statistically significant (ANOVA and Tuki test: $p > 0.05$).

Health workers from SH Sokobanja have significantly lower scores on COPSQ questionnaire compared to the ones from CC Niš and GH Aleksinac for the following four domains: emotional demands, job-family conflict, job burnout and stress. In addition, health care workers from SH Sokobanja have a significantly lower scores on cognitive demands.

The multivariate regression analysis showed that the most important factors affecting the value of the WAI, within the characteristics of workplaces and scores on COPSQ questionnaire by domain, are: an increase of service for 1 year, which significantly reduces the value of the WAI; an increase in scores by 1 unit is associated with a significant increase in the value of job relevance, obligations in the workplace and confidence in the leadership; an increase in scores by 1 unit is associated with a significant decline in the value of the WAI when it comes to quantitative demands and stress. The analysis shows that the most important factors affecting the decline of the WAI are the exposure to threats of violence by the subordinates and exposure to physical violence by the superiors.

The regression model, which contains, as independent variables, all the factors that are allocated as significant in multivariate analysis by blocks, segregates the following: the age of 60 years and more, taking painkillers every day, passive or entertainment activities less than 2 hours a week, scores of quantitative requirements and stress, as factors that diminish the value of the WAI; and the obligation to work, meaningful work, self-assessment of health and enjoyment of daily activities, as factors associated with the increase in the value of the WAI. The regression model containing these factors explains 27.6% of variability in the values of WAI ($R^2 = 0.276$).

Conclusion: With interventions of organizational character in health institutions, based on concrete results, it is possible to prevent psycho-social risk factors in the workplace, increase work capacity and improve the quality of life.

6. MENTAL HEALTH IN BELGRADE POPULATION AND USE OF HEALTH CARE

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Objective: The aim of this study was to examine the association between mental health problems in the general population and use of health care.

Method: The National health surveys in Serbia in 2013, which was conducted as cross-sectional study in the period from 7 October to 30 December 2013, was used as data source. For this study we used a sample of the population of Belgrade aged 15 and over. The statistical analysis included methods of descriptive and analytical statistics.

Results: It was found that 3.1% of the population aged 15 and over shows symptoms of depression in Belgrade (2.1% of the population shows symptoms of mild depression, 0.9% moderately severe depression and 0.1% severe depression). More than half of respondents said that in four weeks preceding the survey were tense or under stress (58.3%). People with mental health problems used services of psychiatrist, psychotherapist or psychologist significantly more ($p < 0.01$). One third of respondents who declared themselves to be suffering from depression visited a psychologist, psychiatrist or psychotherapist (31.0%) and only 13.8% visited a psychiatrist in private practice.

Conclusion: Considering that only a third of respondents who suffers from depression asked for a psychiatric, a psychologist or a psychotherapist help, it is necessary to implement programs to reduce prejudice against mental health illnesses, which helps early detection and treatment.

Keywords: Mental health, depression, health care use.



7. DIABETES CARE IN BELGRADE IN THE TIME OF OUTPATIENT COUNSELING SERVICE AND NOWADAYS- IS IT BETTER OR WORSE?

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Objectives: The aim of the study was to analyse diabetes health care organisation in Belgrade, comparing outpatient counseling service in 2005. and 2015.

Methods: We used data routinely collected from 16 primary health care centers in Belgrade. We compared number of registered patients with diabetes (ICD-10 codes E10-E14) and number and types of diabetic care (diabetes screening, preventive care including ophthalmology and HbA1c level checks).

Results: There were 52.643 registered patient with diabetes in 2005. (33.801 first visits for diabetic patients that indicate that 64% of registered patients visited outpatient counseling service) and 78.624 in 2015. (no data on visits number). In 2005., 29% of diabetic patient were covered with preventive check-ups (no data on check-ups type). In 2015. it was possible to distinguish preventive check-ups, 37,9% patient were covered with preventive ophthalmology testing and 28,8% with HbA1c level checks.

Conclusion: There is a difference in the scope and content of diabetic care between observed years and it is not significant that it was better in 2005 even that specific outpatient counselling services were organized. The difference may be result of lack of the relevant data or non-comparable data source. There is need for continous diabetic health care and data improvement.

Key words: diabetic care, quality, organisation, health service

8. SOCIO-ECONOMIC DETERMINANTS OF HEALTH CARE UTILISATION OF THE ADULT POPULATION IN THE CITY OF BELGRADE

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Objective: Examination the differences in utilisation of the health care in terms of demographic and socio-economic determinants of adult population and relationship between the socio-economic determinants and health conditions of the adult population of the city of Belgrade.

Method:The National health surveys in Serbia in 2013, which was conducted as cross-sectional study in the period from 7 October to 30 December 2013, was used as data source. For this study we used a representative sample of the population of Belgrade aged 18 and over (N=3004). Statistical analysis included descriptive statistics and nonparametric tests (χ^2 test, Mann-Whitney test, Kruskal-Wallis test and Spearman correlation coefficient).

Results: As the most common predictors of morbidity of the population were allocated the following variables: gender, age, employment status, place of residence and income per household member. As predictors of frequency of visiting general practitioner were allocated the following variables: age, gender, employment status, income per household member and the self-reported health status of respondents.

Conclusion:Adults with higher education and higher income per household-member and richer adults assessed their health status as good or very good. Adults with lower educational levels and poor-categorized were using the services of general practitioners and stationary health care services more often.

Keywords: health care utilisation, determinants, self-percievedhealth, inequalities in health

9. PREVENTIVE HEALTH EXAMINATIONS IN BELGRADE POPULATION AND SOCIO-ECONOMIC DETERMINANTS

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Objective: The aim of this study is to measure the coverage with preventive examinations for early detection of malignant diseases (breast cancer, cervical cancer and colorectal cancer) for Belgrade population and their association with socio-economic determinants.

Method: The National health surveys in Serbia in 2013, which was conducted as cross-sectional study in the period from 7 October to 30 December 2013, was used as data source. For this study we used a representative sample of the population of Belgrade aged 18 and over. Statistical analysis included descriptive statistics and Spearman correlation coefficient.

Results: FOB test was carried out in the last 3 years for 7.6% of the target population for early detection of colorectal cancer; 32.8% of the target population for the early detection of breast cancer is a mammogram done, and 71.3% of the target population for the early detection of cervical cancer is Pap test in the past 3 years done.

Recently done FOB test (in the last three years) and colonoscopy (in the last 10 years), as well as recently made mammogram and Pap test (within the last three years) were associated with a higher income per household, while the recent made mammogram and Pap test were also associated with a higher education level, residing in the urban area and belonging to wealthier categories according to indices of well-being.

Conclusion: With regard to the identified socio-economic determinants associated with preventive examinations, work on empowering members of lower socio-economic groups and developing special health program to improve coverage of prevention services within these groups are required.

Key words: preventive examination, empowerment, socio-economic group

10. CHALLENGES IN COMPREHENSIVE CHILD AND ADOLESCENT MENTAL HEALTH SERVICES IN SERBIAStanković Miodrag¹, Bojana Dimitrijević^{2,3}, Ljubisa Milosavljević¹¹Clinic for Mental Health Protection, Clinical Center, Nis, Serbia²Psychiatric Clinic "Laza Lazarević" Belgrade³Faculty of Philosophy, Department of Psychology

Global prevalence of developmental psychiatric disorders in children aged 3-15 years is greater than 10%. At the same time less than 25% of these children receive psychiatric care. The current mental health services for children and young people in Serbia are based on outdated, mainly hospital-orientated model, limited to a small number of cities (Beograd, Niš, Novi Sad). Such a model is incoherent with the modern community-orientated model of service and does not provide comprehensive mental health care of children and young people with equal availability, and coordinated, multidisciplinary, and leveled approach. The key measure is to increase the availability of services throughout the territory of Serbia. Pediatric services in primary health care, which has the direct and the first contact with children and families, should have a consultative (liaison) children's psychiatric services or mandatory continuous education regarding the developmental psychiatric disorders. This would determine the levels of specific assistance and increase the efficiency of specialized services in the secondary and tertiary health care. Forming of consultative teams (liaison child psychiatry) within the children's hospitals and clinics would provide basic mental health protection of families and children with chronic physical diseases that inevitably cause high levels of family stress. The hospitalization for children under 16 years, if necessary, should be provided on children psychiatry departments, not adult psychiatry departments, except in the extremely specific circumstances that should be clearly defined. In order to provide a quality service, it is essential to have experts quality education. A specialization in Child and Adolescent Psychiatry is formally present at three medical faculties in Serbia (Belgrade, Nis, Novi Sad). The theoretical knowledge that specializing doctors acquire, is implemented through only necessary and disproportionate number of learning hours. Providing an objective evaluation of acquired specialist knowledge and skills should involve the provision of optimum, instead of minimum or no minimum teaching staff from the field of child psychiatry. Keeping in mind the prevalence of psychiatric conditions in children and the percentage of children who are being treated and not being treated, child psychiatry specialization should be seen not only as a deficient, but also as a priority for development, while ensuring adequate teaching staff. At several universities in Serbia training of psychologists consists mostly of extensive theoretical, but very modest practical work, especially in the field of children and adolescent mental health. Children psychotherapy is a rudimentary field, limited only to a few centers in Serbia. Formal education of the nursing staff in the field of children and adolescent mental health is not organized. Keeping in mind that working with children, also includes work with families, the number of Family counselings with a certified Family counselors should be increased, especially within primary health care. The general conclusion is that in Serbia there is an objective need for accessible, multidisciplinary, comprehensive, integrated and leveled children and adolescent mental health services. The organization of such a services should be strategically planned and limited in time, and as a precondition there should be a specific and high-quality personnel training and implementation of modern organizational model.

Key words: comprehensive child and adolescent mental health service

11. NEW PREVALENCE DATA OF AUTISTIC SPECTRUM DISORDERSStanković Miodrag ¹, Kostić J¹, Stojanović A¹Clinic for Mental Health Protection, Clinical Center, Niš, Serbia

Autistic spectrum disorders (ASD) occupy the attention of researchers and clinicians due to the continuous and progressive growth in prevalence. Once a rare disease with a prevalence of 1 to 4 per 10,000, now is reaching epidemic ratios with a prevalence that exceeds 2% (1:45, ie 2.24% for 2015), according to the Center for Disease Control (CDC) and the National Center for Health Statistics (NCHS) of the United States. The increase compared to the report from 2014, when the prevalence was 1:68 (1.47%), can be partly explained by the precise diagnostic classification, since there is a continuous decrease in the prevalence of other developmental disorders compared to ASD. However, the increase in prevalence can not be explained solely by better recognition of the disorder by experts and parents, nor by the broader diagnostic criteria. ASD is still about 5 times more common among boys. ASD is present among all racial, ethnic and socioeconomic groups. Learning disorders of different intensity, in comorbidity with ASD are present in 62.5% of cases, and ADHD in about 43%. In more than 40% of children with ASD three or more comorbid conditions are being recorded. Keeping in mind the last census (2011), it is easy to calculate that there are more than 10,000 children aged 0-15 years with ASD in Serbia, and only in Nishava region more than 1000. Keeping in mind that ASD do not only affect the child, but requires the engagement of whole families and local communities, the prevalence of people affected by autism (directly or indirectly) is significantly higher than 2%. Therefore, ASD can be seen as an important current issue that requires much more extensive and organized engagement of the health, social and educational sectors.

Key words: autistic spectrum disorders the prevalence

12. ELDERLY HEALTH-CARE RECIPIENTS, THEIR ROLE AND IMPORTANCE IN THE HEALTH-CARE SYSTEM

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Introduction: According to the latest demographic investigations, namely on the basis of population census in Serbia, it can be stated that our country is among demographically oldest nations in the world. The problem of decreasing birth rate since the late 20th century has eventually led to negative natural growth. The contingent of the old population has increased by 3.7 times over the period of 50 years. The hypotheses on expected demographic tendencies have recently suggested the trend of negative population growth in the first half of 21st century; it is even estimated that by the year 2050 it will have progressed to -0.93%. In such circumstances, chronic non-communicable diseases characteristic of elderly people are dominant in morbidity-mortality structure, thus new priorities of health-care system and society as a whole are being set. They include reduction of present problems in health care system, health care reform and prevention of health care cost increase regarding the observed population.

Aim of the paper: The aim of the paper was to point out the need of evolving understanding of older healthcare users – from passive recipient to emancipated user (partner) who takes part in creating healthcare policy.

Material and methods: Demographic data on elderly population in the Niš area and our investigation data on a sample of elderly people were used in the study.

Results: Observation of the partnership relations between the patient and the chosen doctor suggest that our older healthcare users are still passive recipients of healthcare services (indicators of the choice and acceptance of health issue information, appointments for medical check-ups, flu vaccination). The role of healthcare users should not mean solving actual health problems only, but their latent and potential needs as well (our patients most commonly visit the doctors only in case when the disease is manifested). Out of 38 priorities in healthcare system by the EUROGROUP study, on the top of the list in most European countries was a concern about doctors lacking time for examination and consultations. A positive example is an improvement in medical appointments that has recently been adopted, but also criticized, in our country. Older healthcare users should become more educated in order to require protection with minimum health risk. However, in our circumstances literacy levels are the lowest in this population group, predominantly in females. Also, health care professionals should have better geriatrics and gerontology knowledge. Finally, a lot of our studies lack the assessment of comfort and healthcare facility design, as well as waiting time for examination or some other medical intervention.

Conclusion: Healthcare system reforms in Europe include empowering citizens' opinions and meeting their needs. Particular importance of the reform means recognizing healthcare demands with increasing age and pathology in older people by primarily improving long-term medical and social care, by insisting on professional care and humanity, accessibility to minimum healthcare services to all the users, equality of access to healthcare services and by focusing on the quality of care.

Key words: elderly people, health-care reforms

13. DRY EYE AND GLAUCOMA – CURRENT CHALLENGES AND HEALTH CARE SYSTEM IMPORTANCE

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Introduction. Glaucoma is a leading cause of blindness and at the time recognized and treated adequately, provide a better vision-related quality of life in patients. The adequate ophthalmic care utilization may improve health outcomes.

Aim of the work. We analysis dry eye in patients with primary open angle glaucoma (POAG) and exfoliate glaucoma (XFG).

Materials and Methods. 140 glaucoma patients on medical therapy and 60 patients on surgical treatment were examined, as well as 90 controls at the Department of Ophthalmology, Clinical Center, Nis, in the one-year period. An ophthalmological examination is completed to check the quality of the tear film.

Results. Age has a positive correlation with the type and occurrence of glaucoma (77 years for XFG, 62 years for POAG), with no significant sex difference. The most common type is mixtus dry eye in 61.9% of POAG and 77.78% XFG respondents. Postoperatively, there is a change in the weight of dry eye in both types of glaucoma to more difficult to grades IIb.

Conclusion. Efforts continue to further refine cost-effective ocular care and to define the appropriate levels of glaucoma care services. Implementing clinical evaluation of tests on dry eye in everyday medical practice guarantees therapeutic success.

14. THEORY OF HEALTH

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The author raises the question of making the theory of health, through the concept of health science. This question comes in the time of great social changes, in the conditions of globalization, transition and changed paradigm of medicine and health. Health is, from antiquity to the present day - the highest possible good, neglected nowadays because of the orientation of medicine towards advanced technologies and medicalization, work on stem cells and transplantation of organs. The author raises this question in the time of great changes in the systems of values and morality in the society, in the time of bureaucratization of medicine and medical practices, which leads to changes in the field of medical ethics. From Hippocrates time to date, it is good for medicine and for doctors to deal with - health. In his work, the author starts from the concept and definition of health. His contribution to the theory of health comes from the research results of the projects: "Conversations on Health" which included 600 adult men and women and "Dictionary of Health". Based on the results of the "Conversations on Health" the author brings a laic definition of health. Based on the results of the unfinished project "Dictionary of Health", which was realized in cooperation with dr Milan Rajcevic and the linguist from the Public Health Institute "Batut" in Belgrade, the author shows that the language of health exists, that it is not the language of medicine and that it is needed when talking about health - to speak the language of health. Not only doctors and medical staff speak the language of health, but also other professionals and lay people who deal with health. The language of health, unlike the language of medicine, is simple, understandable to everyone and convenient enough to have the knowledge about health easily spread throughout the population. In this context, the author points out to the ICF - International classification of functioning, disability and health (WHO), which is almost unknown and not used in everyday practice of physicians, although it presents a set of definitions of health and functionality. It is complementary to the ICD, which is a collection of tens of thousands of concepts and definitions of diseases and conditions. In search of health, in an effort to find a path to the theory and science of health, the author uses and analyzes a wide range of literature, especially the topics on health written by dr. Milan Jovnovic - Batut, dr Andrija Stampar, Milorad Dragic and Zlatomir Vidakovic, professional. and foreign literature, especially related to large International Conference on Health in Alma -Ata in 1978, Ottawa in 1986 and other foreign journals, as well as reports on the activities of the major projects to improve health in the Old Yugoslavia: Health cooperatives- dr Gavriilo Kojic, Požaranje, Ivanjica, Rekovac, the project of the Health Edification Institute of SR Serbia on examination of medical culture on flooded areas, Yugoslav project "Healthy school", the project "Work on health education in experimental schools in the Timok region" and others. The author's quest for health in literature reveals the definition of health given by Tin Ujevic in 1938, which is as worthy and meaningful as the official WHO definition. In the quest to health knowledge that can be used to create the theory and science of health, the author also uses public knowledge of health shared by folk healers, that lies in our national heritage: health practices, proverbs, tales, fables and charms. Based on all this, at the end the author makes the definition of health of Rajac health school, comparing health with miraculous, beautiful flower of seven petals, each representing one dimension of health. Finally, the author proposes to establish country-level expert body, composed of experts from various fields, to work on the theory and science of health, and for medical faculties and medical schools to form departments to deal with the science of health and health education of people.

15. THE RESPONSE OF INSTITUTION OF CHOSEN DOCTOR ON CURRENT AND FUTURE HEALTH CHALLENGES

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Objectives: Assessment the respond of the instutution of chosen doctor in Rasina District to health challenges after 10 years of existing the practise of chosen doctor and consider the capacities of that institution to adequate respond to the future health challenges.

Materials and methods: Qualitative survey, focus group, and data analysis from the work's reports of chosen doctor's team in 2005 and in 2015.

Results: The number of preventive services decreased for 34.76%, the participation of the number of preventive services in the total amount of the first visits has fallen from 32.26% to 16.16%, the number of home visits has fallen by about 50%, the number of screening visits has had a sudden increase in 2012, but than this number decreased. The results of focus group indicate complaining about large number of patients, dissatisfaction with the quality of work, the burden of administration work, inability to develop preventive work, but also the possibilities that patients receive advice by telephone call and establish better contact with the doctor.

Conclusion: The institution of chosen doctors did not adequately respond to the health challenges and needs. The solutions are in adequate funding, improving possibilities for preventive health services' implementation, creating substantial cooperation among all actors in health care provision, and connecting medical institutions at all levels of health care.

Key words: chosen doctor, preventive health care services

16. THE AGING OF THE POPULATION AS THE MAIN DEMOGRAPHIC CHALLENGE IN TIMOCKA KRAJINA REGION

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Introduction: The population of Timocka krajina region is currently in process of rapid aging, which appears as a consequence of disadvantageous age structure and fertility rates at low level- which is an attribute of highly developed industrial countries like Japan, Italy and France. At the beginning of the 21st century, Serbia has a population which ranks among the top 5 oldest in Europe and top 10 oldest populations in the world, and the population of Timocka krajina region has the one of the oldest and most developed biological depopulation processes in Serbia, so it is characterized by aging indicators which are even less favorable than the average indicators for Serbia.

The aim of the work: Following the process of demographic aging of Timocka krajina region on regional and local levels, according to the indicators of aging, we can estimate the current demographic potential, as well as the potential for future social development.

Methods of work: Descriptive statistical method was used in the work. The data sources are population censuses in 2002 and 2011.

Results: The demographic aging of the population of Timocka krajina region has started in the second half of the 20th century and at the beginning of the 21st century it has moved from the stage of deep depopulation into the stage of deepest population, especially in rural areas. The aging is more in Zaječar district, which corresponds with more extensive demographic and biological depopulation, where more than one third of the population is more than 60 years old, according to 2002 census, while according to 2011 census, only the municipalities of Zaječar and Bor have less than one third of the population over 60 years old. The population of Knjazevac municipality has the least favorable age structure of the population with the group of population over 60 years old twice as large as a group which is less than 19 years old, and more three times larger on the 2011 census.

In Timocka krajina region, the second demographic transition is in the late stage and the third demographic transition has started to take place “from red to white”, without any biological future, with small families, long life expectancy, higher and higher percentage of old population, with the loss of “demographic bonus” or the main potential for biological reproduction and working and with less than 20% of young population, which cannot change or stop this negative trend. In the following period, the acceleration of this trend is expected, because the generations which were born during baby boom period are now retiring, the longevity is increasing and potential future emigrations and economic transition will intensify this process of aging.

Conclusion: The aging of the population, beside demographic disorders, also leads to socio-medical and economic disorders, which can be reduced with acceleration of economic transition, formation of long-term social plans for improvement of life quality of old people and increasing of life expectancy; by implementing the reform of the system of health care with larger funding of safety and healthcare and care for old people; by implementing of reforms of pension and social system and social payments as a source of constant income and insurance of law protection of old people.

Keywords: aging of population, indicators of aging, biological depopulation, Timocka krajina



17. HISTORY OF THE PASTEUR INSTITUTE IN NIŠ

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Public Health Institute Niš is the oldest preventive health care medical institution in the Balkans. The Institute performs activities within the areas of social medicine, hygiene, epidemiology and microbiology according to the state tasks and programs of the Republic of Serbia. The history of Serbian medicine is a chronological overview of the development of medicine, as part of the history of our nation and its cultural heritage. The objective of this paper is to show the settings in museum located at Public Health Institute, Nis, as the first preventive medicine health care institution in the Balkans.

POSTER PRESENTATIONS**1. INFLUENCE OF HEALTH CARE PROFESSIONALS IN PREVENTING MEDICATION ERRORS**

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Objectives: The pharmacy profession is currently exploring expanded roles in primary care. Pharmacists can improve prescribing practices, reduce health-care utilization and medication costs, and contribute to clinical improvements in many chronic medical conditions, such as cardiovascular disease, endocrinological disorders, and psychiatric illness. Medication error is one relevant example of a risk, which threatens healthcare system, and very often results from polypharmacy or improper use of drugs. The aim of this study was to evaluate the frequency of medical prescriptions with dosage regimen including half tablets.

Materials and methods: The research in the form of an analytic cross sectional study was conducted in Remedia and Nevenpharm Pharmacy Health Facilities on the territory of Niš during March and April 2016. The criterion set for the study was to include all medical prescription with prescribed drug with half tablets dosage regimen. The database was created in an Excel statistical program.

Results: Conducted research shows a high percentage of prescription of drugs for oral administration by a doctor in a divided dose form (21.10%). The most common prescribed drugs with dosage regimen including half tablets are used in the treatment of cardiovascular diseases (75%), CNS diseases (14.53%) and endocrinological disorders (3.74%).

Conclusion: Today, patient safety is a key concept in healthcare system. The professional cooperation between healthcare professionals as well as doctors and pharmacists are important in many services such as patient counseling, use of pill organizers and tablets splitters in polytherapy, drug therapy monitoring and adverse drug reactions reporting.

Key words: healthcare professionals, doctors, pharmacist, half tablets, medication error



2. QUALITY MANAGEMENT SYSTEM (QMS) ACCORDING TO THE INTERNATIONAL STANDARD ISO 9001: 2008 MAY BE APPLIED BY ALL HEALTHCARE ORGANIZATIONS OF ALL TYPES AND SIZES

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Introduction: Quality Management System (QMS) according to the international standard ISO 9001: 2008 may be applied by all healthcare organizations of all types and sizes.

Aim: To show that the implementation of QMS can make significant progress in the work of the WHO.

Method: We analyzed the results of the verification of application of quality management systems in a private health organization that deals with the treatment of infertility. Checking the application of QMS is conducted according to the requirements of ISO 9001: 2008 and the rules of the certification body for management systems in the country accredited by the Accreditation Body of Serbia.

Results of the work: are presented and analyzed the results of the audit of QMS in the provision of health service organizations. Validation was performed as part of initial (2013 god.), And supervisory control of two (2014 and 2015 yr.) In which it was stated that they fully met all requirements of the standard is submitted to the certification committee to decide on the issuance or extension of the certificate.

Conclusion :The introduction of QMS Health Organization has made the improvement of work organization, rationality in the work, cost, complete safety at work and increase customer satisfaction and staff.

Key words: Quality Management System (QMS), a private healthcare facility, treatment of infertility

3. FIVE YEAR ANALYSIS OF MORBIDITY IN SCHOOL CHILDREN AND ADOLESCENTS IN NIŠAVA DISTRICT

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Introduction: The health status of school children represents a great importance for the whole society. A special attention must be paid to this population group not only because of increased sensitivity to the effects of the various factors that may affect their health, but also due to the fact that poor health and unhealthy lifestyles may result in poor health throughout their lives.

Aim: The aim of our study was to analyze the five-year morbidity of school children in Nišava district. Data were collected from the annual statistical reports in the Primary Health Care Centers. We analyzed a period from 2010. to 2014.

Results Number of established diseases, conditions and injuries in health care services of school children in Nisava District in the five-year period decreased from 129.500 diseases (in 2010.) to 97.793 (in 2014). The rate of the overall morbidity ranged from 2636.1 / 1000 children in 2010. to 2064.2/1000 children in 2013. (an average of 3 diagnoses per child). Respiratory diseases were the most frequent, the rate varied from 1697.8 ‰ in 2010 to 1186.7 ‰ in 2014. The most common diagnosis were acute inflammation of the throat and tonsils. On the second and third place are the symptoms, signs and abnormal clinical and laboratory findings (rate -154.9 ‰ in 2014) and the factors influencing health status and contact with health services (the rate -125.7 ‰ in 2014). The following is a group of diseases of the digestive system, which account about 5.0% of the total morbidity (the rate was about 114.8 ‰ in five year period. The fifth most frequent were diseases of the skin and subcutaneous tissue (3,5-4,7%) with a rate of 98.8 ‰ in 2014.

Conclusion: In the five-year morbidity of school children in Nisava district 3 diagnoses were registered annually per child. At least three of the five diagnoses belong to the respiratory diseases.

Key words: school children, morbidity, Nisava district

4. THE REVIEW OF THE INCIDENCE AND MORTALITY RATES OF BREAST CANCER IN NIŠAVA DISTRICT

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Aim: The aim is to show the number of new cases and deaths from breast cancer in women during the ten-year period on the territory of Nisava district (the city of Niš, Municipalities of Aleksinac, Doljevac, Merošina, Razanj, Gadzin Han and Svrljig) and in Serbia.

Methods: The study was conducted as a descriptive epidemiological study. The incidence and mortality rates were calculated per 100,000 inhabitants according to the Census published in 2002, and also the crude rate (CP) and the standardized rate (ACP-W). The register of vital events from the Republic Institute for Statistics, the annual report on the trends of malignant diseases from the Public Health Institute Niš, Cancer Registry of the Institute of Public Health of Serbia and the reported cases of illnesses/ deaths from Public Health Institute Niš were all used as a source of data on the incidence and mortality rates of breast cancer in Nisava district population.

Results: During that ten-year period in Nisava district 2,190 new cases of women with breast cancer were registered (CP incidence was 114.4 and the ACP-W incidence 63.8). In relation to the age structure, the largest number of new cases of women with breast cancer (2,148) in Nisava district was found in the group of 55-59 year olds. The highest number of registrations was recorded in the city of Nis, 1635 (CP amounted to 122.4 and 70.0 W-ACP) and the lowest in the municipality of Merošina 46 (CP amounted to 67.7 and 41.2 W-ACP). During the mentioned period, the total of 786 women died of breast cancer (CP mortality rate was 81.8, and the ACP-W mortality 18.5). The largest number of deaths was recorded in 2009 and 2012, and the lowest in 2004, 2005 and 2008. In Serbia, 1,574 women died from breast cancer in 2004, and 1,169 in 2013. The average mortality rate in central Serbia was 43.4, and 7.9 in Nisava district.

Conclusion: Breast cancer takes an important place in the pathology of the population in this region, considering the fact that it makes 18% of all malignant diseases registered in central Serbia and 24% on the territory of Nisava district. The results indicate a slight increase in morbidity and mortality from breast cancer, but the observed period is not long enough to make relevant conclusions.

Key words: breast cancer, incidence, mortality.



5. DEPOPULATION IN THE ZAJECAR DISTRICT

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Summary: Main objective of this paper is to give attention to main demographic problem in this part of country-negative natural increase and depopulation in Zajecar oblast in the period 2002- 2011, with reference to data across the natural growth in some periods during the 19th and 20th centuries and find main factors for this negative demographic changes. Zajecar oblast characterized depopulation the so- called “ the white plague”, rate of natural increase is about -12.8%, and this area has one of the oldest population in Serbia (average age is about 46.7 year ; stage of deepest demographic age). This part of Serbia also have the highest decrease of total population in the period between two censuses 2002- 2011. (the rate of decline about 15%), negative migration balance, low fertility rate and high mortality. All this has resulted in depopulation population Zajecar oblast.

Key words: depopulation, the white plague, natural increase, mortality, natality, Zajecar, Timok region

6. DEPOPULATION FOR THE CITY OF NIS AND NISAVA DISTRICTZlatković Miloš¹, Zdravković G.²¹ Primary Health Care Center of Nis, Serbia² Primary Health Care Center of Zajecar, Serbia

Summary: The goal of the work is to show the changes in population for the city of Nis and Nisava oblast, as a result of natural movement of population ie. natality, mortality and natural increase and mechanical movement of population ie. migrations and compare these data with data from other parts of Serbia. We analyzed the data from the census of population and database of the Republic Institute for Statistics for the Republic of Serbia. In period 1948-2011 the city of Nis had increased the population of 2.4 times. In Nis in the period 1991-2011. the downward trend was recorded in the share of young and increased mature and old population. Natural increase in Nis have been constantly negative since 1996. There is an increase in mortality and negative natural increase in Nis in the period 1999- 2014. The city Niš in the period from 2011 to 2002. year had a population increase of 4.2 year average per 1000 inhabitants, while Nišavska area has a decline of -1.6 year average per 1000 inhabitants, while the most pronounced decline is in the municipality of Gadzin Han, Razanj and Svrljig. In that period Serbia - south was an year average annual decline of -8.7 ‰ in Serbia - north decline -0.5 ‰, and in the Republic of Serbia decline was -4.7 ‰. Depopulation, unfavorable age structure, reduced fertility, a negative natural increase and migration to the city of Niš are the main features of almost all municipalities of Nisava oblast.

Key words: demography, vital statistics, natality, mortality, natural increase, migration

7. REFERENCE VALUE AND RELATION OF WORK QUALITY INDICATORS OF CHOSEN GYNECOLOGIST IN THE DISTRICTS OF BOR AND ZAJEČAR IN THE PERIOD 2011-2014

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Introduction: Monitoring of the quality of selected gynecologist is the basis for improving the quality of his work directed to preservation and promotion of health, improving quality of life of women, increasing the share of prevention in primary care and reducing the direct costs of medical treatment.

The aim of the work is to compare indicators of the quality of the chosen gynecologist in the period 2011-2014 with a reference value in health centers in the districts of Bor and Zajecar, as well as to compare the work of chosen gynecologist between health institutions in the districts of Bor and Zajecar.

Methods of work: For the quality of the work of chosen gynecologist, the valid "Methodological guidelines for health care institutions reporting procedures on indicators of health care quality" in 2011 were used. Given that there is no standardized value according to which monitoring of movement of indicators should be done, for each indicator we determined the reference (average) values for each district individually and observation period, according to which indicators were observed. For statistical analysis, descriptive statistical methods were used.

Results: The monitored parameters and calculated reference values:

1) Percentage of registered beneficiaries who for any reason visited their chosen gynecologist.

The reference value for the district of Bor was 69.00% and 70.00% for the district of Zaječar. In both districts the average number of registered beneficiaries was approximately the same. 2) The ratio of the first examination and re-examination of the chosen gynecologist for medical treatment. The reference value for the district of Bor was 1,00, and for the district of Zaječar 1.98. In the district of Bor, the first examination was followed by another one, and in the district of Zajecar each first examination was followed by two re-examinations. 3) The ratio of the number of instructions issued by specialist-consultative examination and the total number of visits at the chosen gynecologist. The reference value for the district of Bor was 8.00, and 3.44 for the district of Zaječar. In the district of Bor, after each examination an average of eight medical referrals were obtained, and in the district of Zaječar it was 3.4 referrals for specialist consultative examination. 4) Percentage of preventive examinations in the total number of examinations of chosen gynecologist. The reference value for the district of Bor was 44.00% and 40.00% for the district of Zaječar. There was no significant difference between the districts of Bor and Zajecar in the share of preventive examinations on average. 5) Percentage of beneficiaries aged 25-69 covered by the targeted examination for early detection of cervical cancer. The reference value for the district of Bor was 30.00% and 27.00% for the district of Zaječar. Approximately the same percentage of the beneficiaries were covered by the targeted examination in both districts. 6) Percentage of beneficiaries aged 45-69 referred for a mammogram by gynecologists in the last 12 months. The reference value for the district of Bor was 12.00% and 32.00% for the district of Zaječar. A significantly higher percentage of beneficiaries in the district of Zaječar were sent to mammography.

Conclusion: You can not notice the regularity in the movement of the value of these indicators in relation to the calculated reference value in the reporting period. Reference values for the parameters are different in the districts of Bor and Zaječar. There is a difference in the work of selected gynecologist in the districts of Bor and Zaječar in relation to the reference values for certain indicators.

Keywords: quality indicators of chosen gynecologist, health institutions of districts of Bor and Zaječar, the reference value



8. ORGANIZED SCREENING PROGRAM IN NIŠAVA AND TOPLICA DISTRICT

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Aim: The overview of the organizational problem in the process of implementation of the of organized screening program in health institutions in Nisava and Toplica district.

Methodology: A retrospective analysis of output results quantified in relation to the planned extent and content of the institutions work Plan, staff profiles and technical possibilities of active subjects in the organized screening program in Nisava and Toplica district.

Results: The analysis shows that National screening programs for colorectal cancer, breast cancer and cervical cancer have a common characteristic of low coverage. Health personnel in primary health care, which is crucial in the implementation of screening programs, is additionally burdened with a high level of realized extent and content according to the measures of performance and therefore unmotivated. Technical deficiency in equipment, the lack of personnel profile and the number of staff in the secondary and tertiary level, are a serious obstacle to the tasks.

Conclusion: The elements of each program are based on the resources, funding and supervision, which requires political will to implement and maintain the program. Better organization and motivation of primary health care staff with adequate political support (resources and financing) can increase the coverage of screening programs. Education and motivation of the population should be used in breaking prejudices and stereotypes towards screening. There is a lack of serious research of the problem of implementing screening programs in Serbia, which would indicate the most important issues and directions of their solving. The research to assess the validity of the screening method in our population, as well as research on the effects of screening programs on epidemiological parameters of disease and health care costs are also needed

SESSION: INFORMATION TECHNOLOGY AND HEALTH

INVITED LECTURE

INFORMATION TECHNOLOGY AND HEALTH

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INTRODUCTION

Informational technologies have created technical possibilities to acquire, arrange, store and distribute data of health level of population. Informational technologies can create coordination between the health system and plan health promotion, track research and study health service, suggest and take adequate action in the aim of protecting and upgrading health of the general population, studying the influence of negative factors on populations health and measuring achieved level of general population health.

Medical informational technologies are accepted today as basic medical science, and by its nature it is also experimental science that is characterized with a line of questions that are being raised and experiments that are being designed, analysis are being run, and results that are product of those are being used to raise new questions and run new experiments. It represents also a medical technology because it takes a part in the process of formal medical decision. It studies the law of making, moving, arranging and using information, data, and knowledge, due to solving medical problems.

Informational technologies have found their use in the health system with the idea of automating technology of the working process in complex health institutions, in order to give support for medical decisions and securing conditions of running complex health institutions.

Informational technologies need systems that use PCs and communicational equipment, that are developed around health department at all levels of health protection, and their mission is to acquire, arrange and distribute medical and administrative information that are relevant for all activities and functions in health protection system.

For creation and development of informational technologies, we must take into account results of Leibnitz and Bool (Gottfried Wilhelm von Leibnitz, physicist and mathematician and George Bool mathematician and logicist). In biomedical science, the application of informational technologies has started with Herman Hollerith, with punch cards in epidemiological and public health research. First scientific article from medical informatics has been printed in 1959 in the magazine Science. Numbers of published articles has increased since 1992.

APPLICATION OF INFORMATIONAL TECHNOLOGIES IN HEALTH DEPARTMENT

Information created and transferred in health departments have specific purposes, and the roles of informational technologies in health department are multiple:

1. *To track and lead in the storage of medical documentation* – a number of data that is being recorded in health department are large. Health protection is very specific and complex, and also characterized by constant usage and diversity of files and information.
2. *Usage in medical diagnostics* – computers are being used in medical diagnostics in arrangement and analysis of biophysical signals (electromyography, elektroencefalophy, elektromiografy, measuring blood pressure), afterwards in arrangement and analysis of medical pictures while using computerized tomography (CT) and then the when pictures

received from MR are being used in arrangement and analysis of clinical and laboratory measurements.

In therapy and rehabilitation – the beginning of usage of computers in medicine was in creating programs for planning illumination of cancer(calculating doses and cancer size). Nowadays, this method is being widely used and practically it is impossible to work without computers. In therapy where informational technologies are being used it is understood to track patients health progress in the intensive care. Many procedures of rehabilitation use informational technologies.

4. *Usage in health department* – most important areas where informational technologies are being used are; make an appointment for patients in the ambulances, printing medical receipts, receiving patients to the hospital, monitoring the sick leaves and medical work.

5. *In medical research*–usage of computers in medical research is very important, actually the research nowadays is considered unproductive when informational technologies are not being used. Besides, data analysis, research is getting upgraded more and more via computerized systems for tracking medical literature.

6. *In medical education*–educative materials are being distributed using the internet or using CDs.

AIM

To show the advantage of using informational technologies and their beneficial influence in increasing good health condition and promoting health as well.

Informational technologies and social networks give a lot of space to act positively towards promoting healthy ways of life and to raise the quality of health protection.

ACHIEVED RESULTS AND DEVELOPMENT OF THE INFORMATIONAL TECHNOLOGIES

The health system is developing step by step along with the society development, application of modern technologies has become a common thing among the populace, and it is also much more present in the Serbian health system. The medical informational system in Serbia is quickly developing.

Modern telecommunication has created the technical possibility of being constantly online, wherever a person may be. Ways of communication such as internet, email, conference network, video conference and others give and an excellent chance for increasing awareness for the importance of health among the majority of people.

Besides informational transfer, informational communicational technologies may be used for scheduling appointments, sending results of all diagnostical procedures and for exchanging experiences and consulting specialist.

Providing health protection in Serbia is characterized today by wide application of new informational and communicational technologies(ICT) – smartphones, Teletext, telefax, and e-mail.

Development of ICT has been strongly influenced by the development of computers, which happened in the later years of the twentieth century, but its biggest expansion had happened in the twenty-first century. The amount of data, information, and knowledge of health protection is more frequent when computers were not being used or not being widely accepted.

Fast development of health protection has conditioned application of new medical methods and it has produced big amounts of data, the size of health protection is directly influenced by using this new technologies. Informational technologies are being more and more present every day in health protection system.

The usage of informational technology is being increased by the internet expansion. The Internet has created access for a huge amount of people to open, explore and create databases that are very important for health protection system. Informational technologies provide a lot

of help for giving the right judgment of the population's health level, in diagnostics, in everyday work of doctors and other health employees.

In the system of the health protection, access to information is provided to patients, doctors and all other employees, medical institutions, fund for medical insurance, the ministry of health and others who have some interest.

The use of informational technologies in health department provides:

1. Access to health system using smartphones and laptops, notebooks, etc.
2. It is now possible to arrange a medical appointment and diagnostical procedures for patients and also to apply therapy via the internet.
3. Health system and the management system are easier to operate
4. With the usage of informational technologies, the efficiency is increased and costs of health protection are being lowered
5. Patients are more interested in the protection of their own health and system for health protection is easier to access.
6. With the usage of ICT, it is possible to get the interest of population to take part on a larger scale. In everyday work of health institutions, which is also going to provide faster development of e-health.

The development of application of informational technologies (IT) in health protection system in Serbia has been managed by the law with regulation of work program, development, and organization of integrated health informational system "e-Zdravlje" ("Službeni glasnik RS", broj 55/09)

The application of informational technologies in health must satisfy following principles: securing user privacy and users personal medical data, the efficiency of health informational system, optimal usage of medical data, high quality of medical information.

Good health informational system benefits to:

- Ministry of health is provided with analytic information that is important to the development of the system of health protection.
- it helps health insurance fund to raise the health level of the population using the information provided, this way, much earlier that it was possible without it.
- It is easier for doctors to receive medical information and to consult with colleagues from distant areas using telemedicine.
- It allows the patient to gain easy access to his/hers medical record, which allows him to choose most appropriate medical service.

Current health informational systems in our country are very disconnected. Basic data is still stored in a classic way, thru paper, medical records which are not easy to access and it is not easy to get the whole picture of medical treatment that has been provided to the patient.

Today, in our country the movement of the patient through the system of health protection is unsynchronized and lack real information of his treatment, diagnosis, and therapy.

Every doctor that is going to examine the patient usually does not possess real information of how he was previously treated. And that is why on every level of treatment or when the change of health institution, the patient is being examined again using various diagnostical procedures.

Information about the patient's health is being stored in patients memory, in doctors records, on pieces of paper and usually in patients plastic bag.

Health institutions sometimes do store electronic records, but in most of the cases, records are in the written form. There is still not any coordinated and unique system of storing health information, there is no standardized and safe way of integrating individual health information in one place.

Telemedicine is a method using ICT and telecommunication technologies to give medical service without the importance of the location of the medical service provider, patient,

medical information or equipment. Telemedicine combines standard and innovative procedures and gives many new possibilities in practical work.

Online social networks are a component of the modern health system. They represent the phenomena of today, which is the biggest virtual community and very good renewable source of information which is constantly updated. The population can be informed and educated daily about many questions that are important for health with the help of interactive communication on social networks.

CONCLUSION

Ministry of health strongly supports further development and implementation of IT in health protection system. That process has started in Niš. The idea is that until the end of this year the whole system of medical protection will become connected and work as one organism.

Using IT in the health protection system is very important, the potential of providing health services in the future, that are going to have better quality, lies in planning development of informational system. Using IT is going to be possible to reserve an appointment and diagnostic procedures on the web page of one health institution. The process of reserving the appointment using the telephone or by coming personally is still going to be used, while the percentage of internet users, that recognize true internet's potential does not become much higher.

Expected benefits of IT usage are better quality and more efficient access for patients, faster diagnostics, faster and much safer medicine choice, increased security for the patient, more time for employees to provide medical service and health protection, better quality of the complete medical-statistic coverage and faster transfer of biomedical knowledge.

Electronic health record, electronic receipt, electronic referral letters, electronic health insurance card, telemedicine and usage of the social networks in health protection system in everyday practice is going to be more present.

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ORAL PRESENTATIONS

1.ELECTRONIC HEALTH RECORDS AND INTEGRATED HEALTH INFORMATION SYSTEM IN MACEDONIA 2012-2016

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Objectives: This study aimed to represent patient care and research opportunities through electronic health records gathered during the implementation of e-health system in Macedonia since 2012 to present.

Materials and methods: Interoperable IT systems are essential for the electronic data exchange between health care providers. Ministry of Health in Macedonia in 2012 is started with MyTerm system which provides integrated solutions for healthcare management and covering records of patients visits. Electronic Health Card is also in use since 2012. Today the volume of digital data rapidly grow.

Results: Standardization and harmonization of our software applications for different public health problems enabling maximal synergies with national IHIS and ensure cost-effective healthcare delivery. Our institution and health insurance funds exchange data at regular intervals. Electronic health cards, electronic certificates for blood donors, software for easy exchange of electronic data among personal doctors and laboratories and other electronic services is of an immense benefit for patients and health care institution.

Conclusion: Information Technology holds the key to safer, more efficient care; The availability of integrated patient health information will allow for better outcomes and create value for patients and providers. On the other side collecting and utilising information from patients lifestyle is important for disease prevention, management of chronic diseases and health promotion.

Key words: IHIS, EHR, information technology



2.HEALTH INFORMATION TECHNOLOGIES IN PATIENT'S HOME

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Objectives: Descriptive study is used to depict three examples of modern information and communication technologies in order to reduce workload of health care services and medical personnel. At the same time, users are encouraged to take active role in protecting and improving their own health.

Materials and methods: Depicted cases are derived by researching of PubMed data base. Two examples of telemedicine technologies come from Sweden and Australia. Third one slowly comes into use in Serbia.

Results: These technologies can be adjusted to make unaware users become active users on a subconscious level. For experienced users those can become a tool for further education and expanding their health literacy. And become a source of saved time and more quality life for all.

Conclusion: Making decisions that include both patient and provider is becoming more desirable model for managing health care. Patient's active role in that regard is enabling making of more enlightened decisions, better perception of patient's medical risks, his active role and increased cooperation and respect for the doctor.

Key words: information technology, telemedicine, patient, home care services, chronic disease self-management.

SESSION: HEALTH PROMOTION IN THE COMMUNITY

INVITED LECTURES

HEALTH EDUCATION ON REPRODUCTIVE HEALTH OF HIGH SCHOOL STUDENTS - THE RESULTS OF THE THREE-YEAR PROGRAM IN VOJVODINA PROVINCE

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Contemporary approaches and methods in health education, and this applies to the theme of sexual and reproductive health¹, increasingly rely on empowerment of individuals, families and communities, rather than a paternalistic approach to those who participate in the transfer of knowledge (professional, trained layperson / educator). Today it is considered the content and meaning of information in the educational process and the way that information and knowledge is transferred (*i.e.* "how to teach") to have almost equal importance. Therefore, more accurate term is "exchange" rather than "transfer of knowledge" about health. In the context of health education on reproductive health, this participatory approach is aimed at the participants in this process, especially children and young people, helping them to identify their own concerns regarding factors affecting the reproductive and sexual health and to acquire the skills and confidence that would resolve these concerns. This approach takes into account the conditions in which people live, as important determinants of health.

In the period from 2013 to 2016 year, during 3 school years, in the Autonomous Province of Vojvodina, Republic of Serbia, the Institute of Public Health of Vojvodina implemented the project "Extracurricular health education on reproductive health of high school students in Vojvodina", financed by the Provincial Secretariat for Sports and Youth. These projects had, as the overall goal, explanation and professional documenting of the need for education on reproductive and sexual health of school youth, using the evaluated, intervention, extracurricular health-education program in the sample of second grade students of high schools in Vojvodina. Professional staff have been recruited - university professors in the field of gynaecology and obstetrics (expert project coordinator), children's surgery (urology), developmental psychology, social medicine and epidemiology, school psychology, a youth worker, a journalist, with secured external monitoring for every year of implementation. During the first year, the curriculum is designed as 16 one-and-half hours workshops (reduced to 14 in the 2nd and 3rd year of the project) for youth of 2nd grade of high schools and academies, given by class teachers rather than peer educators – students (as it was in the 1st year of the project), as well as the 195 pages manual (amended in the 2nd year by the Dictionary of reproductive health). Specific goals during all three years were the sensibilisation of the population on the need to improve the knowledge, attitudes and behaviours related to reproductive and sexual health among young people, through social marketing intervention in the community. The last year of performance of the project (70 schools involved, with nearly 6000 students) included the objective "to acquaint the relevant

¹ "Reproductive health is a state of physical, mental and social well-being in relation to the reproductive system in people of all age groups and includes satisfying and safe sexual life, the ability to reproduce (conception and birth) and the freedom to decide on reproduction (whether, when and how many children shall be born)". "Sexual health is enjoyment in sexual relations without fear of pregnancy, disease, abuse, violence and unsafe abortion. It represents the union of physical, emotional, intellectual and social aspects of sexual being".



K. SESSION: HEALTH PROMOTION IN THE COMMUNITY

institutions and individuals with the standards of sexuality education in the world and the results of the project". The three-year effects evaluation is in progress, together with the development of components of a proposals to amend the regulations in the field of education and youth policy.

Within the contents of the topics on which the health education on sexuality and reproductive health had been based (WHO standards on sexuality education) were those of pragmatic character (anatomy and physiology of male and female sexual and reproductive organs, human sexuality, contraception, conception, pregnancy, childbirth, abortion, sexually transmitted infections, visit a gynaecologist/urologist/psychologist and communication skills) but also those that give value determination and, within the sexuality education standards given by WHO, UNICEF and UNDP, provides learning about the concept of human rights, with specific focus on the concepts of gender norms and roles, stereotyping, discrimination, stigmatisation, sexual and reproductive rights (the right to freely decide whether to be and with whom to have a personal relationships, long term love relationships, a sexual relationships; whether and with whom to marry, not to enter early into marriage and against their will; the right to use contraception and ask a partner to use contraception or to test for sexually transmitted infections - STI; to refuse sexual intercourse; to decide whether, when and how many children to have; the right to free decision on the treatment of infertility, adoption of children, safe abortion and information about the protection of reproductive and sexual health).

Standardized approaches to health education on sexual and reproductive health ("sexuality education") have as an inevitable topic assessment of the basic determinants of population health (especially children and young people) in the territory to which the program applies, as well as the teaching of behavioural factors that may improve health in general and therefore sexual health (healthy nutrition, physical activity, avoiding the use of tobacco products and exposure to tobacco smoke, avoiding the harmful use of alcohol and drug abuse, personal hygiene, proper use of health services and a range of practices that can be characterized as protective sexual behaviour in the narrow sense - avoiding early entry into sexual relationships and certainly before the age of 15 and psychophysical maturity, avoiding excessive change and a large number of partners, avoiding the coexistence of two or more partners, the use of contraception in a proper way up to a joint decision on the offspring, planning to have at least 2 years interval between births, regular examinations at the gynaecologist, urologist and VCCT - voluntary confidential counselling and testing for HIV and hepatitis, etc.).

The comprehensive content of the program, its structure (14 one-and-a-half-hour workshops) and mode (interactive, the participants-oriented-learning) accompanied with the reviewed manual (195 pages) and the Dictionary of reproductive health for participants and a manual for conducting workshops by professionals (with detailed description of the objectives of each workshop, methodology of work, schedule, required resources and worksheets), can provide a good basis for the acquisition of knowledge, the establishment of correct attitudes, change regarding prejudices and attaining life skills important for the preservation and improvement of sexual and reproductive health of young people and, most importantly, to enable them to properly use the services of the future healthcare and psychological care, to motivate them for lifelong care of their own general health (especially reproductive) and related needs of its partner(s) and families. Sexuality education consists not only of information, but also of support for the acquisition of skills and competencies and of support for the development of one's own standpoint/attitude towards sexuality. It, thus, helps to enable children and young people to make self-determined, well-informed decisions.

For the third year in a row, the project clearly demonstrated that young people in junior high school period have the emphasized need of acquiring knowledge, attitudes and skills

important for maintaining and improvement of sexual and reproductive health and that, in this respect, trained teachers, psychologists and pedagogues, implementing the pre-evaluated health-education program (which relies on the experience of similar programs of WHO, UNDP and UNICEF), can significantly meet these needs.

The binary logistic regression model of knowledge predictors (in 2015/16 school year) showed that female students are 1.88 times more likely to have better knowledge (score from 16 and above, which is represent the score above arithmetic mean value +1 SD) in the scale from 0 to 23. Those with excellent or very good success in school have more than 2.5 likelihood ratio to achieve limit-score in comparison to those with good and poor success, as well as students who live in cities (OR=1.42) in comparison with those who live in non-urban areas and students who not experienced sexual relationships (OR=1.38) in comparison with those who did. Mother's and father's educational level, socioeconomic status, relationships longer than 3 months, smoking and the use of alcohol did not show statistical significance influence on knowledge in this model.

Today, more than ever, it is important to introduce some form of sexuality education in school curricula of the educational system in Serbia, not later than the age of 16 (preferably much earlier), since the period between the average age in which one engage in sexual relations (16-17 years of age) and the average age when woman gives birth to the first child (28-29 years) and a man becomes a father (>30 years) has never been longer, accompanied with underdeveloped practice of family planning. At the same time, young people have never been exposed to a greater number of unreliable sources of information, false authority and difficult conditions to be realized in partnerships, in terms of full recognition of human rights.

MEN AND FAMILY PLANNING

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Family planning, in its basic meaning, is considered as number of methods and procedures intended to influence on number of pregnancies and timeframe between them. Family planning is a part of entire demographical and population policy of each country and the planet as a whole. In almost every surrounding, objectives of family planning that are usually mentioned are unwanted pregnancy prevention, extensive population growth reduction, health improvement of women, children and population as a whole. According to the definition of the World Health Organization, family planning is not only preventing unplanned pregnancy but also promoting wanted pregnancy.

Men have an important role in family planning. Their role can be direct or indirect.

A direct role involves: the acceptance of contraceptive methods aimed at men and constant care of their own reproductive health, including risk free behavior related to sexually transmitted infections. By taking greater responsibility for their own use of contraception, men can not only can reduce the transmission of HIV and sexually transmitted infections but also lessen the number of unplanned pregnancies. Increased involvement in fatherhood benefits the man's own health and well-being. For example, men who have been recognized in their new position as fathers and experienced emotional support during the pregnancy have better physical and mental health. Men's health is stimulated by the relationships between their different positions as husbands, parents and professional workers. Fathers who are equally active in the domestic sphere and engage themselves in their children also develop less negative health behaviour and have lower associated risks of death and ill health.

Indirect role means support the preservation of reproductive health of women and support in the selection, acceptance and use of specific methods of family planning. Also, men are actively involved in planning the birth of the first child and other children, and the spacing between them. Men, by means of increased involvement in their parenthood and in questions relating to family planning and reproductive health, can contribute to the health of the woman, the child and themselves.

By giving women greater emotional and instrumental support, men can also clearly affect women's attitudes towards pregnancy positively.

During pregnancy and delivery, men can give important psychological and emotional support to the woman. Men's involvement in maternal and child welfare service programmes can reduce maternal and infant mortality. Men's increasing involvement during pregnancy and delivery is related to the possibility of reducing the number of children born with low birth weight. The more the father engages himself during the birth and postnatal period, the stronger is his attachment to the baby. A father with a strong attachment to his baby will also participate more in the child's growing up.

The role of men in family planning in developing countries

In the past it has not paid sufficient attention to the reproductive health of men in developing countries. The reason is a large morbidity and mortality in women due to reproductive problems, as well as physical and social responsibility of women for motherhood. Problems related to the reproductive health of men are most often related to problems during puberty, substance abuse, sexual violence and sexually transmitted diseases.

Men usually are not interested in the reproductive health of their partners. They do not have enough knowledge about sexual and reproductive health. Most men do not participate in

family planning with their partners. Men have a wide margin in the pre-marital and extra-marital sexual relationships, while women it is not allowed. Also there is significant opposition to men (or lack of their support) that their partner use contraception

Reports from Africa and Asia show that the man's participation in maternal and child health programmes can counteract maternal and infant mortality in relation to pregnancy and birth by increasing the possibility of women receiving immediate care in obstetric emergencies. At present, about 95% of all maternal deaths occur in Africa and Asia. Research shows that increasing the involvement and support from the man can also benefit in tackling other significant problems addressed by care services such as preterm birth, low birth weight and fetal harm.

The role of men in family planning in developed countries

The idea of increasing the involvement of prospective fathers in reproductive health is not new and has existed for several decades in many parts of Europe, especially in the countries in the European Union. During the 1960s and 1970s, men were encouraged to take part in parent groups and to participate during labour and to take a more active role in caring for their infants. The primary intention was to give greater support to the pregnant partner before, during and after birth. With this in mind, maternity care services offered fathers instruction and advice that focused primarily on the best way of supporting the pregnant woman. This could, for example, include teaching the man breathing exercises or other relaxation techniques with which he could help the woman. Since this, the purpose of the man's involvement has expanded. Today men are involved not only for the benefit of the health of the mother and child but also for the man's own health and potential to develop an identity as a parent as early as possible.

Involvement by the fathers can affect health outcomes positively for the men themselves, their partners and their children. The maternal and child health care services in Europe still have difficulty in attracting and increasing the involvement of fathers in various programmes. This means that most men get less information and are often less prepared for parenting than women. Maternal and child health programmes have also had particular difficulty in reaching certain groups of parents and fathers, such as immigrant fathers, economically marginalized fathers, fathers with low socioeconomic status and adolescent fathers.

The role of men in family planning in Serbia

Various researches of reproductive health between youth in Serbia have shown that the situation is unsatisfactory. Eighty-four percent of males (adolescents) reported having sexual experience. Research between students of University in Nis has shown that 89% are sexually active students, and 77% use condom. They do not have enough knowledge about contraception, neither about sexually transmitted diseases.

Problem dimensions of sexually transmitted diseases of young people in our country are not completely known because of the inadequate registration of these diseases. However, results of some researches show that huge number of youth has some sexually transmitted infection.

There are not any national programs in our country for family planning and preservation of reproductive health in youth population. Information about family planning was brought in 1998. and it was supposed to partly solve this problem, but it never came to realization. Except youth counseling, which exist in some health centers, recently were opened web sites where youth can get basic information about reproductive health.

In national strategy for youth clause 4.10. read: „Protect and promote health of youth, reduce risks and leading health disorders and develop health protection adjusted to youth“. Within that, one of specific aims is to preserve youth reproductive health, given through clause 4.10.2. „Protect and promote youth reproductive health “. Measures for realization of this aim are following:

4.10.2.1. Promote knowledge, attitudes and behaviour of youth in field of reproductive health, with acceptance and respect of gender diversity;

4.10.2.2. Develop programs of peer educators in work with you in terms of reproductive health;

4.10.2.3. Including contents important for protection of youth reproductive health into curriculums of primary and high schools;

4.10.2.4. Mobilize parents, media, citizens' associations and local communities to affect on public opinion and politics in relation to reproductive health.

Young people in Serbia are not informed about contraception from adequate sources. As a part of school programs in our country an adequate education about sexuality and using of contraception does not exist. They speak rarely about these topics with their parents (1/2 of men), so according to research in Nis, more than half of youth get knowledge about contraception from friends or media. Only one- fourth of students have informed themselves at the doctor, and a little over one-fifth were informed by their parents.

Men and (un)planned pregnancy

The still significantly high numbers of unplanned pregnancies, particularly in eastern Europe and developing countries, shows the importance of increasing men's awareness and responsibility in family planning and reproductive health. All available research in this area shows that male involvement is positive and necessary, as this influences the contraceptive decision-making both directly and indirectly. However, support from a partner is not only important in avoiding unplanned pregnancies but can also have a beneficial effect on the mother's wish to keep an unplanned pregnancy. If the woman could rely on her partner for both emotional and instrumental support this clearly affected whether they wanted pregnancy positively. Women who experience unwanted pregnancies are at greater risk of complicated pregnancy outcomes, and their children are more likely to experience physical or psychological problems in infancy.

Men are often cautious and less ready to have opinions regarding the birth itself, and men were less interested than women in having children and regarded it as a natural consequence of having a relationship.

Men and antenatal care

The main goal of antenatal care is to prevent health problems in both the infant and the mother. The care includes planning for pregnancy and continues into the early neonatal and postpartum period. During pregnancy, prenatal care comprises mainly examinations that focus on the status of the developing fetus and the preparations for a safe delivery. The man has therefore had, historically speaking, a much more withdrawn role in this context.

Maternal and child health services have made efforts to involve men for several decades in many western European countries. A study on fathers in Denmark showed that 80% participate in prenatal preparation courses and preventive health care consultations. In Sweden, the corresponding figure is 90%. In several countries, mainly in Scandinavia, parent groups are offered specifically targeting the expectant fathers. Further, in Sweden the interest among men in participating in parent education has increased significantly during the past 20–30 years. Almost 90% of the men who attend maternal and child health services take part in their parent education. Similar findings are reported in England.

Many men feel themselves marginalized and excluded in their contact with maternal and child health services. An important explanation as to why many men feel left out although they take part in the parent groups is that childbirth or parent education classes most often still tend to mainly focus on women and motherhood and seldom also focus on the men's own concerns and situation. Parent education may target men but only as to how the man can best support the woman. Fatherhood is consequently seen in a new light and has been given a stronger position in the arena that had previously only been afforded to motherhood.

Men who were recognized in their new position as becoming fathers and experienced emotional support during the pregnancy showed better physical and mental health. These men reported fewer problems in the relationship with their partner after birth than those who did not receive this support. During recent years, the Internet has been seen as an important channel in spreading information and advice to people about to become parents. A variety of commercial web sites already address parents, but this knowledge is limited depending on how expectant parents use the Internet for collecting information. The web site was not only used as a source of information but most of the users reported that it also had an important function as social support and an opportunity to identify with others. Single parents and those with low incomes or basic education especially experienced better social support than other people offered by the opportunities for chat rooms on the web sites. Internet can meet an important need of parents because they can receive almost unlimited advice and support from people in a similar situation at any time. Specific discussion forums for men should be introduced to be able to meet this need. This has been attempted in various countries. In the United States, there are numerous web sites for fathers with virtual family life education, a type of parent education that is informative as well as interactive. An interesting exception to made a comparative study of two groups of fathers: one took part in Internet-based parent education and one was only offered participation in the usual maternity and child welfare services group. The Internet group showed a much more positive result than the other group and reported an increase of both competence and self-confidence.

Men's presence during delivery

In accordance with men's increased participation in the parent education offered by maternal and child health services, men's attendance at the birth has also dramatically increased during the past couple of decades, at least in high-income countries (90%-98%). Reports also show increasing participation of fathers at the birth in lower-income countries. For example, in Ukraine, the man's attendance at the birth has increased during the past decade from not much more than 0% to 52%.

Nevertheless, several studies show that the demand on the man to be an active birth coach can also have negative effects. Many men report that they feel stressed by the demands and have doubts as to whether they can really contribute. An important argument for the man's active involvement during labour has been that the man is given an opportunity to develop a relation to the child early.

Fatherhood and positive health outcomes for women

Fathers have an important function in supporting women during both pregnancy and labour. This support included the psychological support for the woman during pregnancy as well as the immediate help in the form of shared responsibility for the child after birth (psychological, emotional and moral support). Lack of social support, especially from the husband or family, has major negative effects on fetal growth.

In much poorer countries, the increase in the man's involvement during pregnancy has also been seen as a possible factor in reducing the number of children with low birth weight. The reason for this is that low birth weight is often caused by insufficient caloric and micronutrient intake during pregnancy, and men often control women's nutritional status as they mediate their access to economic resources.

Family planning in special group of men

Many groups of man have special needs: families with severe social problems, families with children who are functionally impaired, mentally impaired or have chronic illness or mental disorder, immigrants etc.

a) Men who had poor economic conditions

Fathers who live under poor economic conditions participate much less in parent education classes or other forms of activities in maternal and child health care. They read fewer

newspapers and books that contain information about children and parenthood than other parents do. This means that these fathers are often more poorly prepared for the birth of the child than middle-class fathers are.

Financial stress in family life more greatly influences men's behaviour since the responsibility to provide for the family is often so deeply associated with fatherhood. The anxiety, worry or depression that often results from financial difficulty tends to make many fathers more intolerant, authoritarian, punishing or lacking in energy in their parenting.

Class patterns and structures have a huge influence on parenthood in both theory and in practice. For example, the fathers in working-class households often saw fatherhood as creating meaning in their lives and saw the process of becoming a parent as an explicit aspiration to establish something "natural", well known and predictable. Fathers in the middle-class households, on the other hand, considered fatherhood as something new, a reflexive project or an opportunity to develop their identity and to get to know new sides of themselves.

b) Adolescent fathers

The children of teenage parents are more likely to live in poverty, grow up without a father and be involved in crimes and drugs, etc. The most adolescent fathers tend to come from low socioeconomic backgrounds and have less education and fewer employment opportunities than their childless peers. They also tend to experience greater mental and emotional difficulty and more often have a history of delinquent behaviour than other parents. The relationship between the teenage parents is also at a greater risk of breaking down over time, with the consequence that many young fathers lose contact with their children.

But even if the adolescent fathers in this perspective comprise a vulnerable group needing various forms of support, many young fathers report that they had received virtually no professional support for their parenting, especially not from the maternal and child health care services. In some studies, the fathers even claim that the service providers are not only unsupportive but directly obstruct them in taking care of their children. The lack of support from society leads to the young fathers looking for help elsewhere, often from within the family. The greatest support comes from grandparents, especially grandmothers, who constitute an important source of help for young men.

The support of adolescent partner, whether the biological father or a current partner, may be correlated with improving the mother's mental well-being as well as better developmental outcomes for the baby. Fathers' involvement also positively influenced maternal sufficiency, maternal interaction with the infant and early language development.

c) Men who are immigrants

Many immigrants lack health awareness because of language barriers or bureaucracy and often have no or reduced access to health-related information or services. Participation at parent education programmes is not only lower among fathers in general but particularly among fathers with lower socioeconomic status than middle class and among fathers born abroad. There is language difficulty and the problem in the meeting of different cultures. Non-native parents experienced greater financial stress and received weaker emotional and practical support than other groups of parents.

The men had no contact with maternal and child health services before or after the birth. Nevertheless, almost all these men, with the help of a midwife and others, had participated in the birth itself and described it as a very positive experience. The men said that, apart from the increase in involvement, it had helped give them greater understanding and respect for the woman.

However, generally speaking men's discussions about parenthood were of mostly negative experiences. Most emphasized, for example, the difficulty in establishing effective parenthood that meets the expectations of both oneself as well as of others. Some even said

they “regretted” having children, relating difficulty to economic and social segregation (poverty, unemployment, living in highly segregated areas, overcrowding, limited social network, shame, isolation and inadequacy).

The promotion of family planning for men

In 1994, the International Conference on Population and Development established the importance of involving men in the challenge of improving sexual and reproductive health. Above all, the Conference emphasized developing efforts that would increase men’s involvement in parenting and measures that could lead to men taking greater responsibility for their sexual and reproductive behaviour – including family planning and maternal and child health (responsible parenthood, sexual and reproductive behavior, including family planning, prevention of unwanted and high-risk pregnancies, contribution and grant of family income, education, nutrition and health of children, equal evaluation of children of both sexes). The background to this was a growing realization that men’s attitudes, knowledge and ways of reacting influenced not only their own but also women’s reproductive health.

WHO reviewed 59 evaluation studies of programmes working to engage men and boys in health interventions in the areas of SRH, HIV/AIDS prevention, gender based violence, fatherhood and maternal, child and neonatal health. Well-designed programmes with men and boys show compelling evidence of leading to behaviour and attitude change. Men and boys can and do change attitudes and behaviours related to SRH behaviour, maternal and child health, their interaction with their children, their use of violence against women, questioning violence with other men, and their health-seeking behaviour.

For greater involvement of men in addressing reproductive health problems it is necessary to:

- motivate men over sporting events, print and electronic media,
- organize seminars and Worksops,
- nclude leaders from the community (men) to promote reproductive health,
- organize group sessions with men and their female partners,
- formulate a national policy on the role of men in reproductive health,
- increase the rights of women to participate in decisions related to reproductive health,
- all the information and help men should receive not only the services, but also at home, in the workplace and community.

Services for the reproductive health for young people should focus on the needs of men, with particular attention to sexual education, socio-cultural orientation and reproductive health.

They should provide:

- promotion of condom use,
- improving communication skills for better cooperation among partners regarding the issues of reproductive health,
- education and information on reproductive health,
- organization of conferences, in particular for men, as well as for couples,
- promotion of healthy lifestyles reproductive behavior in order to prevent risky sexual behavior and sexually transmitted infections,
- development programs whose target groups are men and their implementation at the point where they dominate,
- educational programs in the mass media.

Conclusion

Education and awareness of men should enable: health, educational and social institutions. Governments of countries should allow: gender equality in the area of reproductive health and increase recourses for development of services for the education of men about family planning and the promotion of reproductive health of men, to regulate the obligation and responsibility of men in reproductive health and governments need to financially support

parenthood. Parents and schools have a role in education and the formation of correct attitudes on gender equality and they should develop understanding and responsibility in all aspects of secure and harmonious family life.

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ORAL PRESENTATIONS**1. IMPORTANCE OF HEALTH EDUCATION IN THE PREVENTION OF SUBSTANCE USE AMONG STUDENTS OF SECONDARY SCHOOLS IN REPUBLIC OF SRPSKA**Radulović Danijela ¹, Radulović O ²¹ Faculty of Medicine Foča, University of East Sarajevo, Republic of Srpska² Faculty of Medicine of University in Niš, Serbia

Objective: The aim of this study was to compare the results of the use of tobacco, alcohol and drugs among high school students in the Republic of Srpska in 2011 and 2013 and to present the role of health education in reducing their use.

Method: Data on the use of psychoactive substances among high school students in the Republic of Srpska in 2011 and 2013, published by the Institute of Public Health Banjaluka, are used for this study.

Results: In 2008 in the Republic of Srpska 18.2% of young people smoked, whereas in 2011 this percentage was lower and amounted to 14.5%. Also, the trend of consuming alcohol on a monthly basis was slightly decreasing. In the month preceding the survey in 2008, 52.8% of young people drank alcohol, whereas in 2011 this percentage was lower and amounted to 47.2%. In 2008 2.5% of young people used the inhalattes and 4.0% sedatives, whereas in 2011 this percentage was higher for inhalattes (5.3%) and sedatives (4.2%).

Conclusion: Taking into account the trend of slight decrease in the use of tobacco and alcohol, and the trend of increase in drug use, intense and continuous health education on the harmful effects of using psychoactive substances is necessary.

Key words: tobacco, alcohol, drugs, young people, health education

2. SUICIDES IN BELGRADE IN THE PERIOD 2006 - 2015

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Introduction: Suicides fall in violent deaths and more recently have shown an increasing trend in developed and developing countries. This is a major public health problem that must be prevented.

Method: An analysis of death certificates shows an insight into the causes of death of inhabitants of Belgrade. The paper presents data from the Database of deceased persons for the period 2006- 2015 using appropriate statistical tests.

Discussion: In Belgrade, from 2006 to 2015 were recorded 1.511 suicides. The standardized suicide rate was the highest in 2009 (12/100000). Men often committe suicides at all observed years, and the rates are usually higher as in women. The largest number of suicides occur in June and October in almost every observed year. The average age of men who committed suicide was 56.5 years and women 57.5 years. The most common method of carrying out the suicide was "... by hanging, strangulation and suffocation" (X70 according to ICD-10) and 43.4%.

Conclusion: The number of suicides among the residents of Belgrade shows the trend of growth in the period. Preventing suicides is a new challenge for public health and all public sectors have to be involved in prevention.

Key words: certificate of death, suicide, mortality

3. CHALLENGES IN CHILD INJURY PREVENTION

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Introduction: Injuries are a significant cause of mortality and morbidity in children. In the world, every year, about 830 000 deaths of children under the age of 18 years are caused by injuries. In addition, tens of millions of children each year suffers injuries that are not deadly, but serious enough to require hospitalization, and sometimes can lead to disability. Most unintentional injuries are the result of traffic accidents, drowning, burns, falls and poisoning.

Objectives: Defining the most important challenges of child injury prevention.

Materials and methods: Descriptive statistical analysis, using health statistics data.

Results: In Belgrade, the number of registered injuries in preschool children in the period 2005-2014. tends to increase while the number of children who have had the injuries that required hospital treatment tends to decrease. In children of school age, injury rates have markedly upward trend, and the rate of hospitalization because of injuries slowly increased in the period 2005-2014. In the structure of all deaths of children in the past 10 years injuries are the most common cause.

Conclusion: Injuries in children represent a serious public health problem. Multi-sectoral and comprehensive approach to injury prevention with a combination of strategies to reduce the risk of new injuries, reduce the severity of injuries that occur and reduce the frequency and severity of disability caused by injuries is necessary.

Key words: injuries, children, prevention, intervention.

4. PEER VIOLENCE IN SCHOOLS - VIOLENCE OR STYLE OF COMMUNICATION?

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Objective: Consider the presence of bullying in 11 secondary schools of North Backa Region.

Design: Conducted a survey on bullying in early 2016. The survey instrument was anonymous questionnaire with 11 questions. A sample of high school students is 489.

Results: 45% of teenagers were victims of violence at school “during their schooling”, and 13% “during this school year”. Bullying was most often in the classroom (58.1%). More than 55% of teenagers witnessed violence at school “during this school year”. Usually were “ridicule and disdain” (71.8%), followed by “gossiping and spreading lies about someone” (54.4%) and “sending disturbing and offensive content on the internet/mobile phone” (15.3%). The largest number of teenagers believe that violence “doesn’t concern and doesn’t need to respond” (38%). Only 8% of teenagers reported violence “during this school year”.

Conclusions: The research suggests that the different forms of aggressive behavior are present high among teenagers. Worrying the increase in aggression and violence as a model for solving problems among teenagers, high tolerance to such forms of behavior and the absence of a real reaction. There is a need to conduct comprehensive violence prevention programs in all schools of North Backa Region and the program for the acquisition of communication skills of pupils and staff in schools.

Key words: peer violence, bullying, aggression, teenager

5. DOMESTIC VIOLENCE AGAINST WOMEN IN THE PROVINCE OF VOJVODINA

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Objectives: Domestic violence against women is a serious public health problem that has consequences not only on the health of a woman, but also on her children. The aim of this study was to estimate the presence of domestic violence against women and association with sociodemographic determinants in the Province of Vojvodina.

Materials and methods: The study was conducted as a cross-sectional study on a sample of 1.642 women aged 20 to 75 years, as a part of the National Health Survey Serbia, 2013.

Results: In Vojvodina in the last 12 months 5.4% (N=89) of women were exposed to domestic violence. The most exposed to violence were women who assessed their financial condition as poor (6.9%; $\chi^2=7.567$; $p < 0.023$), divorced women or women whose common-law marriage ended the split (10.7%, $\chi^2=9.934$; $p < 0.019$), as well as women who did not have social support (7.5% $\chi^2=8.620$; $p < 0.003$). Differences in the prevalence of domestic violence in relation to age, education level, employment status and type of settlement were not significant.

Conclusion: The results indicate the situation of domestic violence against women and the necessity of introducing new standards for recognizing and recording in daily practice of medical, government institutions and non-governmental organizations.

Key words: domestic violence, women, sociodemographic determinants

6. DIETARY HABITS OF HIGH SCHOOL POPULATION OF ZLATIBOR COUNTYProšić Violeta ¹, Stevanović V ¹, Filipović M ¹¹ Institute of Public Health Užice, Serbia

Introduction: Monitoring the eating habits in adolescents can serve as a prognostic factor to recommend preventative measures to reduce the occurrence of diseases due to eating disorders.

The objective: Questioning life habits and awareness of the adolescents about proper diet and the importance of physical activities, as healthy lifestyles, depending on age and gender; such as evaluating the need for health education improvement in schools.

Methods: Questionnaire based survey which covered a total of 478 high school students in Užice and Arilje. Descriptive statistics based data analysis, chi-square test used to define statistical significance.

Results: There is a statistically significant difference in the awareness and knowledge of the principles of proper nutrition in boys than in girls and this differs more by increase in age. It was noted that the increased intake of white bread, spread with a high percentage of milk fat, as well as snacks, sweets and soft drinks, and most do not have the recommended number of daily servings.

Conclusion: It is necessary to improve and intensify informing the youth in the field of proper nutrition and promote physical activity and healthy lifestyles.

Key words: habits, diet, high school, Zlatibor district

7. FACTORS ASSOCIATED WITH OBESITY IN SEVEN TO FOURTEEN- YEAR- OLD CHILDREN IN BELGRADE

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Objectives: Childhood obesity is reaching alarming proportions in many countries and studies are important to identify predictive factors. The aim of this study is to verify the prevalence and associated factors of obesity in samples of school children, in Belgrade, with emphasis on the differences between 2006 and 2013 year.

Methods: This is a cross-sectional study based on the data of the 2006 and 2013 National Health Surveys of the Population of Serbia. This study analyzes the characteristics of the total of 553 (265 in 2006 and 288 in 2013) seven to fourteen- year-old children that are classified as obese. Descriptive analysis, Chi squared test and logistic regression are carried out.

Results: In 2006 8,3% school children were obese and in 2013 14,3%. In 2006, boys, children aged 7-10 and children who lived in households of lower material status were more likely to be obese. In 2013, children aged 7-10 and those who lived in suburban areas were more likely to be obese.

Conclusion: This study has identified the social and demographic factors (male sex, earlier age, lower material status and suburban areas) that are associated with obesity among school children in Belgrade. This information is useful for the planning of public health actions to combat childhood obesity.

Key words: obesity, children, socio-demographic factors

8. ADULT SMOKING OPINIONS, ATTITUDES AND HABITS IN SOUTH BANATPerović Aleksandra ¹, Krstić J ¹, Nikolovski D ¹, Stojanović Pavlović J ¹, Lazić Lj ¹¹ The Institute of Public Health Pančevo, Serbia

Objectives: to examine the opinions, attitudes and habits of the adult population about smoking.

Materials and methods: There were surveyed 247 people in Pancevo, Plandište, Bela Crkva and Kovin. The questionnaire was unstandardized, with 19 questions.

Results: The majority were highly educated (57.1%). Women and men differed not statistically by smoking status. Never smoked 35%, 19.5% were former smokers, 12.6% smoke occasionally and 32.9% smoke daily. In their home 40.1% were exposed to tobacco smoke, in someone else's house a little more 46.2%, in places where they go out 47% and at work 15%. Slightly more than a quarter of respondents did not want to quit smoking, and those who want to do it, 63.4% of them would do it due to health. 67% would not seek professional help to quit smoking habit, nor do they know where ask for help (43.7%). Those 23% who needs help prefer to do it in manner of conversation and exercises. 59.1% of respondents believe that the law prohibiting the sale of tobacco to children is not fully implemented.

Conclusion: It is necessary to strengthen the smoking prevention and to inform citizens about health services for smoking cessation.

Key words: smoking, health promotion

9. SHARED LEARNING IN ACTION” AS A MODEL OF COMMUNITY ENROLMENT IN PREVENTION PROGRAM ON DRUG ABUSE IN ELEMENTARY SCHOOLS

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Objectives: Review of the educational approach “Shared learning in action” in prevention of drug abuse.

Materials and methods: Retrospective analysis of continuous monitoring and achievements of the program “Creative workshop with schoolchildren on prevention of drug abuse”.

Results: “Shared learning in action” changes traditional school roles, transforming teachers into facilitators of the activities and allowing full expression of children’s ideas, thus enhancing development of their emotional intelligence. Children’s research teamwork mobilizes an extensive list of supporters -health professionals, police, psychologists, teachers, parents, older students, media, in aim to collect relevant information which are being shaped into a variety of creative products with strong messages – songs, poems, posters, comics, brochures, leaflets, short plays, video clips.

Since 2010, 350 teachers and 5000 children in 100 Belgrade’s elementary schools were included. Evaluation has shown children’s knowledge upturn for 48%, concurrently with improvement of their self-confidence, teamwork, mutual respect, research and creative capacities. This program was acknowledged as a good practice model by the Institute for improvement of education.

Conclusion: “Shared learning in action” shows that high grade of children autonomy, complementary with enrolment of wide community network support, can make the learning process very successful.

Key words: schoolchildren, drugs, prevention, community support

10. INVESTIGATION OF HEALTH WORKERS NEEDS FOR PROMOTION OF WORKPLACE NUTRITION

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Objectives: to examine the association of obesity risk factors and health workers need to promote workplace nutrition.

Materials and methods: investigation was held in Pancevo in 2016 and was attended by 88 health workers. The unstandardized questionnaire on risk factors, attitudes and habits of the 20 questions was used and the respondents self-filled it.

Results: 36.4% of respondents were smokers, overweight 42.2%, with a highly statistically significantly men overweight, 46.6% believed that the meal consumed on the job is not appropriate for their health status, 55,7% prepare the meal for a job, 75.0% believe that the food market supply in their environment is not in accordance with the recommendations for proper nutrition, they are sitting 5h in front of screens (TV, computer, mobile phone, tablet), and 2h using social networks. The greatest recognized need (69.3%) for nutrition promotion was physical activity. Stress was a significant predictor for the occurrence of the need for improved nutrition.

Conclusion: It is necessary to involve health professionals in the program of physical activity and to improve their skills for stress prevention.

Key words: health workers, promotion of workplace nutrition



11. PARTICIPATION OF STUDENT ORGANIZATIONS IN HEALTH PROMOTION PROGRAMS

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12. COMMUNICATIONS AS A CAUSE OF CONFLICT

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Introduction: Good communication is the basic condition that must be met if we want to keep or build good relationships. People are social creatures, they need to communicate, they need other people to exchange courtesy, emotions, important informations or something else. Disagreement between two or more persons who want to achieve their own interest, need or goal leads to the formation of conflict. The conflict should be resolved as soon as it appears. Troubleshooting should not be delayed. If we delay problem solving, the situation gets worse and possible solution becomes more complicated.

Method: Method of work is the evaluation the existing scientific researches which displays, very often, bad business and everyday communication as a main cause of conflicts appearing.

Goal: Goal of this work is to show the importance of communication and point out the fact that good communication efficiently solves problems and, on the other side, bad communication becomes the cause of conflicts appearing.

Results: Each message consists of the verbal part (what we say?), the tone of voice (how we say something?) and nonverbal part (body language). The researches show that in 7% of cases we use words, in 38% we use the tone of our voice to communicate and in 55% we use nonverbal signs such as body language, facial expression, gestures, movements etc. It is very important to us to harmonize these three elements.

Conclusion: Honest conversation without blaming each other will contribute to solving the problem. This conversation is called „giraffe language“. Giraffe has the largest heart among all mammals, giraffe is the tallest enabling her to perceive the situation from a totally different perspective. This mammal has no natural enemies, does not threaten other animals and has perfect communication with other animals.

Key words: communication, problem, conflict.

13. TOBACCO USE AMONG FEMALE POPULATION IN THE CITY OF ZAJECARVojnović Marina ¹, Živković A ¹, Točević A ¹¹ Institute of Public Health „Timok“, Zaječar, Serbia

Introduction: Almost a billion men and a quarter billion women in the world are smokers. In Serbia, the prevalence of tobacco use is among the highest in Europe.

As before, through numerous studies, a higher percentage of smokers was detected in men (32,6%) than in women (26%) during 2013 in a research conducted on the territory of Serbia. The goal of this study is to show the prevalence of tobacco use among women, as well as their attitudes and opinions about the bad effects of tobacco and tobacco smoke on health.

Method: Anonymous questionnaire was used which focused on examining the smoking habits from the perspective of socio-economic, medical and demographic characteristics of respondents.

The survey was conducted in the city of Zaječar in the beginning of 2015. Number of subjects older than 19 was 190, of which 100 were female and 90 were male.

Results: Survey results indicate a very large percentage of women who were smokers once in their lifetime (73%), and also a high percentage (40%) of current daily smokers in the female population. Most of the respondents in the female population smokes anywhere from 11 to 20 cigarettes a day, a worrisome result is that over half of women (54%) are not sure if they ever want to quit smoking.

Conclusion: The negative impact of tobacco smoke and therefore the use of tobacco is reflected in deterioration of health, especially in the most vulnerable population groups such as women and children.

Keywords: tobacco, women, smokers

POSTER PRESENTATIONS**1. BREAST CANCER MORTALITY RATE FOR THE TERRITORY OF PIROT MUNICIPALITY BETWEEN YEAR 1999 TO 2012**Ćirić Pejčić Slavica¹, Radulović O², Bulatović K²¹ General Hospital Pirot, Serbia² Public Health Institute Niš, Serbia

Introduction Breast cancer is by far the most common cancer among woman (20% of all cancers). With 1.6 million newly diagnosed per year in the world it is the second most widespread cancer when both sexes are considered.

Work aim: The observation of mortality rate caused by breast cancer in the Pirot municipality and suggestions for prevention of breast cancer as relevant social-medical issue.

The method: Application of descriptive-epidemiologist studies of breast cancer for the female population in Pirot municipality for period between 1999. to 2012.

Analysing: The mortality from breast cancer considering regions and the age of group samples for chosen time period.

The results of the work and discussion: In Pirot region the rate of mortality from breast cancer is showing a slight growth from 1999. (36,7) to 2012. (39,7/100.000). The average growth rate for breast cancer mortality rate in the Pirot municipality for observed time period is 34,3/100.000 and it is slightly lower than average mortality rate for central Serbia which was 43,4/1000.000 in the year 2012. The other municipalities in the Pirot region similarly have slightly lower mortality rate comparing to Central Serbia: Dimitrovgrad municipality (40,76/100.000), Pirot municipality (36,5/100.00), Babusnica municipality (28,67/100.000), Bela Palanka municipality (29,9/100.000). The average specific-increase in mortality from breast cancer in regions of Pirot municipality shows that the risk of dying from breast cancer is closely link with the aging factor: the highest percent of woman dying in the age over 50 years old is documented in the Pirot municipaltety (88,9%), followed by Dimitrovgrad municipality (78,6%), Babusnica municipality (78,3%), with the lowest mortality rate being registered in Bela Palanka (72,6%). The highest percent of woman dying under the age of 50 years old is in the municipality of Bela Palanka (13%), followed by Pirot municipality (10,6%), then Babusnica municipality (7,4%) and lastly Dimitrovgrad municipality (7%).

The conclusion: It is necessary to apply prevention measures together with early detection of the illness, as well as the reduction of risk factors and the application of protection measures. It is worth considering the further research into lower age groups in the future.

2. PSYCHOLOGY AND HEALTH PROMOTION: PREVAILING AND CRITICAL APPROACHES

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Objectives: On the basis of critical consideration the current psychological literature on health promotion issues, the paper focuses on the theoretical and practical approaches developed within contemporary health psychology. In this research endeavor, the main objectives of the paper are threefold: (1) to provide a concise overview of the key psychological developments within the areas of health promotion and healthcare; (2) to make a clear conceptual difference between *prevailing* („mainstream“) and recent *critical* psychological approaches to health-related behaviours and health promotion; and (3) to suggest that current models of health promotion relied on by the most health psychologists have focused very narrowly on the relationships between some cognitive processes and individual health behaviour change as the central point in making and implementing a plan of health promotion activities.

Conclusion: Prevailing psychological approaches have based on the key assumption that perceptions, thoughts, beliefs, images and knowledge held by individuals concerning their health may contribute significantly to the performance or non-performance of health-related behaviours. However, recent more critical approaches have led to the development of *alternative* conceptions of health behaviours and a questioning of the role played by psychology – in particular, contemporary health psychology – in health promotion and health improvement. One of the central critical remarks of these newer approaches is that mainstream theoretical models within health psychology provide an image of human beings that is overly rational, ignoring the full complexity of health-related behaviours and the fact that they are often motivated by unconscious forces and emotions.

Key words: health promotion, health improvement, health behaviour, approaches to health promotion, health psychology.



TEN YEARS OF EXISTENCE THE CENTER FOR PREVENTIVE HEALTH SERVICES AT HEALTH CENTER NIŠ

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Health Center Niš

The leading causes of death in Serbia are chronic non-infectious diseases. The risk of these diseases can be reduced or eliminated by applying certain preventive health and health promotion activities. In the Health Niš in May 2006 has been opened the Center for Preventive Health Services. The aim is to demonstrate the importance of preventive work, team and multidisciplinary cooperation in working towards the elimination of risk factors for chronic non-infectious diseases. Results arm: Center for Preventive Health Services performed: Checking blood sugar levels, blood pressure check, determining the percentage of fat mass in the body, BMI with advice on proper nutrition and healthy lifestyles. Screening examinations for breast cancer, cervical and colon cancer, diabetes, depression, cardiovascular disease. Recruitment of participants counseling for smoking cessation, education of women for breast self-examination with the possibility of scheduling mammograms for women over 50 years. Women aged 25-65 years enabled to Pap test. In this period the following activities were carried out: 33 bazaar Health, 135 action "Open Doors" 203 campaign "Let us approach the patients" 945 actions in organizations, about 45,000 people used the Centre's services, provided over 125,000 services ... Conclusion: The significance of preventive work, not only in the prevention of diseases such as HNO, but also in the prevention of disability and premature mortality, reduces health care costs and above all to increase the quality and length of life of our customers.

Key words: prevention, screening, risk factors



SESSION: SEXUAL AND REPRODUCTIVE HEALTH OF YOUTH

INVITED LECTURES

SEXUALLY RESPONSIBLE BEHAVIOR AND SEXUAL EDUCATION OF ADOLESCENTS IN CROATIA - PREVIOUS EXPERIENCE

Lepušić Dubravko

University Hospital Medical Center “Sestre Milosrdnice”

Introduction: HPV is one of the most frequent sexually transmitted diseases in the world, and according to some authors can be found in over 75% of sexually active women. Sexually active adolescents face serious health risks associated with unprotected sexual intercourse including HPV and other sexually transmitted diseases as well as unwanted pregnancy. Behaviours particularly relevant to HPV transmission are: early age of sexual debut, poor contraceptive/condom use, multiple sexual partners, certain sexual practices and the use of substances such as alcohol and drugs. Adolescents may not have sufficient cognitive skills to foresee risks in sexual relationships and this may be compounded by unrealistic perceptions of themselves as relatively invulnerable. Several studies of the etiology of cervical carcinoma suggest that the disease is practically unknown in virgins or persons abstaining from sex. It is pretty rare in some ethnic groups and rather common in women with an early and turbulent onset of sex life with multiple partners.

Materials & Methods: Taking epidemiological anamnesis and educational program for adolescents

Results: We want to do something for that young population for education of Human Papillomavirus and sexual responsible behaviour, so we organized multimedia presentations. Name of the project „Knowledge is pleasure“. Adolescents joined project active, by making their own web sites, scene performances, poems, posters, lectures... all with sexual responsible behaviour themes. Lectures were short (each 20–30 min) accompanied with discussion. Lecture was given in the form of Power Point presentation. By organizing multimedia presentations the interest of that population to attend would be greater. Questions they made after the lecture were those usual for that age. They asked about the way of contracting HPV and other STD-s, medical treatment of partners and use of contraceptives and also about vaccina.

Conclusions: The most effective prevention of sexually transmitted diseases is a stable, harmonious relationship, with a faithful partner. A necessary condition prior to the onset of sexual intercourse is a physical and mental maturity of both partners. For systematic prevention of sexually transmitted infections diseases in this moment it is necessary: introduce an effective sexual education in schools starting from primary school, develop interdisciplinary cooperation between social and medical sciences, including all experts. Still the best and most important education comes from a healthy family as the core of our society.

INTERNET USE BY ADOLESCENTS RELATED TO SEXUAL AND REPRODUCTIVE HEALTHŠagrić Čedomir¹, Radulović O.^{1,2}, Marković R.^{1,2}, Šagrić M.³, Stefanović A.¹, Stojanović S.¹ Public Health Institute Niš, Serbia² Faculty of Medicine of University in Niš, Serbia³ Students Polyclinic, Niš, Serbia

The adolescent population includes young people between ages 10 and 19 years old and represents wide range of young population. Biological processes in adolescence as well as adolescent socialization are suitable areas where social determinants can have positive and negative effect on health of young person. Sexuality is very important aspect of adolescent's life as well as sexual and reproductive health. Sexuality can be expressed in a variety of ways, including feelings, behaviours, attitudes and values, which correlate closely with sexual desire and identity, the state of being male, female and sexual human being. Sexual health is the state of a physical, emotional, mental and social well-being in relation to sexuality; it is not merely the absence of disease, dysfunction or infirmity. Reproductive health is the state of a physical, emotional, mental and social well-being addresses the reproductive process at all stages of life. During the adolescence most of the people become sexual active. The ages consent for sexual activity is being moved to younger adolescents and it causes many reproductive and general health problems. Rates of adolescents' use of contraceptives and condoms remain low and unprotected sex is major risk factor according to analysis of transmitted diseases that group of people. In the world, every year, it is noticed that there are 100 millions cases of sexual transmitted infections among young people as well as 2.5 millions abortions among female adolescents. Young people in Serbia and all around the world are not aware of essential safe and responsible sexual behavior. The way of health services performing has a crucial influence over sexual and reproductive health in order to meet their health educational needs and health education work that is suitable to that special population. The choice of appropriate methods resources and contents of Health Education work can provide satisfying sexual and reproductive health in the future. Modern media, especially the Internet, are used by health experts, health services and other members in order to promote adolescents' sexual and reproductive health. Furthermore, it can give positive results. According to that adolescents confirm that the Internet is an essential part of Health Education processes. However, a lot of adolescents think that it will be very useful to have the Internet Health Services (65, 26%). On the other hand, in the existing practice, only 6 % of adolescents use the Internet for getting information or having knowledge about keeping their sexual and reproductive health. Finally, establishing a partnership with adolescents and the increasing use of the Internet provide them an immense area of Health Education and Interventions on the Internet in order to protect adolescents' sexual and reproductive health.

Key words: adolescents, sexuality, sexual health, reproductive health, Internet.

ORAL PRESENTATIONS**1.HEALTH EDUCATION ON REPRODUCTIVE HEALTH OF ADOLESCENTS IN PRIMARY HEALTH CARE CENTER NOVI SAD 2013-2015**Zarić Dragana ¹, Nićiforović Šurković O ²¹ Primary Health Care Center „Novi Sad“, Serbia² Institute of Public Health of Vojvodina, Serbia

Objectives: The objective of this paper is to present health education activities, methods and topics in the field of reproductive health, tailor made for specific adolescents' age groups.

Materials and methods: Retrospective study; evaluation of reports for the period of 2013-2015.

Results: Promotion of reproductive health of adolescents is one of the activities in Youth counseling service in Primary Health Care Center “Novi Sad”. During the period of 2013-2015, 66.6% of elementary and 81.3% of secondary schools were involved. Total of 500 lectures and workshops including 9.323 elementary and secondary school students was performed. Number of participating students showed trend of increase between years 2013 and 2014, with stagnation in 2015. Curriculum for elementary school students includes topics such as puberty (for 4th grade students), reproductive health of adolescents and prevention of HIV infection for final graders. For secondary school students following topics were explored through lectures and workshops: contraception, prevention of STDs and prevention of breast cancer.

Raising awareness campaigns were also performed, involving elementary secondary school students.

Conclusion: Evaluation of reports showed that schools' coverage was satisfactory. Educational curricula were adjusted to specific age groups of adolescents. This model proved to be highly accepted by local school authorities.

Key words: health education, adolescents, reproductive health

2.THE ROLE AND IMPORTANCE OF HEALTH EDUCATION OF YOUTH ABOUT REPRODUCTIVE HEALTH

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Introduction: Researches that have been conducted among youth in our country and around the world indicate that the bottom limit for having sex is getting lower and that the knowledge of youth about reproductive health is not at a high level. Youth are entitled to a satisfying and safe sex life, ability to reproduce and freely decide about reproduction. Work goal is to point out the role of education system in health education of youth that should give them knowledge of reproductive health and ways of preserving it, and, also, develop conscience about active participation in decisions related to reproductive health. Based on these methods, possibilities for further development and promotion of knowledge of youth about reproductive health have been analyzed.

Material and Methods: During the analysis we used results of researches conducted among 200 students of high schools during school year of 2015/2016, along with results of research from project 'Health Education About Reproductive Health'.

Results: Results that we got from researches prove that youth has basic knowledge about reproductive health, but that developing conscience about personal responsibility for reproductive health.

Conclusion: By common action between education and health system with additional support of local community for organising educational workshops and presentations about reproductive health can preserve reproductive health of youth.

Key words: reproductive health, sexually transmitted diseases, youth

POSTER PRESENTATIONS**1. SEXUAL BEHAVIOUR OF THE YOUTH IN THE PROVINCE OF VOJVODINA**Tomašević Tanja ¹, Mijatović Jovanović V ^{1,2}, Ukropina S ^{1,2}, Šušnjević S ^{1,2}, Milijašević D¹¹ Public Health Institute of Vojvodina, Novi Sad, Serbia² Faculty of Medicine of University in Novi Sad, Serbia

Objectives: Risky sexual behavior is contemporary a threat to the health of the youth. The objective was to investigate the behavior of the youth in the Province of Vojvodina in relation to reproductive health.

Materials and methods: As part of the National Population Health Survey in Republic of Serbia in 2013, 486 youth aged 15-26 years were examined.

Results: Among the youth 68.2% had sexual intercourse, the largest number at the age of 18 (22.8%) and 17 (21.2%). Average age for first sexual intercourse is 16.8 years for boys (SD=1.8; MIN=10; MAX=24) and 17.8 years for girls (SD=1.7; MIN=12; MAX=25), which is significantly earlier for boys ($t=4.185$; $p<0.0001$). Boys had significantly more partners than girls ($\chi^2=46,799$; $p<0.0001$). Among sexually active, 57.7% used condoms, significantly less those aged 24-26 compared to younger ($\chi^2=15.626$; $p=0.001$). Over 2/5 (42.4%) do not know where they can be tested for HIV among which there were significantly more those who are younger and with lower education. Among girls 40% have never visited a gynecologist, including 46.3% at the age 18-20.

Conclusion: Monitoring the factors that are associated with risky sexual behavior is essential for developing effective strategies to preserve the reproductive health of the youth.

Key word: Sexual Behaviour, Reproductive Health, Contraception, Youth

2. CHARACTERISTICS OF REPRODUCTIVE HEALTH OF YOUTH IN SERBIA

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Background/Aim. The increase in sexual activity among young people is one of the hallmarks of contemporary society which manifested of growing proportion of young people who are sexually active in early adolescent period of life. Reproductive health of young people is particularly vulnerable because of the unfinished process of their physical and psychosocial maturation. The aim of this paper is to assess the vulnerability of the reproductive health among young people in Serbia.

Methods. The paper is based on data from a national health survey of the population of Serbia in 2013. (no data for Kosovo and Metohija). For the purposes of this study, the data on households and population age 15 and over were used, so that the final sample for analysis entered 1722 adolescents (15 to 24 years of age). Statistical tests that we used: χ^2 test was applied to test the difference in the frequency of categorical variables). All results with the probability that is equal to, or less than 5% ($p \leq 0,05$) were considered statistically significant.

Results. There was 52,3% of sexually active youth among the respondents. Most of them (16,6%) declared that they had a sex for the first time at the age of 17. Sexual relations with a same gender had a 2,4% of respondents. The male condom is the most common type of protection from pregnancy (27,6%). This kind of protectiones are used less than half of respondents (48,5%) during the last sexual contact. The most of respondents (87,8%) were informed about existence of HIV infection. Although 50,3% of youth knew HIV counseling places but only 5,1% of them verify HIV status.

Conclusion. Our results show that the reproductive health of youth in Serbia is threatened to a significant degree. Information and education about reproductive health is essential to prevent many unintended consequences of ignorance and risky behavior.

Key words: reproductive health, youth, Serbia

3. REPRODUCTIVE HEALTH PROMOTION IN YOUNG MALE POPULATION

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Introduction. In 1995, the United Nations adopted the Declaration which postulated that the population of both sexes is able to have a healthy reproductive life and to be able to independently decide about the number and time of births. The United Nations' Millennium Declaration from 2014 put the collective responsibility in front of numerous countries, ours as well, to promote human rights among which it emphasizes the mechanisms for operationalization, monitoring, strategies and interventions in the field of reproductive health. As opposed to the previous 40 years when the activities planned to improve reproduction health mainly referred to development of new contraceptive possibilities and family planning services, in the new millennia we develop pro-fertility initiatives based on the counseling work with the young which is to a greater degree directed to male sex in as much as men bring the greater share of 'guilt' in partner infertility. By opening the Assisted Reproduction Department in Gynecological-Obstetric Clinic in Nis, more favorable conditions are obtained for scientific research and counseling work not only with female but also with male population.

The aim of the paper. The paper has the aim to determine to which degree is young male population responsible for infertility considering the parameters of their sperm gram.

Methodology. The total of 659 examinees was divided into three age categories: up to age of 30, 31-40 and 41 and older, whereat mutual comparison of indicators of the infertility level is done by applying the corresponding statistical parameters.

Results. In relation to the sperm volume, one in ten young examinees does not fulfill the criteria of WHO (<2ml). According to the spermatozooids concentration, 15.6% from the youngest category of examinees do not have the assigned results (<20x10⁶ml). The young have by far the greatest share of alive spermatozooids (96.5% while the rate is >50%). Considering active motility (the rate is ≥50%), 131 or 75.7% from the category of up to 30 years show positive difference which is statistically proven by the value of χ^2 test on the level $p < 0.05$ ($X^2(2, N=659)=7.67, p=0.22$). Finally, 2/3 of the young have normal forms of spermatozooids.

Conclusion. Although the youngest examinees showed the best results, it would be of particular significance to enable, besides sperm gram analysis, following and evaluation of the risks for clients as well, such as lifestyle factors (BMI, alcohol consuming, smoking, physical activity, exposure to stress and unfavorable conditions of work and environment). By the full scale monitoring of these factors, we can achieve not only the prediction of the parental possibility of male partners at an early phase, but also the planning of further counseling activities by the health services among which the planning of correspondent methods of assisted reproduction as well.

Key words: sterility, young male population

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