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51. ДАНИ ПРЕВЕНТИВНЕ МЕДИЦИНЕ

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MAIN TOPICS

- **Microbiology today**
- **Current parasitosis**
- **Current challenges in health care system**
- **Information technology and health**
- **Health promotion – challenges and perspectives**
- **Environment and health**
- **Nutrition and health**
- **Theoretical and practical problems of communicable and non-communicable disease epidemiology**

51st DAYS OF PREVENTIVE MEDICINE
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26-29. SEPTEMBER 2017.

NIŠ, SERBIA

TABLE OF CONTENTS

KEYNOTE LECTURE

THE POWER OF PREVENTION IN THE ERA OF SUSTAINABILITY

Prof. dr Gianfranco Damiani, Italy
Department of Public Health, Università Cattolica del Sacro Cuore, Rome, Italy

Our times are denoted by different megatrends: the epidemiologic and demographic transition, even if infectious diseases are still a priority of public health; the increasing costs in health care; the social and health inequalities and the environmental changes. In this context, prevention can be part of a sustainable strategy in the management of these changes. The concept of prevention has changed its meaning through time: from simply averting the development of a pathology, it has included the concept health promotion, that is *"the process of enabling people to increase control over, and to improve their health".* It has been also claimed that more resources need to be invested by governments in healthy public policy and in health promotion, to improve the status of their citizens.
However, on average in the OECD countries, in 2015, only less than 3% of the healthcare expenditure has been dedicated to preventive care.
Nonetheless, evidence on the economic sustainability of preventive interventions are growing. In 2009, only childhood immunizations and counselling on low dose aspirin were cost-saving in all of the studies included in a review. In 2017, a research found that, overall, for every pound invested in public health interventions a return of 14.3 times plus the original investment is yielded back, and interventions on a National scale generally achieve even greater returns on investment (legislation, for instance, offers a median 40-fold higher return on investment). From this perspective, the first step to take is to design of a successful preventive program that considers the characteristics of the community to which it is addressed and the need of the "intersectoral action" and "comprehensiveness". The complexity and variety of sectors prevention has to deal with from early to adult life, requires a vast range of interventions that can help reducing risk factors and create safe and supportive environments in home, work and community settings. Multicomponent -Multilevel is the model that is currently sustained by scientific literature. It includes different types of interventions that are synchronized across different levels (regulatory, community, organizational, interpersonal and individual level). The design of preventive programs must also look attentively at the social sustainability of their interventions, tailor these intervention on the disadvantaged communities and consider that gains are likely to be largest when preventive interventions do not require changes in the behavior of the recipients. Innovative prevention should also be seen incorporated and interconnected with integrated models of care as the Chronic Care Model and the Patient Medical Home. In these models, informed and activated individuals and communities, provided with appropriate support, are able to accept life-long disease, prioritize the importance of self-care and the role of lifestyle in the prevention of diseases and can use proper resources to navigate adequately throughout the health care system.

SESSION: CURRENT PARASITOSIS

INVITED LECTURES

1. TOXOPLASMOSIS: OLD DISEASE – NEW DISEASE

Olgica Đurković-Đaković
National Reference Laboratory for Toxoplasmosis, Center for Parasitic Zoonoses, Institute for Medical Research, University of Belgrade, Belgrade, Serbia

Known for over a century, *Toxoplasma gondii* is a globally distributed parasite that according to conventional understanding infects one third of the global population but causes significant disease only in the developing fetus and in immunosuppressed individuals. However, the WHO and FAO have recently declared toxoplasmosis a foodborne infection of global concern, with the greatest disease burden of all parasitic infections. This has coincided with insight into the parasite population structure, shown to be characterized by clonal lineages (types I, II and III) predominating in Europe and North America, and by a higher frequency of non-clonal, atypical strains in South America and Africa, which has had various implications. Atypical strains have been associated with more severe ocular toxoplasmosis, atypical presentations and even life-threatening disease in both immunocompetent and immunosuppressed individuals. Therefore, travel, as well as globalization of food including importation of meats from areas of a highly divergent population structure, present risk factors for severe infections. Above all, a current intriguing line of research is the potential role of toxoplasmosis in the pathogenesis of neuropsychiatric diseases, including schizophrenia, Parkinson's disease and depression. The changing understanding of *T. gondii* infection calls for new strategies in both management and prevention.

Keywords: toxoplasmosis, foodborne infections, genotypes, travel disease

2. TRICHOMONIASIS – A NEGLECTED PARASITIC DISEASE

Mario Sviben [1], Tomislav Meštrović [2]
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[2]Clinical Microbiology and Parasitology Unit, Polyclinic "Dr. Zora Profozić", Zagreb, Croatia and Department of Biomedical Sciences, University Centre Varaždin, University North, Croatia

Trichomonas vaginalis (*T. vaginalis*) is a causative agent of the most common parasitic sexually transmitted infection in the world - trichomoniasis Infection with this parasite in women causes vaginitis, cervicitis and urethritis, whereas in men it can cause urethritis and prostatitis. *T. vaginalis* has also been considered a risk factor for other sexually transmitted diseases, such as *Neisseria gonorrhoeae* and *Chlamydia trachomatis*. Moreover, this flagellate is closely associated with an increased risk of acquiring human immunodeficiency virus type 1 (HIV-1) infection, which is linked to local inflammatory changes within the genital tract characteristic for *T. vaginalis* infections. Other reported associations include preterm labor and cervical cancer.
It has been estimated that between 10 and 50% of *T. vaginalis* infections are asymptomatic, underpinning the need for more intensive screening endeavours to detect infections in sexually-active men and women, as well as pregnant women.
Methods used for the laboratory diagnosis of *T. vaginalis* infection include microscopic examination of wet mount preparations, culture and more recently polymerase chain reaction (PCR). Wet mount examination of genital discharge material is rapid and inexpensive, but the sensitivity is low. Currently broth culture is considered to be the gold standard in laboratory diagnosis, although it requires 2 to 7 days of inoculation and daily microscopic examination. However, the sensitivity is also low, ranging from 50 to 80%. Both methods are inherently limited because they rely on the organism to be viable for proper detection. These limitations have led to an increased interest in the development of molecular assays for the detection of *T. vaginalis* DNA from clinical specimens. Highly specific PCR assays with an improved sensitivity have been developed and are being used in clinical practice.
Appropriate awareness and the use of adequate diagnostic tests will lead to timely diagnosis and treatment of this commonly neglected pathogen, with an end-goal of avoiding potential unpleasant sequelae of untreated *T. vaginalis* infection.

Keywords: *Trichomonas vaginali*s, trichomoniasis, epidemiology, diagnostics, STI

3. PROFESSIONAL AND SCIENTIFIC ACHIEVEMENTS OF NATIONAL REFERENCE LABORATORY FOR TRICHINELLOSIS

Ljiljana Sofronic-Milosavljevic
National Reference Laboratory for Trichinellosis, Institute for the Application of Nuclear Energy – INEP, University of Belgrade, Belgrade, Serbia

In the period from 1993 to the present, INEP has been recognized as a reference laboratory for Trichinellosis - NRLT, first in the field of diagnosis of *T. spiralis* infection in animals, and since 2008 in humans. This was achieved due to extensive study of the immune response to infection, development of several sero-diagnostic kits, monitoring of the epidemiological and epizootiological situation in Serbia. More recently, NRLT has contributed to the first detection of *T. britovi* presence among animals and humans in Serbia and proposed a new serological tool - the universal competitive c-ELISA (detects antibodies against various *Trichinella spp.* in different hosts). The results of basic research at NRLT demonstrated that we can learn a lot from this helminth by understanding the molecular cross-talk between the parasite and the host. Today we know that during co-evolution, *Trichinella* “sealed the deal" with the host on mutual protection by which the organism tolerates the survival of the parasite, and the parasite creates the environment that could prevent the development of autoimmune and allergic disorders. We found also that *T. spiralis* immunomodulatory molecules can trigger the "*Trichinella* clock" aiming to reverse immune responses and ameliorate chronic inflammatory diseases.
(Project No.173047, Ministry of Education, Science and Technological Development, R. Serbia)

Keywords: Trichinella, epidemiology, serology, immunomodulation

4. THE IMPORTANCE OF ECTOPARASITES IN PUBLIC HEALTH: HOW MUCH AND WHY ARE FLEAS DANGEROUS

Ivan Pavlović
Scientific Veterinary Institute of Serbia, Belgrade, Serbia

Fleas are small (1.5 to 3.3 mm long), agile, usually dark colored (for example, the reddish-brown of the cat flea), wingless insects with tube-like mouth-parts adapted to feeding on the blood of their hosts.
Fleas are distributed around the world. In Europa, most abundat sppecies are: *Ctenocephalides felis felis*, the cat flea, *Ctenocephalides canis*, the dog flea, *Pulex irritans*, the human flea, *Echidnophaga gallinacea* as well as *Ceratophyllus gallinae*, fleas found on poultry.
Fleas are typical holometabolous insects. The life cycle of any flea species consists of an egg that hatches into a larva, which generally undergoes three larval moults and an inactive pupal stage before emerging as an adult. A typical flea population consists of 50% eggs, 35% larvae, 10% pupae and 5% adults. Completion of the life cycle from egg to adult varies from two weeks to eight months depending on the temperature, humidity, food, and species.
For the flea, its biology makes it a very efficacious vector of many pathogens. In towns the cat flea is mainly synanthropic and maintains its life cycle indoors feeding. Female fleas are reported to consume an average of 13.6 μl (+/-2.7 μl) of blood per day.
Fleas play an important role as transmitters of a wide spectrum of diseases and have been reported to be the intermediate host of *D. caninum*, the dog tapeworm, *Hymenolepis nana*, *H. diminuta*, *H. citelli*, *H. microstoma* and *Dipetalonema reconditum* as further helminths. Beside these agents they are also reported to be the transmitter of Friend Leucemia Virus, *Rickettsia typhi*, *Rickettsia* sp., *Yersinia pestis*, *Pasteurella* sp., *Brucella melitensis*, *Br. abortus*, *Br. suis* as well as the mites *Cheyletiella parasitivorax* and *Cheyletiella* sp. Of those agents most important for man are *D. caninum*, which is an occasional parasite of man, and, of greater concern, the murine typhus (*Rickettsia thyphi*) and plague (*Yersinia pestis*).

Keywords: epidemiology, fleas

ORAL PRESENTATIONS

1. DIAGNOSING *TOXOPLASMA GONDII* INFECTION IN HAEMATOPOETIC STEM CELL TRANSPLANT (HSCT) AND SOLID ORGAN TRANSPLANT (SOT) PATIENTS (2015-PRESENT)

Aleksandra Uzelac, Tijana Štajner, Ivana Klun, Olgica Đurković-Đaković
Center of Excellence for Food- and Vector-borne Zoonoses, National Reference Laboratory for Toxoplasmosis, Institute for Medical Research, University of Belgrade, Serbia

Objectives: To analyze the results of serological and PCR-based monitoring of haematopoetic stem cell transplant (HSCT) recipients and solid organ transplant recipients (SOT) for primary and reactivated toxoplasmosis.
Materials and methods: *Toxoplasma gondii*-specific IgG and IgM antibodies were detected using TXG- and TXM-VIDAS (bioMerieux, France) in SOT and HSCT patients. Molecular detection was carried out by real time PCR based on a specific primer/Taqman probe for the *T. gondii* 529 bp repeat element in blood (buffy coat), cerebrospinal and/or bronchoalveolar lavage fluid samples.
Results: Of a total of 30 SOT patients (all heart transplants), 50% were positive for *T. gondii* infection in pre-transplant testing. Post-transplant follow-up of 11 patients monitored from 6 months to 2 years revealed no cases of reactivation. Of the 58 HSCT recipients examined for *T. gondii* serostatus prior to HSCT, 27 were monitored for an average of 6 months. *T. gondii* reactivation was detected in 8 patients, and suspected in a further 4 patients.
Conclusion: The presented results demonstrate the need to monitor HSCT recipients, and moreover, the value of pre-transplant serology, followed by post-transplantation molecular diagnosis. Although the method of choice, PCR is burdened with technical challenges, which may greatly affect result interpretation.

Keywords: *Toxoplasma gondii*, serology PCR, Hematopoietic Stem Cell Transplantation (HSCT), Solid Organ Transplantation (SOT)

2. THE FIRST CASE OF MOLECULAR IDENTIFICATION OF *TAENIA* SPECIES IN SERBIA PERFORMED WITHIN THE CYSTINET NETWORK

Zorica Dakić[1], Maria Delmans Flores Chavez[2], Jovan Malinić[3], Olgica Đurković-Đaković[4], Branko Bobić[4], Olga Dulović[3,5], Snežana Jovanović[1], *Teresa Gárate* Ormaechea[2]

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[5]Medical Faculty, University of Belgrade; Belgrade, Serbia

Introduction: Molecular diagnostics for the detection and differentiation of rare parasites, including *Taenia* species, are not yet available in Serbia. Differentiating *Taenia* species based on microscopic examination of eggs and gravid proglottids is often unreliable. PCR-based techniques could resolve the problem of identification of *Taenia* species.
Material and Methods: Under the framework of the COST Action TD1302 (CYSTINET), molecular identification of one stool sample containing *Taenia* spp. eggs and proglottids was performed at the ISCIII, Madrid. DNA extraction from feces and proglottids was carried out using Qiagen DNeasy Blood & Tissue Kits. Two real-time PCRs based on repetitive DNA sequences (pTsol9 and HDP2) were performed. Temperature of melting (Tm) analysis was used to distinguish species.
Results: In March 2016, a 38-year-old Serbian male was diagnosed with taeniosis in the Parasitological Laboratory of the CCS. His stool sample contained numerous *Taenia* spp. eggs and two proglottids. According to the morphology of the gravid proglottids, *T. saginata* was suspected. Both samples showed negative results by Ptsol9-PCR, and positive results by HDP2-PCR. According to Tm analysis, the proglottids and eggs belonged to *T. saginata* species.
Conclusion: The presented case shows the benefits of molecular diagnosis of cysticercosis/taeniosis, thereby underlying the significance of cooperation among European laboratories afforded by CYSTINET.

Keywords: CYSTINET, taeniosis, *Taenia saginata*, molecular diagnostic, cysticercosis

3. ELISA TEST FOR DETECTION OF *BLASTOCYSTIS* SPP. IN HUMAN FAECES: COMPARISON OF THREE METHODS

I. Kucsera, M. Molnár, J. Danka, E. Orosz
National Public Health Institute, Department of Parasitology, Budapest, Hungary

Objectives: *Blastocystis* is an enteric protozoan parasite highly prevalent in humans and animals. It is associated worldwide with aspecific symptoms, like diarrhoea, abdominal pain, anal itching, excess gas, and irritable bowel disease. Therefore the *Blastocystis* infected patients often remained non-diagnosed. Detection of *Blastocystis* is routinely performed by microscopy, culture, and sedimentation concentration technique. These methods are time consuming, laborious and require special skilled personnel. Microscopy is difficult since *Blastocystis* has several morphological forms (vacuolar, cyst, amoeboid, granular, multivacuolar, and avacuolar). Concentration technics destroy some of the forms during stool processing, therefore are unreliable. Culture requires 2-4 days for diagnosis and may allow preferential growth of specific strains while eliminating others. ELISA-based test for detection of *Blastocystis* antigens in stool could be a proper alternative to currently used methods, especially the microscopy. This work compares results of stool examination by microscopy, cultivation and antigen detection test (CoproELISA *Blastocystis*, Savyon Diagnostics, Israel).
Material and Methods: 78 stool samples routinely sent to the laboratory have been tested microscopically and by CoproELISA *Blastocystis*. 67 samples of them were tested with cultivation.
For microscopic examination direct wet mount and Modified Merthiolate-Iodine -Formalin (MIF) preparation, for cultivation modified Boeck and Drbohlav's diphasic medium and for *Blastocystis* antigen detection CoproELISA *Blastocystis* (Savyon Diagnostics, Israel) have been used.
Results: Microscopically in 20,5% (16/78) of samples *Blastocystis* was detected, by cultivation in 38,8% (26/67) and by ELISA 39,7% (31/78). Comparing cultivation and ELISA: 26 by cultivation positive samples were positive in 96.2% (25/26) by ELISA. Testing 41 culture-negative samples by ELISA further 4 positive have been detected (9.7%, 4/41). Based on this comparison the calculated parameters of the ELISA test are: Sensitivity: 96.2% and Specificity: 90.2%.
Conclusions: The ELISA results showed high correlation with results obtained by cultivation, as a standard method. ELISA is expeditious in providing reliable results. Considering this, the ELISA is expected to be the method of choice for diagnosis of *Blastocystis* in the common laboratory.

Keywords: *Blastocystis* spp., ELISA, diagnosis

4. THE ANTIMALARIAL POTENTIAL OF NOVEL AMINOQUINOLINES

Jelena Srbljanović[1], Tijana Štajner[1], Jelena Konstantinović[2], Nataša Terzić-Jovanović[3], Aleksandra Uzelac[1], Branko Bobić[1], Bogdan A. Šolaja[2, 4], Olgica Đurković-Đaković[1]
[1]Institute for Medical Research, University of Belgrade, Belgrade, Serbia;
[2]Faculty of Chemistry, University of Belgrade, Belgrade Serbia;
[3]Institute of Chemistry, Technology and Metallurgy, Belgrade, Serbia;
[4]Serbian Academy of Sciences and Arts, Belgrade, Serbia.

Objectives. To examine the antimalarial potential of novel aminoquinolines with innovative structural modifications.
Materials and methods. A series of 26 compounds synthesized at the Faculty of Chemistry University of Belgrade, was examined both *in vitro* and *in vivo*. *In vitro* testing was performed using a lactate dehydrogenase assay in both a chloroquine (CQ) sensitive (3D7) and a CQ-resistant (Dd2) strain of *Plasmodium falciparum*, with CQ as a control. *In vivo* antimalarial activity was tested in C57BL/6 mice infected with *P. berghei* ANKA strain by the modified Thompson test. Compounds were first examined for toxicity.
Results. Of the 26 compounds, those 12 that showed a growth inhibition rate of at least 50% were further examined *in vitro* (IC50 values) and *in vivo*. Three compounds were excluded due to toxicity in mice. All nine compounds examined *in vivo* prolonged survival of treated vs. untreated mice. Of these, two compounds, both with the adamantane ring as a carrier, afforded 100% survival and resulted in parasite clearance (160 and 80 mg/kg/day), despite not exhibiting thelowest IC50 values.
Conclusion. These results point to adamantane as a carrier which enhances the antimalarial potential of aminoquinolines, while better *in vivo* than *in vitro* results suggest a role for the compound metabolites.

Keywords: malaria, aminoquinolines, LDH assay, Thompson test, adamantane

POSTER PRESENTATIONS

1. DIAGNOSIS *DEMODEX* SPP. WITHIN A FIVE YEAR PERIOD IN A PARASITOLOGY LABORATORY

Dragan Zdravković, Jelena Krstić, Aleksandar Tasić, Nataša Miladinović Tasić
Public Health Institute Niš, Serbia

Genus Demodex includes more than 60 species parasitizing on mammals, also including *Demodex folliculorum* (*D. folliculorum*) and *D. brevis*, obligatory ectoparasites that are the causal agents of demodicosis in humans.
Objectives: Testing the prevalence of demodicosis in the City of Nis area in the past period, using already existing, standard parasitological procedures.
Materials and methods: The study included patients (194) having changes on the skin (redness, peeling, itching, acne, follicles), and most commonly addressed to this analysis by ordinating physicians. Cellophane tape method (CTP) and scarifier from deeper skin layers were used in diagnosis for all respondents. Positive diagnosis was made only after visualizing the Demodex mites (*D. folliculorum*/*D. brevis*) under microscope magnification. Data processing was performed by using standard statistical methods.The research was conducted in the institute at the laboratory for parasitology in the period from July 2011 to July 2016.
Results: During the examining period an increasing trend in demodicosis prevalence was determined; the highest being in 2013 (47.1%), while in 2016 being 35.5%. A positive finding was found in 66 (34.0%) respondents. The average age of the population being examined was 39.82 ± 16.25 years (min 1 year, max 80 years). Respondents with a positive finding were statistically significantly older compared to respondents with a negative finding ($p = 0.005$). In the population with a positive finding, there were significantly more women (56/84.8%) than men (10/15.2%). The highest number of testings and the largest number of positive findings were recorded in 2014 and 2015 (27.3% and 30.3% respectively); the highest prevalence of demodicosis was recorded in the spring (47.0%) ($p = 0.008$).
Conclusion: The higher prevalence of *Demodex* spp. In the environment requires further monitoring and involvement of doctors with other specialties in the diagnosis of this parasitosis. In certain conditions (weakened immunity, skin quality change, autoimmune diseases, malignancy, and age), "quiet" parasites become dangerous to the host, causing severe skin inflammation which requires adequate diagnosis and therapy.

Keywords: demodicosis, prevalence, diagnosis

2. MALARIA IN MOSQUITO POPULATION IN THE TERRITORY OF BELGRADE IN THE PERIOD 1.05.2016 – 31.08.2017. YEAR

Nebojša Tačević, Dragana Despot, Ana Lončar
Institute for Biocides and Environmental Medicine, Belgrade, Serbia

Malaria is a zoonotic disease that is transmitted by mosquitoes of the genus Anopheles. This is the most important parasitic disease of all times. The Institute for Biocides and Medical Ecology monitors mosquito populations primarily in Belgrade and on the territory of Serbia as part of their regular activities, tested for the presence of malaria in mosquitoes.
The population of Anopheles mosquitoes are present on the territory of Belgrade in the early summer and early autumn. After penetration of migrants coming from endemic areas in our country we start to monitor developments in the camps to accommodate control over most diseases and especially against malaria. Samples are collected on a daily basis and processed to institute and tested to malaria every time we have a malaria mosquitoes.
PCR methodology is implemented. From the total of 42 samples for the territory of Belgrade, all samples were negative. We expected due to malaria because it not exist in the our country as domestic only inported cases.
Due to the large number of imported cases, due to the presence of migrants as well as due to climate changes Department monitors the population malaria mosquitoes and undertakes reaction towards them regardless of the final result of the behavior and toward individuals this kind of as hazardous according to the vectors of ilness.

Keywords: malaria, Belgrade, PCR

SESSION: MICROBIOLOGY TODAY I

INVITED LECTURES

1. ANTIVIRAL MICROBICIDES

Angel Galabov
The Stephan Angeloff Institute of Microbiology, Bulgarian Academy of Science, Sofia, Bulgaria

2. TORCH INFECTIONS IN CHILDBEARING-AGED WOMEN IN CROATIA: PREVALENCE AND PREVENTION

Tatjana Vilibić-Čavlek[1,2], Tabain I.[1], Kolarić B.[1], Jeličić P.[1], Djaković I.[3], Janev-Holcer N.[1], Košec V.[3], Jemeršić L.[4], Barbić L.[5], Bauk N.[1], Savić V.[4], Stevanović V.[5], Sumpor B.[3], Kaić B.[1]

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The TORCH acronym includes the most common etiological agents of infections in pregnant women and newborns: *T. gondii*, rubella virus (RUBV), cytomegalovirus (CMV), herpes simplex viruses (HSV) type 1 and 2, as well as several other viruses: varicella-zoster virus (VZV), parvovirus B19, hepatitis B and C viruses (HBV, HCV), HIV, enteroviruses and bacteria. The "others" category has rapidly expanded, including emerging and re-emerging viral zoonoses. Most of the TORCH infections cause mild maternal morbidity, but have serious consequences on fetal health. In the last two decades, some zoonotic viruses have emerged such as hepatitis E virus (HEV) and Zika virus (ZIKV) which can cause infections in pregnant women and newborns. HEV infection may be more severe during pregnancy with fatal outcome in 15-25% pregnant women. ZIKV infection during pregnancy is associated with severe congenital malformations, including microcephaly. Materno-fetal transmission of re-emerging viruses such as dengue virus (DENV), chikungunya virus (CHIKV) and West Nile virus (WNV) was also reported. DENV infection during pregnancy is associated with higher rate of spontaneous abortion, intrauterine fetal death and premature birth. Congenital dengue fever is caused by the transplacental transmission of the virus during delivery. Most materno-fetal CHIKV transmissions occur during the peripartum period. Congenital WNV infections are possible but very rare; they are associated with malformations, particularly of the brain.

In the period from 2005 to 2015, several studies were conducted at the Croatian National Institute of Public Health to define the seroprevalence of TORCH infections. In childbearing-aged women tested from 2005-2009, the overall IgG seroprevalence rate was found to be 75.3% to CMV, 96.4% to RUBV, 69.4-78.7% to HSV-1, 5.8-10.2% to HSV-2, 63.5% to parvovirus B19 and 83.4% to VZV. Among viral hepatitis markers, HBsAg was detected in 0.5%, anti-HBc in 3.8% and anti-HCV antibodies in 0.5% women. Two pilot studies on the seroprevalence of emerging and re-emerging arboviruses (2011-2015) found seropositivity of 0.38% to DENV and 0.76% to CHIKV. In addition, recently conducted study (2015-2016) on the HEV seroprevalence showed seropositivity of 2.3%. A total of ten asymptomatic pregnant women who returned from endemic areas were tested for ZIKV, DENV and CHIKV during 2016-2017, of whom all were negative.

During the tested period, acute CMV and VZV infections (positive IgM antibodies/low IgG avidity) were confirmed in 0.09% childbearing-aged/pregnant women. HSV-1 and HSV-2 IgM antibodies were found in 1.2% and parvovirus B19 IgM antibodies in 6.9% participants. In 0.36% women, recent asymptomatic WNV infection (positive IgM antibodies/borderline IgG avidity) was confirmed. In addition, imported CHIKV and ZIKV infections were detected in two febrile childbearing-aged women who visited endemic areas. Acute infections caused by other TORCH agents were not detected during the tested period.

Determination of serological status in childbearing-aged women will help to identify seronegative women who are at risk for TORCH infections during pregnancy and help the clinicians to appropriately counsel mothers on preventive measures to avoid these infections. Presented results highlight the importance of surveillance, as well as a need for expanding of TORCH diagnostics including emerging and re-emerging viral zoonoses.

3. TYPING OF HUMAN PAPILLOMAVIRUS (HPV) AND MOLECULAR VARIANTS OF IDENTIFIED TYPES IN WOMEN FROM VOJVODINA PROVINCE

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Objectives: The aim of this work was to define the distribution of different oncogenic HPV types in examined women from Vojvodina province and to determine genotypic variability of the most prevalent HPV genotypes.
Methods: Genotyping of HPV was done on 564 women (age 18 to 69) by commercial real-time HPV High Risk kit (Sacace, Italy). Molecular characterization of HPV 16, 18, 31 and 33 variants within the L1 (MY9/11) region was undertaken by Sanger sequencing method. The heterogeneity within HPV type 51 was examined by PCR-RFLP method. The Neighbor joining and Maximum Parsimony methods were used in order to construct the phylogenetic tree.
Results: The prevalence of HPV infection in tested women was 51.8%. Phylogenetic analysis of nucleotide sequences of HPV 16, 18 and 33 confirmed that the most of isolates from the Vojvodina province are grouped in lineage A, while isolates of HPV 31 belong to lineages A, B and C. Based on PCR-RFLP analysis HPV type 51 correspond to lineage A, sublineage A1.
Conclusion: Knowledge of variability of HPV gained by analysis of molecular variantes will be important for designing primers and probes for HPV detection methods and prevention strategies in screening of cervical cancer.

Keywords: Human papillomavirus, genome variability, phylogenetic relations

4. ARBOVIRUSES IN VOJVODINA

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Objectives: determinating the seroprevalence of West Nile virus, usutu virus and chikungunya virus in people from Vojvodina as well as activity of these viruses in vectors.
Material and methods: seroprevalence of specific IgG antibodies against WNV in 608 inhabitans from several regions of Vojvodina was detected by commercial ELISA test. Seropevalence of usutu virus has been investigated by ELISA anti-usutu IgG test in 88 healthy people. Serum samples from 48 helthy soldiers in Serbian Armed Forces were tested for specific antibodies to chikungunya virus by commercial ELISA IgG test and immunofluorescent IgM test. Mosquito pools were tested for viruses by real time RT PCR test: 50 pools for WNV and 216 pools for usutu virus and Japanese encephalitis virus.
Results: Seroprevalence against WNV was 4,77% (29/608). Highest seroprevalence was registered in the Middle Banat region (12,5%) and the lowest in Srem region (2,1%). Four samples (4,5%) proved positive for specific IgG antibodies against usutu virus. All serum samples tested for antibodies against chikungunya virus were negative. The survey detected WNV genom in 6% (3/50) of examined pools while Usutu virus genom was demonstrated in 2 (0,9%) pools.
Conclusion WNV and usutu virus circulated among people and mosquitoes in Vojvodina.

Keywords: West Nile virus, usutu virus, chikungunya virus, ELISA IgG
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ORAL PRESENTATIONS

1.RE-EMERGING VIRUS – MEASLES VIRUS

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Introduction: The measles virus, which had become extremely uncommon in developed countries, is making a comeback. MV may cause measles, highly contagious acute infection which is important cause of child morbidity and mortality worldwide. In the years before 1963 when a vaccine became available, nearly all children got measles by the time they were 15 years of age. Measles became a re-emerging disease in European nations: France, Italy, Germany, Romania, Netherlands, United Kingdom, our country, etc.
Virus and disease: MV is a non-segmented, negative sense, single-stranded RNA virus of the genus Morbillivirus within the family Paramyxoviridae. It consists of helical nucleocapsid, 100-300nm in diameter, surrounded by an envelope. MV has six structural proteins and two accessory proteins encoded in a 16-kb RNA genome. Monotypic in nature-only a single serotype of the virus has been describes. The MV may cause measles, a systematic infection starting in the respiratory epithelium of the nasopharynx. Measles may lead to severe complication and can cause death. Symptoms of measles include fever and maculopapular rash accompanied by cough, coryza and conjunctivitis, Koplik spors. Common complication are bacterial superinfection. Complication associated with acute measles can on rare occasions, involve the central nervous system. These are postinfectious measles encephalitis which develops soon after infection, and months to years after the acute disease, measles inclusion body encephalitis and subacute sclerosing panencephalitis which are based on a persistent MV infection of brain cells. The diagnosis is confirmed by laboratory tests, including serodiagnosis by the detection of specific anti IgM antibodies and molecular diagnostic by detection viral RNA.
Summary: Measles can be considered a re-emerging disease and additional efforts are necessary to achieve measles elimination goal. Measles is considered a candidate for eradication, because of the availability of highly effective vaccine, the monotypic native of the virus and the lack of an animal reservoir.

Keywords: measles, re-emerge virus, infectious disease.

POSTER PRESENTATIONS

1. SEROPREVALENCE OF HSV-1 AND HSV-2 INFECTION AMONG WOMEN IN REPRODUCTIVE PERIOD

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Objectives: Herpes simplex viruses are widespread throughout the world. The ability of herpes viruses to cause persistent, latent and productive infection makes man a lifelong source of infection.Herpes simplex virus type 1 (HSV-1) primarily infects oropharynx by direct or indirect contact. Herpes simplex virus type 2 (HSV-2) is primarily sexually transmitted and associated with lesions of the anogenital region, although both viruses can infect any area. HSV-1 and HSV-2 can be transmitted from mother-to-neonate during pregnancy and the post-partum period. The aim of this study was to determine seroprevalence of HSV-1 and HSV-2 antibodies among women in reproductive period.
Material and methods: The study included 500 women aged 18 to 50 years, divided into three groups.The first group consisted of women from 18 to 25 years old, the second group from 25 to 35 years old and the third group of women aged 35 to 50. All serum samples were tested for HSV-1 and HSV-2IgG andIgM antibodies using an HSV-type specific, enzyme-linked immunosorbent assay (ELISA).
Results: Seroprevalence of HSV-1 and HSV-2 was 62,2% and 10% among women in reproductive period. In first group seroprevalence of HSV-1 and HSV-2 was 48,6% and 10,4%, in second group 64% and 7,5% and 75,2% and 14,7% in third group. Among seropositive women HSV-1 IgM antibodies were detected in 1,9 % and HSV-2 IgM antibodies were detected in 20 %. A high percentage of HSV2 IgM antibodies was found in the age group 18 to 25 years (45%).
Conclusion: Results confirm a high prevalence of HSV-1 and a relatively low prevalence for HSV-2 infection. The highest prevalence for HSV-1 and HSV-2 infection is in women aged 35 to 50 years.

Keywords: HSV-1, HSV-2, women,seroprevalence

2. PREVALENCE OF HCV INFECTION IN HEMODIALYSIS PATIENTS

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Objectives: Patients on hemodialysis are at a high risk for hepatitis C virus infection. The factors that might help reduce and/or prevent the spread of HCV infection among patients on hemodialysis include: early screening of patients for anti-HCV, reduction of the number of blood transfusions given, strict application of universal infection control precautions and isolation of patients or machines, which ever is feasible. Our aim was to establish the overall prevalence of HCV infection in hemodialysis patients and prevalence of newly detected anti-HCV positive patients, by years, in a period of three years.
Material and methods: The study involved 710 patients treated at the Dialysis Department, Clinic of Nephrology, Clinical Center Niš, in the period from January 2015 to August 2017. The following methods were used to diagnose HCV infection: 4th generation ELISA and automated Cobas e411 to detect anti-HCV antibodies.
Results: Out of the total of 221 patients tested in 2015, anti-HCV antibodies were detected in 37 (16.7%). As for the testing in 2016, among 235 hemodialysis patients, 33 (14.1%) were anti-HCV positive; in 2017, out of 254 patients in total, anti-HCV antibodies were detected in 29 (11.4%). Testing of anti-HCV negative patients on hemodialysis revealed the following: in 2015 and 2016 anti-HCV antibodies were not detected in any of the examinees, while in 2017 anti-HCV antibodies were detected in 1 (0.44%) patient.
Conclusion: In the observed three-year period, the prevalence of anti-HCV antibodies in hemodialysis patients decreased, and the percentage of newly detected anti-HCV positive patients was 0.16%.

Keywords: hepatitis C virus, hemodialysis, prevalence
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3. PREVALENCE OF VIRUSES DISEASES TRANSMISSIBLE BY BLOOD IN PREGNANT WOMEN, PEOPLE WITH RISKY BEHAVIOUR AND PATIENTS WHO WERE PREPARED FOR SURGERY

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Aim: Two-year analysis of the testing of pregnant women, people with risky behaviour and patients who were prepared for surgery in the presence of the viruses (HBs Ag, anti-HCV and anti-HIV) in the Institute of Public Health in Belgrade is given.
Methodology: During two years 11,983 pregnant women and 934 people with risky behavior and 5,411 patients who were prepared for surgery were tested. Preliminary testing for the HBs antigen, anti-HCV antibodies and anti-HIV antibodies was performed with third ELISA generation. Against positive blood samples, a confirmation "Western Blot" test was made.
Results: From 11,983 tested pregnant women, 38 (0.32%) were affirmatively positive for HBsAg and 35 (0.29%) pregnant women were affirmatively positive in the anti-HCV and 5 (0.04%) pregnant women were affirmatively positive for anti-HIV antibody. From 934 tested individuals with risky behaviors 28 (2.99%) were afirmarively positive for HBsAg and 33 (3.53%) were affirmatively positive for anti-HCV and 9 (0.96%) were affirmatively positive for anti-HIV antibody. From 5,411 who were prepared for surgery, 18 were affirmatively positive for HBsAg and 19 (0,35%) were affirmatively positive in the anti-HCV and 11 (0,20%) patients were affirmatively positive for anti-HIV antibody.
Conclusion: Our studies show the highest prevalence on HbsAg, anti-HCV and anti-HIV code for people with risky behavior.

Keywords: Prevalence of diseases; blood transmissible diseases; hepatitis B virus (HBV); hepatitis C virus (HCV); human immunodeficiency virus (HIV).

SESSION: MICROBIOLOGY TODAY II

INVITED LECTURES

1. FREQUENCY OF ISOLATION AND CLINICAL RELEVANCE OF NONTUBERCULOUS MYCOBACTERIA IN SERBIA

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Nontuberculous mycobacteria (NTM) are a diverse group of widely distributed environmental organisms, particularly found in water and wet soil. NTM are responsible for a wide range of infections, with pulmonary disease (PD) being the most common. The incidence of both NTM isolation and NTM PD is increasing in many parts of the world where the incidence of tuberculosis (TB) is decreasing, with apparent geographical differences in the species encountered. However, the clinical relevance of NTM isolate is often unclear, and to differentiate true infection from colonization and/or contamination, the American Thoracic Society/Infectious Diseases Society of America (ATS/IDSA) established criteria for the diagnosis of NTM PD.
TB remains major mycobacterial disease in Serbia, but the burden of the disease has been significantly reduced from 36 per 100,000 in 2003 to 17 per 100,000 in 2015. On the other hand, the annual fractions of respiratory samples that were positive for NTM increased with NTM isolation frequency rates rising from 0.9/100,000 to 1.6/100,000 over the period 2010-2015. The annual NTM PD incidence rates rose throughout the six year period from 0.18/100,000 to 0.48/100,000. The NTM isolation and NTM PD rates were the highest in 60 years and over age group. The most frequently isolated species over the six-year period were *M. xenopi*, *M. gordonae*, and *M. fortuitum*, which are among the most common NTM species isolated in Europe and, particularly, in neighbouring countries. The most common NTM species recovered from pulmonary specimens of patients who met ATS/IDSA microbiologic criteria were *M. xenopi*, *M. abscessus*, and *M. kansasii*. The clinically relevant NTM species were isolated with higher frequency in more urbanized North region, while species usually considered as colonizers of low virulence were predominant in more rural South region.
While the increase in NTM clinical relevance is clearly significant, the NTM PD apparently remains a rare disease in Serbia, with a rate below the European cutoff of 5 cases/10,000 population. In addition to a sharp decline in TB incidence, other possible reasons for increased recognition of NTM as human pathogens in the country are improvements in laboratory methodology used for identification of NTM, and enhanced clinicians' awareness of NTM relevance. Host changes such as aging population, possible changes in NTM virulence or altered interactions between host and pathogen can also be considered as factors affecting NTM isolation and NTM PD incidence rates in Serbia.

Keywords: nontuberculous mycobacteria, isolation rate, relevance, Serbia

2. CHARACTERISTICS OF VANCOMYCIN RESISTANCE IN ENTEROCOCCI FROM HUMAN SPECIMENS

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Enterococci are known as cause of urinary tract infections, surgical wound infections, intra-abdominal infections and endocarditis. *Enterococcus faecalis* is isolated from approximately 80% of human enterococcal infections, and *Enterococcus faecium* from most of the rest. Infections with other enterococcal species are rare. Enterococci are resistant to many antibiotics, but VRE are therapeutically problem nowadays. Six different types of resistance are shown in enterococci, but Van-A, Van-B and Van-C have been seen in general clinical practice.
Objectives: The aim of this study was to detect vancomycin resistant enterococci (VRE) from different human specimens and to determine the genes of resistance in enterococci from urine samples.
Methods: A total of 4258 strains of enterococci in a 5 year period were analyzed: 2880 were isolated from urine samples, 1378 were isolated from blood and wounds. The strains were isolated on Columbia blood agar, UTI chromogenic agar and VRE chromogenic agar. Identification was confirmed by Vitek automated system. Susceptibility was determined by standard disk diffusion method, Vitek system and E-test. The genes for resistance: *vanA, vanB* or *vanC* were detected by PCR only for uro-isolated enterococci.
Results: A total 51 (1.77%) strains out of 2880 from urine samples were determined as VRE. All VRE strains were identified as *Enterococcus faecium.* There isn't isolated any vancomycin resistant strain of *Enterococcus faecalis* in our Institute until now. The most of these strains (43) were obtained from hospitalized patients, 15 (29.4%) were from University Clinic for Infectious Disease. A total of 73 VRE strains (out of 1378 enterococci) were detected from blood and soft tissue infections. All were identified as *Enterococcus faecium* except two VRE strains from blood cultures which were identified as *Enterococcus gallinarum*. The most often VRE isolates were obtained from patients hospitalized in Surgery Intensive care unit (24.7%), than from hematology and nephrology. The resistance to vancomycin in all VRE strains was followed by resistance to many other antibiotics as: penicillin, ampicillin, ciprofloxacin, norfloxacin, moxifloxacin, clindamycin, gentamycin, erythromycin and tetracycline. All strains were susceptible to linezolid and tigecycline. Examination by PCR of 43 VRE strains (isolated from hospitalized patients) showed that 41 of urinary strains carried *vanA* gene and only 2 strains were *vanB* positive.
Conclusion: Vancomycin resistance was detected in *Enterococcus faecium* and *Enterococcus gallinarum.* All strains were susceptible to linezolid and tigecycline. VanA resistance was the most often detected type of resistance in our isolates.

Keywords: vancomycin resistant enterococci, *Enterococcus faecalis, Enterococcus faecium*

3. DETECTION OF CARBAPENEMASES IN *ENTEROBACTERIACEAE* BY A PHENOTYPIC AND MOLECULAR METHODS

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Because of the irrational use of antibiotics more and more microorganisms are developing resistance to available antibiotics. Multidrug resistance, and, especially, carbapenem resistance among a variety of bacterial species is spreading worldwide at an alarming rate. Infections caused by carbapenem-resistant Enterobacteriaceae has become a worldwide major public health issue. Therefore, the worldwide spread of *Enterobacteriaceae* expressing carbapenemases now represents a significant threat for the public health and requires efforts toward detection and infection control strategies. When broad-spectrum cephalosporins were introduced into clinical practice, ESBL-producing Enterobacteriaceae began to be resistant to those agents. In the late 20th century, many resistant Gram-negative bacteria were often treated with carbapenems as single therapeutic agents and that overuse of carbapenems resulted in an increase in carbapenem resistance. The early and accurate identification of carbapenemase- producing *Enterobacteriaceae* (CPE) in the clinical laboratory is essential for prevention of the development of untreatable infections and the worldwide spread of resistance to carbapenems by those enzymes. Screening of *CPE* is required in clinical specimens and in detection of colonizing strains. The aim of this article is to provide an overview of the different phenotypic and genotypic methods available for detection of carbapenemase. Resistance to carbapenems may be related either to the production of hydrolysing enzymes, carbapenemases, or to an association of the extended-spectrum beta-lactamases (ESBL) and AmpCs (either chromosomal or acquired) with other mechanisms such as porin mutations, increased expression of efflux systems or penicillin binding protein (PBPs) alterations. Carbapenemases confer resistance to a broad variety of β-lactams, including carbapenems. Based on amino acid homologies, the clinically significant carbapenemases are included in classes A, B and D of the Ambler classification. Class A and D β-lactamases (oxacillinases) have a serine residue in the active site; Ambler class B enzymes are zinc-dependent metallo-β-lactamases (MBLs).Carbapenemase-encoding genes are often located on diverse mobile genetic elements, carrying other resistance determinants to multiple classes of antibiotics like fluoroquinolones, aminoglycosides and cotrimoxazole. That genes can easily spread, contributing to a widely dissemination among clinically relevant Gram-negative bacteria. Carbapenemase- producing Enterobacteriaceae causing both nosocomial and community acquired infections. **Screening of carbapenemase-producers based on antibiotic susceptibility tests.** Isolates with reduced susceptibility to carbapenems are suspicious as carbapenemase-producers. Preliminary screening of these isolates based on recognition of decreased susceptibility to carbapenems in antibiotic susceptibility tests, followed by phenotypic and genotypic methods, wich remains the gold standard of detection. Proper selection is crucial, because the ranges of carbapenem MICs for *Enterobacteriaceae* producing the carbapenemases (including the 'big five' KPC, OXA-48, IMP, NDM and VIM) span from below the susceptible breakpoints to high-level resistance. For most carbapenemase-producing bacteria the MICs of carbapenems will be above the epidemiological cut-off (ECOFF) values defined by EUCAST, even if some isolates are not clinically resistant. Screening cut-off values for possible carbapenemase-producing *Enterobacteriaceae* proposed by the European Committee on Antimicrobial Susceptibility Testing (EUCAST), are MIC 0.125/25mm for meropenem i 1,0/23mm for ertapenem to avoid false negative results, or to maximize detection sensitivity (EUCAST, 2014). In primary susceptibility testing carbapenem molecules (either ertapenem or meropenem and imipenem) as the indicator drugs should be included against all clinically-significant isolates.. Ertapenem has the best sensitivity among the available

analogues (because MIC values of ertapenem are usually higher than MICs of other carbapenems), but poor specificity for carbapenemase producers. Meropenem provides the best balance between sensitivity and specificity in terms of carbapenemase detection. In regions where carbapenem resistance is largely mediated by carbapenemases determining low MICs (such as OXA-48-like producers) a meropenem screening cut-off of 27 mm has been proposed at the expense of decreased specificity Low-level carbapenem resistance (especially for imipenem) is observed among *Proteus* spp., *Providencia* spp. and *Morganella* spp. Moreover, *Enterobacter* species producing AmpC β-lactamase at a high-level and simultaneously presenting porin loss usually exhibit high ertapenem MICs. **Phenotypic detection methods.** They include the modified Hodge test, inhibitor-based tests, colorimetric tests, carbapenem inhibition method (CIM), and the use of specific culture media. Modified Hodge test. The modified Hodge test is based upon inactivation of a carbapenem by a carbapenemase- producing test strain. As described by the CLSI, Hodge test is performed on Mueller–Hinton agar, carbapenem susceptible organism (*E. coli* ATCC 25922) at a turbidity of 0.5McFarland standards is used to inoculate the plate surface, and ertapenem/ meropenem disc is placed at the center. The test strain is streaked from the disc to the plate periphery. After overnight incubation, the presence of a distorted inhibition zone (cloverleaf-shaped indentation) is interpreted as positive test. One adventage of the modified Hodge test is that it assumes very good sensitivity for detection of Ambler class A and class D carbapenemases. The detection of MBL-producers by the modified Hodge test lack sensitivity. The modified Hodge test is an easy and inexpensive tool that can be used to test isolates screening for carbapenemases by antimicrobial susceptibility tests. It may be useful to incorporate this test within the infection control process, especially in outbreaks caused by suspected carbapenemase producers. Disadvantages of MHT: it does not discriminate between the carbapenemase types, the results are sometimes difficult to interpret, it is time-consuming, requires at least 24–48 h, and it lacks both specificity (false-positive results have been reported for high level AmpC producers or CTX-M type ESBL producers and in *Enterobacter* species) and sensitivity (weak detection of NDM enzymes). **Inhibitor-based tests.** Phenotypic tests based on presence of specific carbapenemase inhibitors, such as ethylenediaminetetraacetic acid (EDTA), dipicolinic acid (DPA) or phenylboronic acid [PBA].There were a several variants of tests: double-disc synergy test, where synergy between the disc of the carbapenem and the carbapenemase inhibitor is considered a positive result; combined disc test, based on an increase in inhibition zone diameter around the disc of the carbapenem with the inhibitor compared to inhibition zone diameter around the disc of the carbapenem alone. Based on the same principle are gradient diffusion strips (MIC test strips). Those are based on a combination of a β-lactam substrate and a β-lactam/β-lactamase inhibitor (EDTA or boronic acid), available to detect metallo-β-lactamase and KPC enzymes. Reduction of the MIC of the tested isolate in the presence of a carbapenem combined with a carbapenemase inhibitor compared to the same carbapenem alone considered a positive result. Phenylboronic acid also may inhibit AmpC producers. Class A carbapenemase can be differentiated from AmpC enzymes by synergy with cloxacillin, a commonly used AmpC inhibitor without activity against KPC and other class A carbapenemases. Boronic acid compounds inhibit also some of the CTX-M-type ESBLs leading to false positive results. Strains harbouring both KPC and MBL could be detected with tablets containing PBA and DPA/EDTA.Specific inhibitor for class D carbapenemase (including OXA-48 enzymes) does not exist. For the detection of those enzymes temocillin disk has been proposed as a surrogate marker. High-level resistance to temocillin, in isolates without PBA or DPA synergy and a temocillin inhibition zone ≤10 mm (absence of inhibition zone) or MIC ≥128 mg/L are suspected to be OXA-48 producers. temocillin resistance alone has proved to be insufficiently robust, and it should always be used in combination with other markers. Adventages of the inhibitor-based assays: they are easy to perform and inexpensive, and offer the possibility of discriminating between various classes of carbapenemases However, results are achieved within 24 h and the interpretation of the obtained results are

sometimes doubtful which leads to the need of further confirmatory tests. Colorimetric assays.Colorimetric assays are biochemical detection method of carbapenemases in *Enterobacteriaceae*, based on the enzymatic hydrolysis of the β-lactam ring of a carbapenem by the tested strain, followed by color change of a pH indicator, phenol red from red toyellow/orange for Carba NP or bromothymol blue for Blue-CARBA.The test requires lesst han 2h, and it is also cheap and has no requirement for special equipment However, the test cannot differentiate among carbapenemase classes and showed less than optimal results in detecting carbapenemases with a low hydrolytic activity, particularly for OXA-48-like and GES-5 enzymes. Carbapenem inhibition method (CIM). The CIM method perform using meropenem disk (10 μg), which is immerse in a bacterial suspension of a test strain. After 2 hours of incubation at 35°C the disc is removed from the suspension and placed on a Mueller-Hinton agar plate previously streaked with a susceptible *E. coli* indicator strain (ATCC 25922) and subsequently incubated at 35 °C. After overnight incubation, if the organism harbours a carbapenemase, this results in an inactivation of the antibiotic, allowing uninhibited growth of a susceptible indicator strain. When the inhibitory diameter was less then 20 mm using the meropenem disk, the results of the CIM were judged as positive. One of the main advantages of CIM test is simplicity and easy performance. However, the test does not distinguish the different types of carbapenemases, and overnight incubation is required for the results to be read. Spectrophotometric detection. UV spectrophotometric assay based on the analysis of the imipenem hydrolysis. An overnight culture of the tested strain is centrifuged,subject to protein extraction, and either the crude cell extracts or the purified β-lactamases are mixed with imipenem. Hydrolysis of imipenem is then quantified using a UVspectrophotometer at a wave length of 297nm The technique is cheap and can detect any type of carbapenemase The technique,however, is time-consuming, technically-demanding and laborious, so should be performed only in reference laboratories. Also, it cannot indicate types of carbapenemases or detect carbapenemases with very weak activity. Mass spectrometry. Matrix-assisted laser desorption ionization time-of-flight mass spectrometry (MALDI-TOF MS) is based on the detection of antibiotic degradation products by bacterial hydrolyzing enzymes. The detection of carbapenemase activity is performed using a fresh overnight bacterial culture, suspended in a buffer, and centrifuged, and the pellet is resuspended in a reaction buffer containing the carbapenem molecule. After incubation for 1 to 3 h at 35 °C, the mixture is centrifuged and the supernatant is mixed with a proper matrix and measured by MALDI-TOF MS. Advantage of the MALDI-TOF MS is reduction of the turnover time needed to obtain results till an average of about 4 h if a fresh bacterial culture is available.However, the MALDI-TOF MS exhibits some limitations:the interpretation of the spectra needs specific training and dedicated softwares, and the identification of the carbapenemase type is not possible. *False negative results were mainly reported in OXA-48 producers.* MALDI-TOF MS may not be suitable to detect carbapenemase activity in clinical samples, like surveillance swabs, urine or wound specimens. Given this, it should be accompanied with genetic techniques for epidemiological purposes. **Molecular detection of carbapenemase genes.** PCR is nowadays becoming a routine method in many clinical laboratories to circumvent the difficulties associated with phenotypic detection. A PCR technique performed on genomic DNA can give results within 4h, and may be followed by sequencing if needed for precise identification of a carbapenemase variant, rather than just its group (e.g. VIM-type, KPC-type, NDM-type,and OXA-type) PCR can be single, multiplex, or real-time. PCR use a commercial amplification kits, like the Check-MDR CT102 DNA microarray, and the hyplex®-MBL ID Multiplex PCR-ELISA. A loop-mediated isothermal amplification (LAMP) method can be used for the rapid and sensitive detection of NDM gene. Real-time PCR with SYBR Green detection was developed for screening of KPC-producing organisms in stool specimens and nasal swabs. The main disadvantages of the PCR-based methods are their cost, the requirement for high degree of expertise, and the inability to detect novel unidentified genes.The high diversity of carbapenemase-encoding genes and the escalating number of new variants imply that a

negative PCR result concerning a carbapenem resistant strain in a local laboratory setting requires re-evaluation by a reference laboratory for further genotypic analysis. **Conclusion.** Detection of CRE is often challenging.While currently available phenotypic methods are easy and affordable to implement in routine settings, their sensitivity and specificity remain inconclusive. Culture media and biochemical tests have demonstrated the ability to detect carbapenemase-producers with high efficiency. Genotypic techniques are the gold standard test. Selection of the tests depends on the laboratory resources and epidemiological situation.

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4. POLYMORPHIC GENES IN *HELICOBACTER PYLORI* INFECTION

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Gene polymorphism can be viewed as a phenomenon of adaptation to the environments. In *Helicobacter pylori* (*H. pylori*), there is gene polymorphism in the regions responsible for virulence: *VacA* and cag PAI, genes. VacA protein has a mosaic structure with allelic variations in the signal (s), mid region (m) and intermediate (i) region, located between the (s) and (m) regions. Deletion (d) region has been described, too. CagA a is involved in an increased cancer risk becomes phosphorylated on specific tyrosine residues within repeating penta amino acid Glu-Pro-Ile-Tyr-Ala (EPIYA) motifs. So far, four different motifs have been described according to the amino acid sequence. Considering genes for interleukins (IL), there is substantial work done on IL-1, TNF-α, and IL-10. Some polymorphic types of IL-1 and TNF-α gene-cluster are related with the etiology of carcinoma, IL-10 certain gene polymorphisms are associated with an enhanced anti-inflammatory response as the function of the Treg cells. Polymorphisms in the host genes coding for Toll-like receptors (TLRs) may influence the innate and adaptive immune response to the infection, affecting the susceptibility to *H. pylori*.
Conclusion: The outcome of the infection depends on interactions of various forms of *H. pylori* and products of polymorphic genes responsible for the synthesis of some interleukins.

Keywords: *Helicobacter pylori*, polymorphic genes, infection outcome.

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5. CHANGE OF BACTERIAL INFECTION CHARACTERISTICS IN HEMATOLOGICAL PATIENTS WITH NEUTROPENIA

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Objectives: The authors analyzed the change in epidemiology and sensitivity to antibiotics of bloodstream bacteria detected in hematological patients with febrile neutropenia, between two time periods in a single centre.
Materials and methods: Bacterial isolates from the blood stream of two groups of febrile neutropenic patients were analyzed. In the first historical control were 11 positive cultures from patients treated from January 1st 2001 - 31st December 2002. 5 had acute leukemia (AL), 2 suffered of Non Hodgkin lymphoma (NHL) with T cell origin, 2 and another 2 Myeloma and Hodgkin's lymphoma, respectively. Antibiotic prophylaxis consisted of per oral trimethoprim-sulfamethoxazole and aminoglycoside with parenteral second generation cefalosporine. Second contemporary group consisted of 24 positive cultures obtained form the patients treated during the period January 1st 2014 –December 31st 2016. The AL had 18 patients, 2 had aggressive NHL, while Multiple myeloma, resistant Chronic lymphocytic leukemia, Hodgkin's lymphoma, and Aplastic anemia had 1 case, respectively. Contemporary prophylaxis is based on per oral Ciprofloxacine or Levofloxacine with immediate addition of Piperaciline/Tazobactame.
Results: In the historical group, *Staphylococcus epidermidis* (*S. epidermidis*) was present in 72,7% cases, (6/11) patients. *Staphylococcus aureus (S. aureus)* in 2/11 isolates and they all were resistant to cephalosporines macrolides, penicilins, linkomycines while all had sensitivity to vankomycine. Gram-negative bacteria *(Pseudomonas aeruginosa, Enterococcus faecalis, Escherichia coli, Serratia spp, Acinetobacter spp)* were present only in mixed infections accompanied by gram-positive bacteria in severely immunocomprimised cases with sensitivity to ciprofloxacine.
In the contemporary group the most frequent were Gramm-negative bacteria with Acinetobacter spp in 45.8% (11/24) that was multi-resistant in 4 cases (sensitive only to Ampicillin/Sulbactam, Tobramycin, Colistin, Doxycycline). *Pseudomonas aeruginosa* was isolated in 3/24 cases while 2/24 had *Escherichia coli,* and *Enterobacter spp*. *Proteus spp. Serratia spp. and Klebsiella spp.* were detected each in one case separately. ESBL+ was confirmed in *E.colli* and *Enterobacter* cases. Among Gramm-positive 6/24 had *Enterococcus spp,* while *Staphylococcus sp.* was also found in 6/24 cases. All 3 isolated *S. epidermidis* were resistant to penicilins, cephalosporines and carbapenems and sensitive to Vankomycine, Teicoplanin, Linezolid and Rifampicine while case of *S. aureus* had MRSA.
Conclusion: Authors found the rise of incidence of Gram-negative bacteria in blood isolates of contemporary group over historical control The change is reflected by the influence of differences in antibiotic prophylaxis between time periods and results could suggest the potential way for the improvement of this strategy.
Keywords: Gram-negative resistant bacteria 1, acute leukemia 2, febrile neutropenia 3, blood stream bacteria 4
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6. OPPORTUNISTIC INFECTIONS IN PATIENTS WITH KIDNEY TRANSPLANT

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ORAL PRESENTATIONS

1. MOLECULAR CHARACTERIZATION OF MULTIDRAG RESISTANT *KLEBSIELLA PNEUMONIAE* ISOLATES AT A NEONATAL INTENSIVE CARE UNIT FROM INSTITUTE OF NEONATOLOGY, BELGRADE, SERBIA

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Objectives: The present study was undertaken to investigate the characteristics of *Klebsiella pneumoniae* producing carbapenemases and other beta-lactamases recovered from an outbreak at neonatal intensive care unit (NICU).
Materials and methods: The genetic relatedness of the isolates was evaluated by pulsed-field gel electrophoresis with XbaI-digested genomic DNA. Antimicrobial resistance genes were detected by using polymerase chain reaction.
Results: All the isolates were completely resistant to the third and fourth generation cephalosporins tested, as well as carbapenems. Susceptibility profiling of the isolates indicated resistance to colistin. All the isolates showed the presence of $bla_{\text{OXA-48}}$ with co association of $\text{bla}_{\text{CTX-M-group-1}}$. Moreover, all the isolates posess a gene for resistance to trimethoprim, *dfr*A17. PFGE typing revealed a single clonal type circulating in the NICU environment.
Conclusion: In conclusion, the circulation of identical strains in such a relatively short period of time (3 months) could indicate an epidemic that requires urgent attention in order to improve infection control precautions. Furthermore**,** co-production of $bla_{\text{OXA-48}}$ with $\text{bla}_{\text{CTX-M-group-1}}$ in *K. pneumoniae* isolates was detected for the first time at our NICU. The early detection of these genes will help in prevention and adequate infection control by limiting the spread of these organisms.

Keywords:; *Klebsiella pneumoniae*, NICU, PFGE, $bla_{\text{OXA-48,}}$ $\text{bla}_{\text{CTX-M-group-1}}$

2. THE MOST COMMONLY USED TESTS FOR THE DIAGNOSIS OF ACUTE CHLAMYDIAL INFECTION IN PUBLIC AND PRIVATE LABORATORIES IN SERBIA

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Abstract

Objective: To determine which laboratory tests are most frequently used for the diagnosis of acute chlamydial infection within the Network of the Public Health Institutes and private laboratories in Serbia.
Methods: The survey involved 22 microbiological laboratories from the Network of Public Health Institutes of the Republic of Serbia and 20 laboratories from the private sector. The survey was conducted by phone and five different tests were offered: DIF, RT, IgA, IgG and PCR where each laboratory could indicate another diagnostic test used.
Results: Of the total number of respondents from the Network of the Public Health Institutes, 59.1% use RT for diagnosing chlamydial infection while 40.1% use DIF. Besides DIF, more than half laboratories (55.6%) also perform serology. Of the total number of surveyed private laboratories, 90% use DIF for diagnosing chlamydial infection. Other tests are offered besides DIF, but the serology (65.0%) has advantages over other tests. PCR as recommended method is used in private laboratories in higher percentage (40%) than in Public Health Institutes (9.1%).
Conclusion: Based on the overall sample, DIF, IgG and RT are most commonly used for the diagnosis of chlamydial infection. The dominant method for diagnosing this infection in Public Health Institutes is RT, while in private laboratories it is DIF.

Keywords: *Chlamydia trachomatis*, diagnostic methods, survey, Serbia

3. MONITORING THE EFFECTS OF LOCAL APPLICATION OF PESSARIES WITH PROBIOTIC STRAIN *LACTOBACILLUS RHAMNOSUS* LB68 IN WOMEN OF DIFFERENT AGES

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Lactobacilli are part of the physiological vaginal flora with a role in maintaining the balance of the vaginal ecosystem. The beneficial effects of the local application of the probiotic strain *Lactobacillus rhamnosus* LB 68 in the form of pessaries have been proven by the long-term use in our market. Monitoring the effect of this strain in a new form, easily soluble pessaries, and presenting part of the results obtained are part of this pre-clinical study for the registration of the preparation.

The aim of this paper is to monitor the effects of local application of pessaries with probiotic strain *Lactobacillus rhamnosus* LB 68 in women of different ages

Material and methods: The study was carried out at the Institute "Torlak". Sixteen women (8 women in generative period and 8 postmenopausal women), aged 35-85, were involved, who agreed to participate in the experiment due to various disorders in terms of increased secretion, stinging, itching or dryness. Vaginal swabs were cultivated before the use of pessaries, 7 days after the use of the pessaries and 7 days after the repeated use of pessaries containing *Lactobacillus rhamnosus* in the amount of 10^{8}-10^{10} CFU / ml. Isolation of microorganisms was done on standard bacteriological and mycological culture media, and isolation of lactobacilli on MRS agar. The patients provided their medical history and all observations during the use of pessaries they provided in the form of a survey.

Results: Prior to the use of pessaries, saprophytic flora was found in 14 women, while *Candida albicans* monocultures were isolated in 1 woman, and in the other woman the cultivated culture media remained sterile. Lactobacillary flora was isolated in 4 women of the generative period and in 1 in postmenopausal period. After the first use of the pessaries for 10 days, the isolated flora remained unchanged. After the repeated use of the vagina for 10 days, strain *Lactobacillus rhamnosus* LB 68 was isolated in all women in the generative period and in 4 postmenopausal women. Subjective symptoms were visibly reduced in all women after the first use of pessaries, and after the repeated use in 14 women the symptoms completely disappeared. No adverse effects were reported.

Conclusion: Local application of the probiotic strain *Lactobacillus rhamnosus* LB 68 in the form of easily soluble pessaries colonized the vaginal epithelium, influencing the reduction or cessation of subjective disorders, without adverse effects.

Keywords: *Lactobacillus rhamnosus*, vaginal flora.

4. ASSESSING THE CROSS CONTAMINATION AND TRANSFER RATES OF *ESCHERICHIA COLI* FROM LETTUCE UNDER DIFFERENT KNIFE-HANDLING SCENARIOS

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Objectives: Improper food preparation practices in consumers' homes have previously been demonstrated as contributing to food-borne diseases. Aim of the study was to evaluate the transfer of ***E.coli*** from inoculated lettuce to knife and from contaminated knife to uninoculated lettuce as model of ***E.coli*** O157:H7 contamination.
Methods: In scenario 1, sterilized knives were used to cut contaminated lettuce (log 7 CFU/mL) and after that, without previous washing, were used for cutting fresh lettuce; in scenario 2, used knives were washed with water (1L, 46ºC, 25s); and in scenario 3, with detergent (1 mL) and hot water (1L, 46ºC, 25s). In each scenario, knives and lettuce were sampled for population of *E. coli*.
Results: Contamination transferred from an inoculated lettuce to a sterile knife resulted in further transfer of cells to fresh uninoculated lettuce. In scenario 1, transfer rate was 34%. and in scenario 2 was 15%. However, in scenario 3, less than 1 log CFU/g or cm^2 organisms were detected on lettuce or knife, after proper washing of knives.
Conclusion: These results highlight the necessity of proper sanitization of utensils when used in preparation of raw produce and show that the recommended practice for proper washing of knives is effective in removing *E. coli* and preventing food-borne infections.

Keywords: ***E.coli*** O157:H7, cross contamination, food-borne disease

5. AN OUTBREAK OF CARBAPENEM AND COLISTIN RESISTANT *KLEBSIELLA PNEUMONIAE* AT A NEONATAL INTENSIVE CARE UNIT AT THE INSTITUT OF NEONATOLOGY, BELGRADE

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Objectives: Carbapenem-resistant *Klebsiella pneumoniae* associated with colistin resistance, poses a severe health threat due to the limited treatment options.In order, to describe the outbreak of *K.pneumoniae* carbapenemase (KPC) producing *K.pneumoniae* in a neonatal intensive care unit (NICU) in Belgrade, we checked antimicrobial susceptibility to various drugs to assess the burden of multiple drug resistance.
Materials and methods:A total of 17 clinical isolates of *K. pneumoniae* of 192 cases of neonatal infection were studied from February to May 2017. Bacterial isolates were identified using standard phenotypic methods and sensitivity to antibiotics was carried out by the Kirby-Bauer disc-diffusion method, E-test and Vitek-2.
Results: All the isolates were completely resistant to the third and fourth generation cephalosporins tested, as well as carbapenems and colistin. Isolates have susceptibility only to chloramphenicol and amikacin.
Conclusion: Our experience demonstrates the serious risks presented by KPC, especially colistin resistant, in NICU.The development of multidrug resistant organisms should dictate the rational use of empiric antibiotics for neonatal infections. Furthermore, continued monitoring of the susceptibility pattern is necessary in order to detect the true burden of resistance for its proper management.

Keywords: *Klebsiella pneumoniae*, NICU, carbapeneme, colistin

6. ADVANTAGES OF LIQUID BACTERIAL GROWTH MEDIUM APPLICATION IN ROUTINE TUBERCULOSIS DIAGNOSTICS

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Introduction: Lately in laboratory tuberculosis diagnostics, methods for fast *M.tuberculosis* identification have been increasingly applied.
Aim: The aim of our study was to emphasize significant shorter time needed for isolation and identification of *M. tuberculosis* using liquid growth medium.
Materials and methods: A retrospective study included period from Jan 2015 till Dec 2016. Laboratory results obtained in the Municipal Institute were used. Samples are simultaneously grown both at Löwenstein medium and Mycobacteria Growth Indicators Tubes (MGIT).
Results: Out of total 1202 samples, sputum smear were 557 (46.34%), fibroaspirates 266 (22.13%), pleural punctates (11.64%) and 115 (9.59%) other specimens.
Positive culture results were obtained in 180 (15%) of which 170 cultures were found to be *M.tuberculosis* while 10 was noted as nontuberculous mycobacteria. Growth in both media were observed in 150 (83.33%) specimens, 23 were recorded only in Löwenstein medium and 7 (3.9%) were found positive only in MGIT.
Fluorescence of liquid growth bacterial medium was most often observed in week 2, in 58 (36.94%) samples, then in week 1 in 44 (28.02%) samples and finally in week 3 in 31 (19.74%) specimens. Of 157 liquid medium positive cultures, in 32 (26.11%) sputum smear microscopy proved to be negative.
Conclusion: Use of MGIT for specimen growing, significantly shortened time necessary for isolation of *M. tuberculosis*.

Keywords: *M. tuberculosis*, laboratory diagnostics, MGIT

POSTER PRESENTATIONS

1. EVOLUTION OF MACROLIDE RESITANCE IN *STREPTOCOCCUS PYOGENES* IN THE TWENTY TWO-YEAR PERIOD IN SERBIA

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Objectives: The aim of this study was to examine the prevalence, phenotypic and genotypic characteristics of macrolide resistance in pharyngeal isolates of *S. pyogenes* in a 22-year period (1991-2012) in Serbia.
Materials and methods: The study included 6196 pharyngeal *S. pyogenes* isolates collected from different regions in Serbia, which were tested for antimicrobial susceptibility. The further characterization of macrolide resistant isolates included determination of phenotypes, detection of resistance determinants (*mef*A, *erm*TR, *erm*B, *tet*M and *tet*O), *emm* typing and MLST analysis. The majority of these isolates (89%) originated from school age children.
Results: All strains were completely susceptible to penicillin. During the examined period, macrolide resistance rates steadily increased (from 2.41% in 1991-1999 to 12.5% in 2009) but in the period 2009-2012 slight decrease was noted (9.6%). The M phenotype of macrolide resistance dominated throughout the whole observed period (84-71.8%), followed by the cMLS (12-9.7%) and iMLS (4-18.4%). Among macrolide resistant isolates three clones predominated: *emm*75/*mef*A (62%), *emm*12/*mef*A (14%) and *emm*12/*erm*B/*tet*M (6%). Resistance to tetracycline and norfloxacin was found in 6% and 9.8% isolates, respectively.
Conclusion: Further surveillance of antibiotic resistance in *S. pyogenes* in Serbia is important for the monitoring of macrolide resistance and examination for clonal stability of resistant strains.

Keywords: *S. pyogenes*, macrolide resistance, phenotypes, *emm* types

2. ANTIBIOTIC RESISTANCE RATES OF GROUP B STREPTOCOCCUS IN SERBIA 2015-2017

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Objectives: The proportions of group B streptococci (GBS) isolates resistant to clindamycin and erythromycin have increased over the past 20 years. This led to changes of therapeutic and prophylactic guidelines for GBS infections. In this study antibiotic resistance and distribution of macrolide resistance phenotypes of GBS isolates from Serbia was determined.
Methods: GBS isolates collected from different regions of Serbia in the period 2015-2017. were tested for antimicrobial susceptibility and macrolide resistance phenotypes were determined.
Results: All isolates (N=644) were susceptible to penicillin, vancomycin, norfloxacin and chloramphenicol. Isolates with reduced susceptibility to penicillin were not found. The rate of tetracycline resistance was high (86.6%). Resistance to erythromycin and clindamycin was detected in 24.8% and 22.2% of isolates, respectively. Among macrolide resistant isolates, 92.5% of them were also resistant to tetracycline. In invasive (N=40) isolates, rate of macrolide resistance was 20%, and all isolates were tetracycline co-resistant. Among noninvasive (N=604) isolates, 23.6% were macrolide resistant and the majority (93.4%) were co-resistant to tetracycline. The cMLSB phenotype (58.1%) was predominated, following with iMLS (26.9%) and M (15%) phenotypes.
Conclusion: Rates of resistance to macrolides and tetracycline are high both among invasive and noninvasive GBS isolates, and ccontinuous surveillance is therefore needed.

Keywords: Group B streptococcus, antimicrobial susceptibility, macrolide resistance phenotypes

3. COLISTIN ANTIMICROBIAL SUSCEPTIBILITY TESTING: IS THERE A SIMPLE SOLUTION?

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Objectives: Colistin antimicrobial susceptibility testing is of great challenge today, since the most commonly used methods (disc-diffusion, gradient test, automated systems) are no longer reliable. Broth microdilution, as a reference method, is not suitable for routine use. The objective of this investigation was to evaluate the newly developed Rapid Polymyxin NP test that enables rapid detection of polymyxin resistance in *Enterobacteriaceae.*
Materials and methods: For 8 colistin resistante *Klebsiella pneumoniae* isolates minimal inhibitory concentrations for colistin were determined by broth microdilution method and were interpreted in accordance with EUCAST recommendations. Molecular basis of resistance to colistin was assessed by the *mgrB* gene sequence analysis, RT-qPCR for the *phoP*, *phoQ* and *pmrK* and PCR for mcr-1/2 genes. All isolates were tested with Rapid Polymyxin™ NP test (ELITech Microbio, France).
Results: The broth microdilution showed high level of resistance to colistin (MIC: 8-64 mg/L). Molecular mechanisms included over expression of *phoP, phoQ* and *pmrK* and mutations of *mgrB* and *pmrAB* hromosom genes. The *mcr* genes were not detected. Rapid Polymyxin™ NP test showed the sensitivity and specificity both 100%, compared to the broth microdilution as a reference test.
Conclusion: The Rapid Polymyxin™ NP test can be used for simple and reliable determination of susceptibility or resistance to polymyxins and to rapidly identify carriers of polymyxin-resistant isolates.

Keywords: Colistin, Antimicrobial Susceptibility Testing, Polymyxin ™ NP test

4. COMPARING THE PRESENCE OF SERUM ANTIBODIES TO *HELICOBACTER PYLORI* AND STOOL ANTIGEN TEST

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Objectives: Until recently, serum antibodies against Helicobacter pylori. (H. pylori) considerd always of diagnostic significance, but with the introduction of a stool antigen test to prove the antigen with monoclonal or polyclonal antibodies, new perspectives were open. In a group of patients with a positive serological finding, it will determine if there are patients in whom H. pylori antigen can not be shown in the stool.

Materials and methods: Ambulatory patients were examined at the Institute of Public Health Nis, in the period from 27.12.2013. to 25.07.2014. years.
Serum antibodies have been proven by the ELISA method (EUROIMUN,H.pylori IgA, IgG, Germany).
In patients with an ELISA method the presence of H. pylori antibody was required in the presence of antigen in the "Stool antigen" salt monoclonal antibody (OXOID, United Kingdom)
Results: Of the total number of patients examined, 162 patients were tested for both infertility. In them, the ELISA method demonstrated the presence of H. pylori antibodies. In 100 patients with positive antibody finding (61.73%), the presence of antigen in the stool antigen test was also demonstrated. The presence of this antigen was not demonstrated in 62 patients (38.27%)
Conclusion: The "Stool antigen" monoclonal antibody test proved to be a more precise method for diagnosis than the antibody test for H. pylori.

Keywords: Helicobacter pylori, antibodies, antigen in the stool

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5. SUSCEPTIBILITY OF CLINICAL ISOLATES OF ANAEROBIC BACTERIA TO ANTIMICROBIAL AGENTS

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Introduction: The most common anaerobic infections are polymicrobial and isolation and susceptibility testing of clinical isolates of anaerobic bacteria is time consuming. For this reason the therapy is often empirical. However, data from literature indicates that resistance of anaerobic bacteria increases and performing of susceptibility testing is useful for therapy as well as surveillance. The objective was to show susceptibility of clinical isolates of anaerobic bacteria.
Material and method: From January 2012 to June 2017 in the Center for microbiology, Public Health Institute Niš, antimicrobial susceptibility testing was performed with routine testing for 102 isolates of anaerobic bacteria (except *C.difficile*). Bacteria were isolated from blood (8), peritoneal fluid in abdominal infections (42), pus aspirate (41), and smears from deep wounds (11) obtained from hospitalized patients. Identification of anaerobic bacteria performed by BBL Crystal system and VITEK 2 system, and susceptibility was determined using E test strips for penicillin, amoxicillin\clavulanate, meropenem, clindamycin and metronidazole. The test was interpreted according to CLSI standard (from 2012 to 2014) and EUCAST standard (from 2015).
Results and conclusion: Out of all isolates 29 belong to *Bacteroides fragilis Group*, 13 were other species in the genus *Bacteroides*, 19 were other Gram-negative rods, *Clostridium spp*. 11 isolates, other Gram- positive rods 6 and Gram-positive cocci 24 isolates. All tested isolates were susceptible to meropenem. All *Bacteroides fragilis Group* isolates were susceptible to metronidazole, and in 60.9% to clindamycin. From isolates that belong to other species in the genus *Bacteroides* to metronidazole and clindamycin were susceptible 84.6% and 40% of isolates respectively. Other Gram-negative rods were susceptible to metronidazole and clindamycin in 94.7% and 66.7% of isolates respectively. All isolates of *Clostridium spp*. were susceptible to amoxicillin/clavulanate, meropenem, clindamycin and metronidazole. Gram-positive cocci were susceptible to metronidazole in 75% and to clindamycin in 70%. Susceptibility of isolates to meropenem and metronidazole in our local area is high and periodic surveillance is need to monitor susceptibility trend.

Keywords: susceptibility, anaerobic bacteria

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6. RECAP/3D-QSAR ANALYSIS OF SULFONAMIDE DERIVATIVES OF *CIS*-5-NORBORNENE-*ENDO*-2,3-DICARBOXYLIC ANHYDRIDE AS INHIBITORS OF CARBONIC ANHYDRASE II

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Objectives: Applying the retrosynthetic combinatorial analysis procedure (RECAP), the aim of the study was to find sulfonamide derivatives of *cis*-5-norbornene-*endo*-2,3-dicarboxylic anhydride that would inhibit carbonic anhydrase II (CA II). Also, using the 3D-QSAR model and molecular docking we tried to explain the mechanism of inhibition of the most potent compounds.
Materials and methods: In order to search novel sulfonamide compounds as putative CA II inhibitors, four computational strategies were adopted: (1) RECAP, (2) pharmacophore search, (3) 3D-QSAR modeling and (4) molecular docking.
Results: Molecular database with 10000 compounds was created by RECAP analysis. Subsequently 19 sulfonamides incorporating *cis*-5-norbornene-*endo*-3-carboxy-2-carboxamido moieties and 16 sulfonamides incorporating *cis*-5-norbornene-*endo*-2,3-carboximido moieties were RECAP synthesized according to pharmacophore query. The best 3D-QSAR model with r^2 (0.93) and q^2 (0.87) values was used to predict the activity of RECAP synthesized sulfonamides. Application of 3D-QSAR model, showed responsible factors of sulfonamides inhibitory activity. The interactions as well as binding affinities of the most potent RECAP sulfonamides to CA II enzyme, were compared to standard inhibitor dorzolamide.
Conclusion: This study provide valuable insight for designing more potent and selective CA II inhibitors for the treatment of glaucoma and ischemic cardiomyopathy.

Keywords: RECAP, 3D-QSAR, sulfonamides, CA II enzyme, molecular docking

7. CHEMOINFORMATICS INVESTIGATION OF SULFONAMIDE DERIVATIVES OF BENZAMIDE AS INHIBITORS OF CARBONIC ANHYDRASE I

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Objectives: Sulfonamide derivatives of benzamide are important inhibitors of enzyme carbonic anhydrase I (CA I).The aim of this study was to determine the drug-like properties of selected sulfonamides and to select the most promising sulfonamide as a fingerprint for design and *de novo* synthesis of noteworthy CA I inhibitors.
Materials and methods: Physico-chemical, pharmacokinetic and toxicological properties for 40 sulfonamide derivatives of benzamide were examined and compared using the Molinspiration, admetSAR, Toxtree, DataWarrior and MOE programs.
Results: Chemoinformatic parameters of the studied sulfonamides single out sulfadiazine as a promising drug-like CA I inhibitor. Interactions between sulfadiazine and enzyme were shown using the molecular docking. It was shown that sulfadiazine acts as the strong CA I inhibitor followed by the interaction with amino acids Asn67, Gln92 and Thr199. The sulfadiazine pharmacophore model confirmed the lack of compounds with similar structural and CA I inhibitory properties.
Conclusion: Results of this study showed the importance of chemoinformatics in the study of inhibitory properties of sulfonamides. Based on the pharmacophore model of sulfadiazine, we have concluded that there is a need for further research and *de novo* synthesis of a new pharmacologically active sulfonamides.

Keywords: chemoinformatics, sulfonamides, CA I enzyme, sulfadiazine, pharmacophore model

SESSION: CURRENT CHALLENGES IN HEALTH CARE SYSTEM

INVITED LECTURES

1. HEALTH FACILITY QUALITY THROUGH THE REFORM OF HEALTH SYSTEM IN THE REPUBLIC OF SERBIA

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[2]Public Health Institute „Milan Jovanović Batut“, Serbia

Reform is the process of changing the prevailing economic, political and other relations and institutions, by peaceful means on the basis of acts of state authorities, or on the basis of the agreement of certain social forces and organizations. Reform of the health system involves activities related to the change in health care policy and institutions through which these changes will be implemented. Reforming the health care system focused on: defining priorities, improving Health Policy and reform of the institutions through which policy will be implemented in practice. The health care system reform passes through several phases: problem definition, diagnosis, policy formulating, political decisions, implementation, and evaluation. Causes of health care system reform in the world are different: Political changes, changes in the social system in the former socialist countries and liberalization after a period of conservatism, Economic changes- the global economic crisis, Demographic changes, - 1970 and 1980, and the last couple of years have been years of transition in demographic models, Cultural changes - changes in lifestyles, the traditional family structure, values and general expectations, Epidemiological changes - mortality, morbidity, Higher public expectations, New findings, Technical and technological improvements.

In such environment striving for quality is expected. It is well known that Quality is doing the right things (effectiveness) in the right way (efficiency), but standards are higher and higher and in modern systems excellence is needed. Quality in health system is not new concept. Historically, health facility Quality was seen and analyzed through phases, firstly as exclusive responsibility of health professional, and lately as product of overall quality of medical facilities and staff, patients, health systems and environments. There are a multitude of dimensions of quality care or dimensions of quality performance, to name just as: efficiency, efficiency, efficacy, continuity, equity, acceptability, timeliness, appropriateness, availability, safety, effectiveness.

Taking into account the different interests of the stakeholders who are directly involved in providing medical services, there are three viewing angles on the quality of medical care: quality for users and what users and health professionals expect; professional quality: medical doctors and other experts estimate that you have met the needs of the patient; if the services are rendered technically correct; and whether proper procedures were applied in order to meet users' needs; quality management: medical care is assessed in relation to the efficiency, effectiveness and productivity, within the given limits and guidelines prescribed by the political and financial decision-makers in the health system.

Various mechanisms have been developed for assessing, monitoring and quality assurance of health care, but not all mechanisms are equally successful: some diagnose poor quality, but it does not improve, some have only contributed to the development of the new administration and bureaucracy with high cost and low performance. However, it has been pointed out that quality is measurable and that poor quality can prevent, monitor and evaluate. The quality of

health services has led to significant positive changes in the attitude of health workers and the management of health institutions.

Program of improving health facilities quality in the Republic of Serbia has been conducted since 2004 and has undergone various stages of development, and aided by legislation, the development of the Methodological guidelines for the monitoring indicators and rankings annually, has taken root in health facilities. Key role has been taken by Ministry of Health of the Republic of Serbia and Public Health Institute "Dr Milan Jovanovic Batut". Although it was not easily implemented, the Program had clearly defined goals from the very beginning:

- Continuous monitoring and evaluating the quality of health services;
- Continuous improving the quality of health care provided to the patient;
- Quality for health professionals and health facility.

Thirteen years have passed and there were many obstacles that we have faced in practice. We needed years to develop and implement the system, and when we did it, new challenges appeared: frequent changes in the commissions for the improvement of quality, a lack of understanding of the process, the lack of an integrated approach, the lack of financial resources, denial of existing problems, the absence of corrective measures, poor teamwork, the impact of poor interpersonal relationships, changes in the field which were not followed with adequate changes of indicators and methodology. Joint work on the program quality in many areas of health care facilities gave positive developments: purchased much needed equipment, organized a number of training to improve the skills of health workers, and introduced new procedures implemented in the workforce reorganization. For the period of the Program it seems that system stopped the system in some segments. There are many health facilities in Serbia where TQM is applied and lead to better results and high quality of health services, but still there are health facilities that need further support for developing the quality. It appears that health facility quality stayed as responsibility of health facilities depending on conscience of their own. These could be logical in the process of reform since it is the process that need time, need years. It is important to recognize such moments, and continue the change. The role of the institutes of public health with the support of the Ministry of Health is crucial for further development of the program.

Keywords: quality, health facility, reform, health system

ORAL PRESENTATIONS

1. CHILD ABUSE AND NEGLECT REPORTED IN HEALTHCARE FACILITES IN SERBIA 2015

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Objectives: Child abuse is when a parent or caregiver, whether through action or failing to act, causes injury, death, emotional harm or risk of serious harm to a child.
Materials and methods: Data aanalysis from 29 healthcare facilities through the online recording system.
Results: A total of 639 children were reported, regarding 709 reports of instances of abuse and/ or neglect. The higher percentage (27%) of children had been exposed to abuse and/or neglect was in the age of 12-14 years. Three-quarters of the reported children had suffered physical abuse (78%), two-fifths emotional abuse (40%), one-seventh sexual abuse (14%) and every seventeenth child had witnessed domestic violence.
From a total of 201 reported instances of neglect, more than half of the children suffered medical neglect (55%) and emotional neglect (51%), 45% physical neglect, and one-third educational neglect (30%).
The most common abuser, for all types of abuse are peers, parents and known person from the child's environment.
Conclusion: Child victims are no longer invisible: every year health professionals are better able to detect and treat the consequences of abuse and to report each instance to the relevant system.

2. EXPERIENCES IN THE PROJECT WASTE MANAGEMENT CURRICULA DEVELOPMENT IN PARTNERSHIP WITH PUBLIC AND PRIVATE SECTOR

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[2]Public Health Institute Niš, Serbia

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. The WaMPPP project wishes to address the slow progress in environment protection (Chapter 27), especially in the field of waste management. Serbia still produces excessive amounts of all kind of waste (mostly dumped in landfills) and manages hazardous waste by inappropriate means. Insufficient efforts have been made to tackle the problem, possibly hindering the Serbian accession to the EU. It will also contribute to raising the awareness in society about the importance of the overall WM process and its possibilities in the development of society and reduction of poverty.
Accordingly, the project had 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

Keywords: Waste, management, curricula

3. INDICATORS OF EMPLOYEE SATISFACTION AS A MEASURE OF THE QUALITY IN HEALTH INSTITUTIONS

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The national survey of employee satisfaction in health institutions in the Republic of Serbia gives the opportunity for all employees to express their opinions on equipment, interpersonal relationships, working time, professional development opportunities, salary, cooperation with coworkers, managers and patients, exposure to stress and pressure at work, and even whether or not they plan to change jobs.
The survey was carried out in 2016, December 5 in 324 healthcare institutions in Serbia. The studies used a unique questionnaire composed of 23 questions and fill it by employed workers of all profiles in health institutions.
A comparative analysis of general job satisfaction showed that employee satisfaction continued to grow from 2006 to 2009. In the period from 2009 to 2016, the satisfaction of workers has been steadily decreasing. In 2016, the percentage of satisfied and very satisfied is amounts to 40.4%, dissatisfied and very dissatisfied - 24.5%.The number of those who are indifferent to the work is maintained at about 35%from year to year.
The most satisfied employees are working in primary health care.At the primary level, employee satisfaction is higher in all aspects than in secondary and tertiary ones.
The percentage of very satisfied is decreasing in all professions.
The highest average satisfaction rating (3.47) in 2016, as well as in previous years, had employees in institutes of public health. Job satisfaction was rated with the lowest rating in emergency medical services (2.95).
Our research has shown that the greatest dissatisfaction among employees is the salary and it is grows from year to year, as well as increased stress at work.

Keywords:employee satisfaction, health institutions, survey, quality

4. CAPACITY OF PRIMARY HEALTH CARE CENTERS OF SERBIA TO SUPPORT EARLY CHILD DEVELOPMENT AND CHILDREN WITH DISABILITIES

Danijela Dukic, Mirjana Zivkovic Sulovic, Jelena Brcanski, Snezana Plavsic
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Objectives: The aim of this study is to get information about capacity of Primary health care centers in Serbia to provide services for children at developmental risk, in order to improve services for early child development, and for children with disabilities.
Materials and methods: It was cross sectional research. We used questionnaire, composed of six parts.Through network of Institutes of public health, we disseminate questionaireto Primary health care centers. Data were collected during January and February 2017. We used SPSS (Statistical Package for Social Science,22.0) for sorting, grouping, tabular and graphical analizing and presentation of data.
Results: There is260 pediatritians in 39 analized primary health care centers, and out of them only 84 pediatritianshave additional training in area of early child development. Out of them only 56 use that knowledge in every day practice.
Coclusion: These results suggest that the Ministry of Health needs to reconsider Health Policy in order to improve capacity of pediatritians.

Keywords: Child development, Primary Health Care, Child disabilities

5. THE TREND OF ILL-DEFINED CAUSE OF DEATH IN SERBIA FROM 1997-2016

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Background: Ill-defined cause of death is one of the most important indicators of the quality of coding in the registration system. The aim of this registry-based study was to estimate the trend of ICD codes for "symptoms, signs and ill-defined conditions "- ICD 10 codes R00-R99) as the cause of deaths in Serbia from 1997-2016.
Method: The underlying cause of death from ill-defined cause of death was determined using the International Classification of Diseases and Injuries (10^{th} Revision, ICD -10) codes R00-R99. We obtained the mortality database for the period 1997-2016 from the Statistical Office of the Republic of Serbia.
Results: From 1997 to 2003, the percentage of the R00-R99 cause of deaths increased, with the annual percentage change (APC) of 7.15% in men and 7.16% in women. From 2003 to 2006, the percentage of the R00-R99 cause of deaths steeply decreased with APC of 21.87% in men and 21.23% in women. From 2006 to 2016, there was a non-significant gradual decline with APC 0.73% in men and 1.08% in women.
Conclusions: From 1997 to 2016, the ill-defined cause of deaths showed two segment trends in Serbia, with an increase in the first, and a decrease in the second period, which indicates an improvement in death certificate registration system in Serbia.

Keywords: death certificate, trends, registry system, ill-defined cause of death

6. ATTITUDES OF HEALTHCARE WORKERS FOR OPPORTUNITIES FOR WORKPLACE STRESS PREVENTION

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Occupational health promotion positively affects the health profile of employees, which is reflected in the increase in productivity and economic profit of the organization.
Objective: To evaluate organizational factors of importance for the development of health promotion programs at work and to define the causes of stress at work.
Method: 88 employees of the Public Health Institute Pancevo participated. The "Checklist for the prevention of stress at work" was used in order to determine priorities for taking preventive measures.
Results: Priorities have been identified in 10 testing segments and the priorities showed the need to protect privacy, adjust the scope of work, encourage employees' participation in improving work and productivity, provide a comfortable working environment, optimize working hours, openly praise the good work of employees and teams, creation of procedures and models of activities for finding solutions for violence, harassment and abuse at work, improving the stability of employment, regular informing of employees about important decisions, and informing employees about plans for the future and changes.
Conclusion: The highest priority was given to the need to protect the privacy of employees and to provide a comfortable work environment that is suitable for physical and mental health.

Keywords: stress at work, prevention, management

7. THE WORK QUALITY EVALUATION IN THE FIELD OF GYNECOLOGY AND OBSTETRICS AT THE INSTITUTIONS OF TERTIARY LEVEL OF HEALTH CARE IN THE REPUBLIC OF SERBIA

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Introduction The health care institutions of all three health care levels are included in the implementation of health care quality concept.

Objectives The indicator`s analysis in the field of gynecology and obstetrics at the four tertiary health care institutions in the RS in the period 1.1.2012-31.12.2015.

Methods The work quality indicators in the field of gynecology and obstetrics for the CC Vojvodina, CC Kragujevac, CC Serbia and The Gynecological and Obstetrics Clinic `National front` were used from the database of The National Institute RS, for the period 1.1.2012-31.12.2015.

Results The average staying length at the hospital of all institutions has been increased after normal birth (mostly at CC Vojvodina, 25.95%), as well as the births percentage performed by C-section (the highest at CC Kragujevac, 24.08%). The C-section births percentage is the highest at CC Serbia (2015 - 36.73%), which also has the lowest injured infants number. CC Vojvodina had the smallest injured women percentage in 2015, and the highest percentage of infants was 11.88%. The situation at CC Serbia was reversed: 28,58% of injured mothers and 0.19% of the injured infants. The highest epidural anesthesia births percentage is performed at NF (2015 - 55.17%).

Conclusion In order to improve the health care quality, establish a scientifically and professionally based standard for each of the health care indicators.

Keywords: quality, indicators, gynecology and obstetrics

8. IMPACT OF BILL PROPOSALS FOR CHANGES OF THE LAW ON PROTECTION OF POPULATION AGAINST INFECTIOUS DISEASES

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Objectives: Adjustment of national legislation with the requierements of the EU, assessment of the status and basic issues regarding bill proposal for changes of the Law on protection of population against infectious diseases and the effects of the law making, benefits of the bill proposal
Materials and methods: Legal framework and analysis of conducted consultation and comments by interest groups on the bill
Results: Reduction of frequency of medical examinations and health education. There is no longer a need for medical examinations of persons in the education system and people who handle only packaged food. The legal proposition is to implement the measures contained in the program aimed at reducing the business costs of entrepreneurs through the reduction of parafiscal charges, thus freeing the possibility of reinvesting funds and encouraging the growth and development of the private sector.
Conclusion: Without taking into account the differences of individual counties and parts of the Republic of Croatia, further jeopardizes the business and financial stability of a significant number of public health institutions, and indirectly their ability to carry out their core activities and participate in providing health care to Croatian citizens.

Keywords: law, changes, influence, difference, reduce

9. AUSTRIAN NURSING HOME RESIDENT: A CHALLENGE FOR GOOD QUALITY OF LIFE

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Introduction: Replacing place of living in late life can turn out to impact on social interactions. The amount of social activity could influence on psychological stability and health. One of the main challenge of long-term care organization in nursing homes for elderly disable people is quality of life improvement.
Objectives: The aim of the study was to analyze influence of social activities inside the nursing homes on self-rated health.
Materials and methods: This study relies on a cross-sectional survey administrated in June 2017 in Graz, is the capital of the southern Austrian province of Styria. Study population were elderly people over 65 years' old who were in nursing home. 27 individuals completely filled the questionnaire, with response rate of 65% of the overall target sample. Ordered logistic regression analysis was used to estimate associations between self-rated health and social activities inside the nursing home with adjustment for individual characteristics.
Results: The participants of the study were included on average in 2.5 social activities organized in nursing home. The mean age was 86 years and most of them spend more than a year at nursing home. We found that better self-rated health was associated with bigger number of social activities.
Conclusion: The results show that social activities have influence on subjective health assessments. The long-term care organization inside of the nursing homes should constantly improve, considering, both social and healthpatients' needs.

Keywords: nursing homes, social network analysis, elderly, self-rated health, long-term care

10. PREDATORY PUBLISHING IN SCIENCE

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Abstract
Researchers today are under strong pressure to publish. That is why some researchers may wish for an exit strategy when traditional academic publishing is perceived as slow.
Journals are usually indexed and receive impact factor on the basis of how frequently their articles are cited in other articles. But the problem is that figures and numbers can be manipulated. One way to do this is to create citation cartels, in which journals enter into an agreement to quote each other's articles to an excessive extent, by choice of the editor.
The explosion of open access journals in recent times has brought with it increased opportunities to find decent journals to place academic work in. But not all actors are interested in promoting science while making their money. Rogue publishers serve their own economic interest, while creating dubious merit for scholars publishing with them.
This article describes and discusses the phenomenon "predatory publishing", in relation to academic journals, and suggests a list of characteristics by which to identify predatory journals. Towards the end of thearticle it is discussed what can be done to eliminate or reduce the effects of this development.

Keywords: Predatory publishing; Predatory journals

11. SAFETY AND HEALTH AT WORK IN HEALTHCARE

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Goal- Analysis and prevention of health and safety risks of healthcare activities.
Methodology - The survey was conducted as a cross section study with two standardized questionnaires:
1. COPSOQ - Questionnaire for assessment of psycho-social factors in the working environment
(National Center for the Workplace Environment (NRCWE), Danska)
2. WAI - A questionnaire for assessing the working capacity index.
(National Institute of Occupational Safety and Health, Finland)
In total, 815 health workers, doctors of specialists and nurses-technicians from KC Nis, SB Sokobanja and OB Aleksinac were examined.
Conclusion- The analysis found: Health workers from OB Aleksinac were exposed to unwanted sexual attention in 4.4% of cases, which is significantly higher than in respondents from KC Nis (0.7%; Fischer test: $p < 0.01$) and SB Sokobanja (0.0%; Fischer test: $p < 0.01$). Health workers from SB Sokobanja were exposed to violence by patients in 2.3% of cases, which is significantly lower than in respondents from KC Nis (16.2%; Fischer test: $p < 0.05$) and OB Aleksinac (17.6%; Fisher's test: $p < 0.05$). Health workers from KC Nis were exposed to abuse by the manager in 9.6% of cases, which is significantly higher percentage than the respondents from SB Sokobanja (0.0%, Fischer test: $p < 0.05$) and OB Aleksinac (3,3%; Fischer test: $p < 0.05$).
The examined healthcare workers from all three institutions in most cases find that they are not ill or able to work with some symptoms. Because of illness or injury, they sometimes have to slow down the pace of work or change the way they work 17.8% of respondents from KC Niš, 11.4% from SB Sokobanja and 20.9% of respondents from OB Aleksinac. Often they have to slow down the pace of work or change the way of work of 3.7% of respondents from KC Nis and 3.3% from OB Aleksinac. From KC Niš, 0.7% of respondents are able to work part-time, and 0.4% think they are permanently incapable of work.
The surveyed health workers from all three institutions are in most cases relatively confident that they will be able to do their job in two years. That 25.0% of respondents from KC Nis, 38.6% from SB Sokobanja and 26.4% of respondents from OB Aleksinac consider it to be uncertain. That this is unlikely to be considered by 2.4% of respondents from KC Nis and 5.5% from OB Aleksinac. There are no statistically significant differences between these frequencies (Hi square test: $p > 0.05$).
With each increase in service for 1 year, a significant decrease in the IRS value was associated with 0.022 (0.011 to 0.033; $p < 0.001$). With the fall in IRS values are significantly related: exposure to threats by violence by subordinates by 0.931 (0.080 to 1.782; $p = 0.032$) and exposure by physical violence by the leader by 1.086 (0.028 to 2.144; $p = 0.044$).
With the increase in IRS values are significantly related: daily activity consumption by 0.463 (0.359 to 0.567; $p < 0.001$), activity and bustiness by 0.275 (0.136 to 0.414; $p < 0.001$) and fulfillment of hope for the future by 0.358 (0.268 to 0.448; $p < 0.001$).
Proposal measures- Program activities of an organizational character based on concrete measures of prevention, reduce the safety and psychosocial risks of the workplace, improve working ability and improve the quality of life.

POSTER PRESENTATIONS

1. SMOKING AS A RISK FACTOR IN CHRONIC NONCOMUNICABLE DISEASES

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Smoking is one of the most important risk factors for the emergence of massive, chronic non-contagious diseases. In Serbia, the mortality consequences from chronic non-contagious diseases are following global and European negative trends. Leading causes of death are almost identical to the causes of death in European countries, such as cardiovascular diseases, malignant diseases and chronic respiratory diseases. Smoking multiplies the risk of lung cancer and other tumors, cardiac infarction, stroke, chronic obstructive pulmonary disease. Half of smokers die from smoking-related illnesses, and a quarter of smokers die in their middle age (30-69).Smokers have, on average, a shorter lifespan than non-smokers; however, quitting smoking at the age of 50 halves the risk and at the age of 30 almost eliminates the risk. Quitting smoking at the age of 60, 50, 40 or 30 contributes to the prolongation of life for 3, 6, 9 or 10 years. Smokers have significantly higher rates of coronary heart disease, and deaths in 46% of men and 37% of women are due to the heart diseases. If a mother smokes during pregnancy there is an intrauterine fetal development delay, premature birth (14%), low weight of the newborn (20-30%), complications with placenta, spontaneous abortion. About 10,200 people die from smoking in Serbia, which is 30 per day, or at least one person per hour. Smoking, as the leading cause of the emergence of chronic non-contagious diseases, causes not only health problems in smokers but also poses public health problem that has socio-economic consequences, as well as the consequences for society and the community. Prevention and smoking cessation are one of the most effective measures for improving health. The experiences of countries that have used broad activities to prevent and quit smoking have produced significant results in reducing the number of smokers, which is correlated with the reduction in the incidence of cardiovascular and other diseases. In order to reduce mortality and morbidity from chronic non-contagious diseases caused by smoking, it is necessary to raise the awareness of the population about smoking as one of the most important risk factors for the emergence of chronic non-contagious diseases, initiate and support all forms of promotional and preventive activities in the fight against smoking throughout the community and society.

Keywords: smoking, chronic non-contagious diseases, cause, death, prevention

2. REGISTERED HEALTH STATUS OF MIGRANTS BEFORE AND AFTER THE CLOSURE OF THE BALKAN ROUTE

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Objectives: Aim of this study was to compare registered structure of medical conditions among migrants in Serbia, and structure of health services delivered to migrant populations before (07/09/2015-20/03/2016) and after the closure of the Balkan route (21/03/2016-20/08/2017).
Materials and methods: Data analysis from Information system for health surveillance over the population of refugees, migrants, asylum seekers and asylums in the Republic of Serbia in two periods.
Results: Analysis of structure of medical services provided to migrants shown that percentage of preventive screening is increased from 1,5 to 14,8 after closer of Balkan route, and laboratory analysis from 0,8 to 3,2. Curative services decreased from 94 to 79 percentage from 20th March 2016. Respiratory infections was leading cause for medical services during Balkan route (46,6%), other conditions 34,1% and gastrointestinal diseases 8%. Now, main reasons for medical services are other conditions (not relevant for epidemical surveillance) 51,8%, respiratory diseases 21,5% and parasitosis (scabies, pediculosis corporis, capitis and pubis) 8,1%.
Conclusion: Keeping migrants in collective centers caused a change in the structure of the disease as well as medical services. The change is influenced by the structure of migrants in collective centers with a large number of children.

Keywords: migrants health, Balkan route, medical conditions, services

3. HEALTH SYSTEM RESPONSES TO GENDER-BASED VIOLENCE IN SERBIA 2016

Vesna Horozović[1], Mirjana Živković Šulović[1], Nataša Ločkić[1]
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Objectives: Gender-based violence (GBV) is an expression of power inequalities between women and men. Forms of GBV are: domestic, physical, sexual, psychological, emotional and economic violence, isolation, use of children and threats of violence and harm. GBV has a strong impact on women's health and it´s a great challenge for public health.
Materials and methods: Data analysis of Questionnaire (Ministry of Health) collected from all public health institutions in April 2017.
Results: Total of 3378 GBV cases were registered in Serbia. The police were informed in 86%, the Prosecutor's Office was informed in 13% and the Center for Social Work was informed in 46% of total registered cases. Every tenth reported (9%) was women with disabilities, pregnant women, maternity or old women, and 5% of total were Roma women.
Although health workers was noted GBV, in 5% of cases, they did not submit an application to the competent police authorities, the Center for Social Work or the Prosecutor's Office.
Conclusion: A woman´s visit to a health service provider might be her only chance to receive support and care and escape a situation of abuse. GBV should be systematically integrated into health care.

Keywords: Gender-based violence, health care

4. EFFICIENCY OF IMPLEMENTING ORGANIZED SHRINING

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Introduction. Since 2013, the Republic of Serbia has organized screening programs for the early detection of cervix, breast cancer, colorectal cancer, cardiovascular risk, type 2 diabetes and depression, but the results achieved are not at a satisfactory level.
The goal is to point to problems in conducting the screening.
Method. Descriptive analytical.
Results. From the tabular presentation of the screening of all primary health care institutions in the territory of Belgrade (Branch Office for the city of Belgrade RFZO / 2017), the realization of the screening is not successful. In conditions of difficult work due to lack of staff, high burden on curative services, imposed administrative obligations related to IZIS, doctors do not have enough time to organize and conduct screenings. Healthcare law (Official Gazette of the Republic of Serbia No. 57/2011) provides for the establishment of a Screening Directorate, which, among other tasks, should organize and monitor the implementation of the screening program, participate in the organization and implementation of the screening promotion campaign. With the support of the European Union, the National Screening Office at the Institute of Public Health of Serbia "Dr Milan JovanovićBatut" was established with the task of directly implementing national programs for the early detection of cervical cancer, breast cancer and colorectal cancer.
Conclusion. By systematic screening by applying internationally recognized principles, the response of patients would be greater and more responsible while doctors would have more time to do professional work. The ultimate outcome, a better realization of screening is a common goal.

5. PRIMARY CARE OF VISION WITH CHILDREN OF PRESCHOOL AUGUST AND PUPILS OF PRIMARY SCHOOL IN THE TUZLA CANTON

Maida Mulić[1]
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Introduction: Screening, detection and treatment of amblyopia creates a healthier individual, but also a society that has a developed awareness of the importance of children's health. Ambliopia is a reduction in visual acuity on one or both eyes, without clear structural or pathological anomalies of the eye. It occurs during the process of early development of vision. Treatment of amblyopia can be successful only if it starts before the age of 7 years. The **aim** of the research was to determine early visual impairment in children, and children instructed for ophthalmic treatment and prevent further visual impairment and accompanying psychological developmental disorders.
Material and methods: The survey was conducted in the Tuzla Canton area on a sample of 26,801 preschool and school age children in primary schools and kindergartens in 2014. Children were primarily examined by educated defectologists, teachers and caregivers and addressed to ophthalmologists.
Results: 14.67% of children use glasses, 9.6% of children are treated with an ophthalmologist, in 54.2% of the sent girls and 45.8% of the boys who are molested, an ophthalmologist has established an ophthalmological disorder.
Conclusion: A high percentage of registered children with visual impairment requires continuous screening of vision with intensive intersectoral cooperation.

Keywords: screening, children, vision

6. ECONOMIC ASPECTS OF PREVENTIVE MAMMOGRAPHY COMPARED TO THE COSTS OF BREAST CANCER TREATMENT

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Goals: To present:
Disease through the incidence registered in population Cancer Registry of FBiH(Can Reg), and breast cancer mortality;
Number of opportunistic screening (mammography) in cases of breast cancer;
Hospital treatment through the number of in-hospital days and costs of treatment;
Sick leave costs.
To compare early diagnosis costs to the cost of breast cancer treatment.
Methods: Retrospective data analysis and comparison of obtained results through the prism of early diagnostic and breast cancer treatment.
Results: Breas cancer incidence, in the area of Tuzla Canton, ranges from 20-25/100.000 inhabitants, and mortality rate is 11,50/100.000 inhabitants.Preventive mammograms in the form of opportunistic screening annual include approximately 3,5% of female population of the age from 50 and above. Tuzla University and Clinical Centre conducts, in average, 260 episodes of breast cancer treatment and conducts in average 120 breast surgeries. Average costs of medical treatment, on annual level, amount 580.000 KM. Employed patients, who suffered from breast cancer, spend 9.500 days on sick leave annually. Costs of preventive mammograms, on annual level, amount300.000 KM.
Conclusion: Regular cancer screening and health checks are useful for the whole population and enable, through the early detection and early intervention, more qualitative life for patients and better chances of survival, and in some cases even a complete healing. Financial costs of prevention are significantly lower than medical treatment costs and therefore the allocation of funds for prevention would mean a significant disburdening for a health system and would enable the possibility for more rational expenditures.

Keywords:brest cancer, early diagnostic, treatment, costs

7. PHYSICIANS' PERCEPTIONS OF PHARMACISTS' ROLES IN SELF-MEDICATION AND HEALTH CARE TEAM

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Objectives: The objective of this study was to characterize physician perceptions of pharmacists' roles in primary care and self-medication, alongside their opinion on physicians-pharmacists collaboration.
Materials and methods: The study was designed as a cross-sectional survey.After obtaining basic information concerning age, gender, professional education level and position, consenting physicians were askedquestions to assess experiences and expectations of pharmacist roles, especially one regarding self-medication. They were also asked to estimate existing and possible interprofessional collaboration.
Results: Interviewed physicians were between 25 and 75 years old and female participants were slightly more in numbers. 29 different medical specialty were represented and around half of respondents work in primary health care institutions. The majority of the participants, 75% have excellent or good collaboration with pharmacists, although 21% of them communicate with pharmacists only about actual therapy related problems. Interprofessional collaboration could be beneficial and deeper involvement of pharmacists in to healthcare team could lead to improvement in healthcare outcomes according to 86% and 83% of respondents, respectively.
Conclusion: The physicians' perception of pharmacist was generally positive. Bearing in mind that pharmacists are drug therapy specialists and professionals involved in health care who optimize the use of drugs, physicians-pharmacists collaboration must be improved for a patients well-being.

Keywords:physicians, perceptions, pharmacists, healthcar

8. RESULTS OF HISTOPATHOLOGICAL FINDINGS IN THE NATIONAL PROGRAM FOR THE EARLY DETECTION OF COLORECTAL CANCER IN MONTENEGRO, FOURTH YEAR OF IMPLEMENTATION

Jovana Vuković-Leković, Đurđica Ostojić, Ivan Samardžić, Ivana Nikčević-Kovačević, Boban Mugoša
Public Health Institute of Montenegro

From June 1, 2016, on the territory of Montenegro, started the fourth year of implementation of the National Program for early detection of colorectal cancer. The target group consisted of 38,778 participants of both sexes aged 54-58. The screening test is iFOBT (Immunochemical Fecal Occult Blood Test), with a screening cycle on every two years.
Method: Based on the electronic data obtained from the screening implementers, reports were generated, and statistically processed at the Public Health Institute of Montenegro.
Results: In the past period (01.06.2016-01.06.2017), 12,859 samples were analyzed, 12,459 (96.60%) results were returned, 909 of them (7.30%) were positive. During 692 colonoscopies, 88 (15.07%) samples were taken for the histopathological analysis. Histopathological examination of the bioptic material revealed: 12 participants (13.64%) with colorectal carcinoma, 18 participants (20.45%) with adenoma-high degree dysplasia, three participants (3.41%) with adenoma-moderate degree dysplasia, 55 participants with adenoma-low degree dysplasia, ulcerative colitis, inflammatory bowel disease, or polyps.
Conclusion: More than one-third (37.5%) of participants had a pre-cancerous lesions: moderate/high grade dysplasia or cancer, without any symptoms of gastrointestinal tract.Screening, histopathological analysis, cancer

SESSION: INFORMATION TECHNOLOGY AND HEALTH

INVITED LECTURES

1. SOCIAL NETWORKS AND HEALTH

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Increased pace of technological development has made the means of communication available to almost everyone on the planet. With the development of telecommunication equipment and appearance of Android telephones, a large number of people spend the most of their day with their telephones in hand, communicating with a significant number of other people. By organizing wi-fi networks, communication devices are always available. In everyday life, wherever you go you will meet people who use their telephones and other communication devices.

Social networks are a modern phenomenon and are certainly the most used form of communication. They represent the largest virtual community and inexhaustible source of information. They can be used for socializing, meeting, sharing information, for promotion, getting informed as well as for entertainment. Through the use of social networks the population can be informed and warned on a daily basis about many issues, among other things, on issues of relevance to health. Social networks are a potentially integral part of the modern health system.

Theoretically, social networks present an excellent platform for the promotion of healthy lifestyles, consultation with appropriate doctors of medicine, scheduling examinations, the flow of health information important for diagnosis and patient therapy, and other important issues important for the state of health. Modern technology has created technical conditions to always be online anywhere you are.

The health information system in health care in the last year is experiencing progress thanks to the efforts of the Ministry of Health. Parallel with the development of the health information system, social networks are also becoming important. Social networks have always been created among people. They were not in electronic form, i.e. they were not Facebook or the like, but social and social contacts between people were always realized. Interactions and socializing were organized, not virtual, but face-to-face, and the ties between friends spread. Friends, friends of friends, relatives, neighbors, colleagues started entering the friendship circle.

In face to face contacts earlier, and today through social networks, social influence has been realized and is still being realized by transferring our experiences- positive or negative- to one another. From discussing what to prepare for lunch, how to nurture a newborn child, to

recommendations for a movie, dress style, or a book. The potential to influence the health of others through social networks is very large and its use is questionable.

Today there is not a significant number of health institutions that use a social network to advise or help to achieve a positive impact on health. It is probably a very new concept, and the assumption is that in the future those influences will strengthen daily because of the increasing number of social network users and a longer period of time are visiting various forums.

Investigating the impact of social networks such as Facebook and Twitter on the quality of their users' lives has shown that the use of social networks deteriorates the quality of their lives. Respondents have self-confidence problems when they compare their work results or effort with the results of their friends whose results they follow on social networks. Two thirds of the respondents have a problem to completely relax or fall asleep after spending some time on social networks. These examples show that a longer stay on social networks leads to a deterioration in the quality of life of their users. Virtual world is outside of reality and can certainly disturb everyday life and reality. The impact of social networks can be depicted through the fact that half of social network users are "worried" when they are unable to connect to Facebook or Twitter.

As long as you see social networks as well as the Internet itself as a place that makes life easier, where you can discover new great music, look for recommendations for good books and movies, easily find the information you need, and actually enjoy socializing with friends then there is no reason to worry, you are certainly having the best of both worlds.

Researchers working on the study of relationships between people on social networks have found that the influence of other users can change attitudes and feelings as well as to reflect on health, ranging from the flu to obesity.

"People create social networks wherever they are," says Dr. Larry Miller, chairman of "Activate Networks". "Google has their own approach, which is very wise. They watch how many people search the Internet for the flu, "notes Dr. Miller. "It means we can get a couple of weeks to prevent the epidemic." Hypothetically, we can see that on a specific day groups of volunteers measure temperature in cities and healthcare workers use these results to determine which sites are susceptible to the spread of influenza. "Vaccination can be organized, because you have a few weeks available," says Dr. Miler.

In his works, Dr. Nicholas A. Christakis, a professor at Harvard University and one of the world's 100 most influential people in 2009, points to a significant link between people and health. He is at the forefront of a research project on social networks and "social network science" - an area that is in its infancy but which is rapidly developing. Dr. Kristakis watched 744 students at the University of Harvard with a group of researchers before the 2009 influenza epidemic. The first group of 319 was chosen per the random sample system, followed by 425 students identified by the first group as their friends on social networks. This study found that on average, members of interlinked groups of "friends" got influenza infection between 14 and 46 days earlier than others who were not part of this network. In conclusion, social connections are very useful, but there is also a negative side to them. Dr. Kristakis's work also suggests that happiness, divorce, obesity, and smoking cessation are more widespread over social networks.

The social impact is achieved to the extent that we are learning from each other - by recommendation of a book or a film, accepting fashion trends, improving habits related to health or work. This is also done apart from direct friends - over hundreds of people - and many of them we will never meet. Given that social networks can greatly strengthen certain tendencies, they are ideal for spreading important messages to a large number of people, stresses Dr. Miller. It's the group that is important, not an individual. It is now crucial to

examine how the social impact in a particular network works and determine who has the strongest influence in it.

"Recent discoveries enable a systematic assessment and measurement of social impact," says Dr. Miler. "Speaking the language of Facebook, a friend's friend friend - who you may not know about - affects you. This includes health-related habits, such as smoking, obesity, alcohol and drug use, sleep, depression, feelings such as happiness and loneliness and the entire spectrum of behavior that is the subject of analysis."

According to Dr Miller's interpretation, social impacts are achieved in three levels of separation. If you spend a few hundred dollars to help someone stop smoking, it can affect his friends and friends of their friends - which minimizes costs. Employees form relationships that look a bit like the structure of their corporations. They may be connected because they feel the need to talk regularly or are connected within the department in which they work or on the basis of their duties. "We claim that these networks are at the very least important, and are probably more important than the formal organizational structure. This is the way in which information is really transmitted within companies and hence habits in people's behavior, "explains Dr. Miler. "Active Networks" advises corporations how to improve co-operation, innovation, management, health and relaxation. "You can track a relatively small group of people in the network and based on their behavior one can foresee the behavior of all participants in the network," says Dr. Miler. His company uses a similar method to anticipate the use of recipes or medicines.

"You can get a picture two months ahead of what will happen in the entire population. It's a significant period, "he says. In this way, community networks of doctors can be identified as well as using better techniques for, for example, treatment of diabetes. When the key impact persons have been determined, the message can be transmitted face to face or electronically. "When information about their colleagues (on the social network) is provided to them, people change their behavior. They do it intuitively, "says Dr. Miler. If one understands that most of his colleagues have adopted more effective or more useful methods, this strongly influences behavior change.

Significant relaxation programs will be realized by way of social networks. "Soon, we need to start a project that involves drawing a sketch of the social network of the entire state of Iowa as well as a relaxation program because its governor wants Iowa to become the healthiest state in the United States," said Dr. Miller. There is still a lot to learn because the effect is realized in mysterious ways, and many of them are not yet understood. For someone in Boston, who has an obese friend of friend living in California, the risk of him becoming obese increases, regardless of whether they know each other. This is interesting and indicates that geographical proximity has less impact than expected. "Impact does not only occur between individuals, but also among groups of people. This is one of the key observations. The group is important, not just an individual, "concluded Dr. Miler.

One research that deals with the issue of marriage divorce and the impact of social networks has revealed that divorce probability increases by 75 percent if it happened to someone's friends, relatives or colleagues, if the fact was made available on social networks.

There were interesting studies concerning health, happiness and obesity. The health characteristics of online friends and changes in their status were analyzed. Depression and blood pressure level did not affect relationships among friends. Relationships ending between smokers had the least probability. Also, the least probability is that smokers will establish a relationship with other smokers on the social network.

In a study dealing with the feeling of happiness, 4,739 respondents were included, and their happiness was determined to depend on the happiness of the people they are connected to on the network. A happy friend online, about a mile away, increases by 25 percent the likelihood

that you will be happy too, while the spouse with whom you live increases this opportunity by just 8 percent.

The obesity problem was examined on a sample of 12,067 adults, found that a person with overweight online friends increased the risk of becoming obese by 57 percent. "It is not a matter of obese or skinny people looking for similar persons with whom they will hang out. Here the influence is a direct cause-and-effect relationship."

Some researches show that social networks can have a positive impact on human health. For the health care system, it is important whether social networks can influence the improvement of the health status of the population. The assumption is that the answer is positive, but today social networks are still not used enough in the health care system.

To date, many more papers were published that look into the negative consequences of using social networks.

The first negative consequence that is observed is dependence. It is known that excessive use of a computer can develop a certain dependency, especially when it comes to video games, but there is not too much difference in the use of social networks. Dependence on social networks occurs because their use stimulates the centers of pleasure in the brain that activate each time someone gives your photo a "like" or leaves a positive comment. Communication in any form, not only on social networks, affects the centers of pleasure. Stimulation of dopamine, a neurotransmitter responsible for a sense of lust, such as the desire for cigarettes, reaches a completely different level when we spend time on social networks.

The largest number of social network users have hundreds and even thousands of "friends" who regularly update their profiles, publish photos and write statuses, and in some ways communicate with each other. In real life it's hard to get fifty positive comments about a new hairstyle or car, no one will publicly praise you because you have a great musical taste or have found a phenomenal quote. Live communication requires much more effort and time than social networks and rarely involves as many participants as it is on the Internet, so we feel quite good when communicating with people via comments and likes.

As time goes on, a lack of attention and concentration develops, active social network users will notice that their focus becomes increasingly difficult and how less and less attention is being paid to them. Too much time spent on social networks can bring down the concentration as well as many other symptoms of ADHD because communication on social networks requires constant switching from one topic to another, from one place to another, from reading comments, tracking new posts, and responding to messages like and commenting and liking. Symptoms of attention deficit are: lack of concentration, always turning away from working or learning to check what is on social networks, having problems reading longer texts that quickly grow boring and uncomfortable feeling while sitting for a long time doing nothing.

The information received on social networks is constantly occupying thoughts while there are no concrete benefits from them. For this reason, there is a decline in intellectual abilities over time. Social networking, watching other people's photos, commenting and publishing short statuses can hardly be categorized under intellectual activity that improves a person in any way. Social network users over time make a conversion of real life to a virtual one. They ignore activities such as reading books and informative texts on the Internet and this is actually their worst side. That's why there is a decline in intellectual abilities.

Social network users think they are relaxing while in a virtual world, but the truth is that social networks do the opposite, because careful monitoring of everything that happens is causing fatigue. The surplus of information is tiring, especially the information received without any order and sense, quickly and in small portions. For this reason, the level of stress and fatigue increases. Instead of resting and sleeping, you will feel the need to re-entertain with some activities. This is the way the information your brain has not been able to process

during the day affects your psyche. Shorter rest and concentration drop creates stress which is a starting point for many physical and mental problems.
Aside from the aforementioned issues, social network users are suppressing emotions. When they read some bad news on the social network, they immediately look at what virtual friends think about it or simply share their impressions with them. In this way, they escape from reality and from confronting their own thoughts and emotions.
A survey conducted in Israel has shown that time spent on Facebook is directly related to eating disorders. The most common disorders are bulimia or anorexia in female adolescents aged 12 to 18 years - those are the results of a study that included 248 subjects. The research found that young people are too attached to this social network, which negatively affects their health. This is especially pronounced in girls who, unhappy with the appearance of their bodies, resort to exhausting diets leading to anorexia or bulimia. The authors of the research emphasized that the constant time spent on Facebook leads to a one-sided focus on appearance, habits and behavior. That's why parents need to monitor what their children read on this network as much as possible in order to reduce the risk of illness.
In recent years, intense social network users have begun to seek the help of experts to solve the addiction problem, which experts say is stronger than alcohol or narcotics. Therapists now offer various consultations, devised "detox treatments", and the corporative wellness industry in expansion offers more and more solutions to spending a day without a constant compulsive "scrolling" of the pages. If you can not resist going to Facebook, Instagram or other social networks, you feel anxiety when you can not check your smartphone or you do not have a signal, you may need help.
In order to prevent the negative impact of social networks, it is necessary that the time you use for social networks be usefully spent, instead of watching silly photos and funny videos, mark useful pages and profiles that might be interesting to you, but also in some way instructive. The good thing about social networks is that the flow of information is incredibly great from around the world and it would be a shame to not get a benefit out of them. This is not just about the gossip and "tabloid facts" but also about a lot of useful information from which you can learn a lot. Pay attention to reading more informative content and participating in smart discussions instead of just "liking" and watching photos of your friends.
After a busy day, if you come too tired from work, do not try to relax by visiting social networks, and instead go out in the fresh air, walk, drink coffee with your friends, read a book, or browse a new issue of your favorite magazine. After all, allow yourself to do nothing, lie in silence, close your eyes and literally rest.
The particular danger of using mobile phones comes from electromagnetic radiation. The radiation intensity of the mobile phone is different at different stages of the connection. The most intense radiation is in the reporting stage and decreases during the conversation phase. Therefore, it is recommended that the mobile phone comes into contact with the ear only after the connection is established.

A recognized Indian study has investigated genetic damage to the blood cells and mouth cavity tissue of people using mobile phones daily from one to fifteen hours. The control group in this experiment never used a cell phone, so the damage to their cells was about 4%. In cell phone users, average cell damage was 39.75%. The blood of one of the 24-year-olds showed a cell damage of 63 percent. He used the mobile phone 1 to 2 hours a day for two years. Unfortunately, this is today the norm for millions of children around the world.
Electronic devices with wireless technology connect to wireless computer networks (wireless LAN) using electromagnetic radiation. They are installed in homes, schools, offices, shops, cafes, airports, bus stations, libraries, hospitals, public buildings and entire parts of the city. Wireless signals, unlike TV and radio signals, are strong enough to penetrate the concrete

walls. Many health professionals believe that long-term wireless radiation is extremely dangerous for the health of children, especially children.

Wireless radiation penetrates the body, affects cell membranes, and cells lose the ability to function properly over time. This disturbs the natural energy field of the body causing stress, fatigue and weakening of the immune system, causes headaches, problems with concentration, dizziness, depression, is often the trigger of seizures, insomnia, high blood pressure, infertility, and so on.

Children are particularly sensitive to wireless radiation signals because their nervous systems are still in development. Their skulls are thinner and smaller, and the radiation penetrates deeper into their brain. Many schools now use wireless technology, but this has a negative impact on children's learning ability.

Today, most people on the Internet using social networks are not even aware of the potential risks and dangers that the presence on the networks carries with them. Many are not aware how dangerous to their safety and health can the placement of various information be. Unfortunately, social networks today are abundant with negative and bad information. They are a public platform, where the publication of data is equivalent to publishing a worldwide-available billboard.

CONCLUSION

1. Internet and social networks have positive sides as long as people use them moderately, living in the real world, and not in a virtual one. It's not controversial that social networks can be a really great place to hang out, have fun, meet people who have similar affinities, and also for the flow of information as long as you do not exaggerate.
2. There is an insufficiently exploited possibility of promoting health and placing information that can improve the health of the nation.
3. Healthcare institutions in the healthcare system in Serbia today use social networks at a minimum level, and expectations are that this will change very quickly.
4. A large number of people, especially young people who do not have enough information or do not want to acknowledge information about health hazards if social networks are used without limits.
5. It is especially important that children be spared the radiation and the harmful effects produced by the communication information technology.

ORAL PRESENTATION

1. IMPLEMENTATION OF INNOVATIVE MODEL OF PUBLIC AND ENVIRONMENTAL HEALTH PROFESSION PROMOTION ON THE LOCAL AND GLOBAL LEVEL

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Objectives: To implement the innovative model of promotion Public and Environmental Health Profession on the local and global level.
Materials and methods: Promoting Public and Environmental Health Professionals, by starting with the innovative approach of building a professional platform **sanitarc.si** since 2014. Became the full members of European Public Health Association (EUPHA) and International Federation of Environmental Health (IFEH).
Results: The platform **sanitarc.si** collects key information related to the field of Public and Environmental Health Profession in Slovenia. The platform has four levels. The first level is a model construction of the Historia Sanitaria. Itis an online form of chronologically arranged landmark events and achievements of established individuals in the field of the Public and Environmental Health Profession. The second level is the issue of the scientific journal - International Journal of Sanitary Engineering Research / IJSER. It publishes the latest scientific achievements and results of research and professional achievements by the majority of Public and Environmental Health Professionals and other scientists and experts. The third and fourth levels are models of smart specialization, and design management skills in the field of the Public and Environmental Health Profession.
Conclusion: The indicators of the effectiveness of the implemented model of promotion in practice, are a good starting point for further steps; they are, namely: increasing the visibility of the profile in the immediate and global environment, improving the reputation of the profession on a global scale, increase the employment of graduates - raising confidence in the business profession, placing it into equivalent professional teams, and lastly, the development of interested graduates or individual groups of graduates, as well as cooperation with the business sector in solving concrete problems.

Keywords: Public and Environmental Health Professionals,sanitary engineering, innovative model of promotion of Public and Environmental Profession, Historia Sanitaria, International Journal of Sanitary Engineering Research

POSTER PRESENTATIONS

1. PERSONAL INFORMATION IN THE PROCESS OF PROVIDING HEALTH CARE

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Objectives: The objective is to elaborate the advantages of using information technologies in the daily, providing of health services, and to enable and guarantee the protection of confidential information about patients who are being treated in a health institution.
Materials and methods: Use of adequate hardware and software, education of authorized health workers for proper guidance and preserving of electronic records on patients' personal data.
Results: Secure database of patients' personal data, their health and medical condition, process and course of treatment, as well as on all relevant facts that may influence on adequate health care services or any compromising of the patient due to a diagnosed medical condition.
Conclusion: Most of us feel that our health information is private and should be protected. The Law on Patients' Rights (*Official Gazette of RS no. 45/2013*) provides in an adequate manner that medical documentation containing patient information must be kept in places where access is restricted to unauthorized persons. Electronic databases with appropriate software would allow better protection of patients' personal data and significantly reduce the possibility of their abuse, because it would be handled only by authorized persons. The access to these databases and programs is, also, much more severe and implies certain technological advancement, which would make the access to this information even more difficult than documentation in paper form.

Keywords: information technology, information systems, patients' personal data, privacy of personal data

2. INTEGRATED HEALTH INFORMATION SYSTEM (IZIS) IN THE HEALTH CENTER NIS

Vatrica Premović, Nevena Simović, Dragana Pantić, Natalija Premović, Ivana Kostić
Health Center Nis, Serbia

In the Health Center Nis Inherited health information system - IZIS started on March 28, 2016. Local information systems of health institutions are integrated. Objective: To recognize the importance of introducing ISIS for patients and employees. Method of work: Data were obtained by insight and retrospective analysis of medical documentation at the Department of Social Medicine and Medical Informatics of the Health Center Nis in 2016. Results: In the Health Center Nis, there are 222 doctors and 49 dentists. The facility has 450 workstations, 250 in the Central facility, 66 facilities with 200 workstations connected to the server in the Central Cable and WIFI network. The electronic healthcare card and electronic invoice software was developed by the Faculty of Electronic Engineering in Niš under the name "MEDIS NET", which is integrated through the WEB services in IZIS. Conclusion: Advantages of introduction are recognized for patients and employees in health care institutions. Patients are better informed about the work of doctors because the portal "My doctor" shows the schedule of work of all doctors in the Republic of Serbia. New functional possibilities were created, electronic recipe and instructions were created, with the simultaneous scheduling of examinations and diagnostic procedures by the selected doctor. All reports of doctors about the condition of the patient are available to all doctors in the territory of the Republic of Serbia. IZIS presents the medical basis for better work with patients, better monitoring of their health, and to the Ministry of Health better insight into the use of health insurance funds, better insight into the number of physician examinations, scheduling examinations and waiting list, which increases the efficiency in work as well as the cost savings in treatment costs.

Keywords: information system, electronic recipe, schedule review, waiting list

3. APPLICATION OF INFORMATION TECHNOLOGIES IN MONITORING AND IMPLEMENTATION OF THE SKRINING PROGRAM

Nevena Simović, Vatrica Premović, Dragana Pantić, Ivana Kostić, Natalija Premović
Health Center Nis, Serbia

In Serbia every year, 32000 people are infected with cancer. The Ministry of Health and the Government of the Republic of Serbia adopted the National Program for Early Organs of Malignant Diseases. The aim of the paper is: To show the importance of the application of information technologies in monitoring and realization of the screening program. Method of work: Data were obtained by insight and retrospective analysis of medical documentation at the Department of Social Medicine and Medical Informatics of the Health Center Nis in 2016. Results: In 2016, 1604 insured persons from the target group from 50-69 years were called, and in 1568 insured mammograms were made, the response was 98%. 10512 women were called on screening of cervical cancer, 7792 women were examined and PAPA test was performed, the response was 41% above the plan. On the screening of colon cancer, 15486 target group target groups from 50-74 years were called and 4548 FOB tests were performed, the response was 54%. Bearing in mind that the service review of occult bleeding in the chair in the Health Center Nis provides since the opening of the Center for Preventive Health Services, a large number of insured persons has already been examined on several occasions. During the realization of the screening program great attention was paid to the education of the population, organization of numerous appearances on the media as well as numerous lectures, workshops, leaf split and brochures. On the website of the Health Center there are all information regarding the screening program implemented by the Health Center Nis. Conclusion: Reporting on the realization of the screening program is carried out using informational technologies at the daily, monthly and annual level. Daily reporting is done on the report forms individually for each screening program. Thanks to the application of information technologies, at any moment, it is possible to monitor and inspect the realization of the screening program and, hence, to improve the implementation of the screening.

Keywords: prevention, screening, risk factors, information technology

SESSION: HEALTH PROMOTION - CHALLENGES AND PERSPECTIVES

INVITED LECTURES:

1. IMPLEMENTATION OF CORE HEALTH PROMOTION PRINCIPLES FOR BETTER HEALTH OF THE POPULATION

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Introduction

Health promotion is a complex area with lot of definitions. It is a process of increasing the ability of individuals and communities to control the determinants of health and thereby to improve their health. The concept includes support of the lifestyles and other social, economic, environmental and personal factors that contribute to the health.[1] Health promotion is any combination of health, education, economic, political, spiritual or organizational initiative designed to bring about positive attitudinal, behavioral, social or environmental changes conductive to improving the health of populations. Health promotion, also, is a comprehensive political and social process, that are not only common actions aimed for strengthening the skills and capabilities of individuals, but also actions aimed for changing the environmental, economic and social conditions, with aim to reduce their impact on public and individual health.

There are 3 key elements of health promotion:

1. Good governance for health

Health promotion requires policy makers across all government departments to make health a central line of government policy. This means they must factor health implications into all the decisions they take, and prioritize policies that prevent people from becoming ill and protect them from injuries. These policies must be supported by regulations that match private sector incentives with public health goals.

2. Health literacy

People need to acquire the knowledge, skills and information to make healthy choices, for example about the food they eat and healthcare services that they need. They need to have opportunities to make those choices. And they need to be assured of an environment in which people can demand further policy actions to further improve their health.

3. Healthy cities

Cities have a key role to play in promoting good health. Strong leadership and commitment at the municipal level is essential to healthy urban planning and to build up preventive measures in communities and primary health care facilities. From healthy cities evolve healthy countries and, ultimately, a healthier world.[2]

Health promotion is now seen as a branch of modern public health aimed at actions tackling the major determinants of health and thus contributing to the positive health development of all people. Many of the approaches that were considered highly controversial – or not even thought of – at the time the Ottawa Charter was adopted, are now accepted as mainstream such as empowerment and inter-sectoral approaches to tackle wider health determinants.[3]

There are 9 health promotion conferences organized all over the World in the period from 1986 to 2016.

I International conference for promotion of health, Ottawa, Canada, 1986

Document: Declaration for health promotion and new modern science of public health.

Ottawa Charter identifies three main strategies for promotion of health. Those strategies are: Dissemination of health - to create important conditions for provision of health; Empower people to use their health potentials; Mediation between different interests in society in the field of the health.
These strategies are supported by five major areas of action as headlines in Ottawa Charter for health promotion:

- Create a public-health policy
- Building environment that will support the health
- Strengthen the joint action for work
- Develop personal skills
- Diverting the health services[4]

II International conference on public health policy, Adelaide, United States, 1988
The adoption of the Declaration of Alma-Ata a decade ago was a major milestone in the Health for All movement which the World Health Assembly launched in 1977. Building on the recognition of health as a fundamental social goal, the Declarationset a new direction for health policy by emphasizing people's involvement, cooperation between sectors of society and primary health care as its foundation.
The spirit of Alma-Ata was carried forward in the Charter for Health Promotion which was adopted in Ottawa in 1986. The Charter set the challenge for a move towards the new public health by reaffirming social justice and equity as prerequisites for health, and advocacy and mediation as the processes for their achievement.
The Charter identified five health promotion action areas:

- Build Healthy Public Policy,
- Create supportive environments,
- Develop personal skills,
- Strengthen community action, and
- Reorient health services.[5]

III International conference for supportive the environment, Sundsvall, Sweden, 1991
Third International Conference on Health Promotion: Supportive Environments for Health - the first global conference on health promotion, with participants from 81 countries - calls upon people in all parts of the world to actively engage in making environments more supportive to health. Examining today's health and environmental issues together, the Conference points out that millions of people are living in extreme poverty and deprivation in

an increasingly degraded environment that threatens their health, making the goal of Health For All by the Year 2000 extremely hard to achieve. The way forward lies in making the environment - the physical environment, the social and economic environment, and the political environment - supportive to health rather than damaging to it[6]

IV International conference for health promotion, Jakarta, Indonesia, 1997
- Document: Declaration for leading the health promotion in the 21st century

The most effective are the joint approaches for development of the health. Those who use combinations of the five strategies are more effective than those who choose a unique approach;

Options for health have offered opportunities for practical implementation of the strategies; Participation is necessary. People should be directly involved in the action for health promotion and decision-making process; Access to education and information is essential to achieve an effective participation.

Jakarta Declaration defines five priorities:

- Promote social responsibility for health
- Increase investments for health development
- Develop partnership relations for health promotion
- Increasing national capacity and individual responsibilities
- Provision of infrastructure for health promotion.

V International conference for health promotion, Mexico City, Mexico, 2000
Contemporary directions for the development of health systems around the world underline the importance of new approaches for health promotion. Health outcomes are increasing where the priorities are based on investing in determinants for health through health promotion.

VI Conference for health promotion, Bangkok,Thailand, 2005
Required actions>
To make further advances in implementing these strategies, all sectors and settings must act to:

- Advocate for health based on human rights and solidarity.
- Invest in sustainable policies, actions and infrastructure to address the determinants of health.
- Build capacity for policy development, leadership, health promotion practice, knowledge transfer and research, and health literacy.
- Regulate and legislate to ensure a high level of protection from harm and enable equal opportunity for health and well-being for all people.
- Partner and build alliances with public, private, nongovernmental and international organizations and civil society to create sustainable actions.

VII Conference for health promotion Nairobi, Kenya, 2009
To ensure that the conference is able to address the theme and agree on the Nairobi Call to Action, five key Tracks have been identified. These are:
Track 1: Individual empowerment – health literacy and health behaviors
Track 2: Community empowerment
Track 3: Health systems strengthening
Track 4: Partnership and Intersectional action
Track 5: Building capacity for health promotion.

VIII Conference for health promotion Helsinki, Finland,2013

- Document: Declaration of this conference:

- Prioritize health and equity as a core responsibility of governments to its peoples.
- Affirm the compelling and urgent need for effective policy coherence for health and well-being.
- Recognize that this will require political will, courage and strategic foresight.
- We call on governments to fulfill their obligations to their peoples' health and well-being by taking the following actions:
- Commit to health and health equity as a political priority by adopting the principles of Health in All Policies and taking action on the social determinants of health.
- Ensure effective structures, processes and resources that enable implementation of the Health in All Policies approach across governments at all levels and between governments.
- Strengthen the capacity of Ministries of Health to engage other sectors of government through leadership, partnership, advocacy and mediation to achieve improved health outcomes.
- Build institutional capacity and skills that enable the implementation of Health in All Policies and provide evidence on the determinants of health and inequity and on effective responses.
- Adopt transparent audit and accountability mechanisms for health and equity impacts that build trust across government and between governments and their people.
- Establish conflict of interest measures that include effective safeguards to protect policies from distortion by commercial and vested interests and influence.
- Include communities, social movements and civil society in the development, implementation and monitoring of Health in All Policies, building health literacy in the population.

IX Global Conference on Health Promotion, Shanghai, China, 2016

- Document -The Declaration highlights the need for people to be able to control their own health – to be in a position to make healthy lifestyle choices. Noting the need for political action across many different sectors and regions, it highlights the role of good governance and health literacy in improving health, as well as the critical role played by city authorities and communities.

• Governance-related commitments include protecting health through public policies, strengthening legislation, regulation and taxation of unhealthy commodities and implementing fiscal policies to enable new investments in health and wellbeing. The Declaration also stresses the importance of universal health coverage, and the need to better address cross-border health issues.

• Health literacy pledges include the development of national and local strategies to improve citizens' awareness of how to live healthy lives, and increasing citizens' ability to control their own health and its determinants by harnessing the power of digital technology. The Declaration also commits to ensure that environments support healthy consumer choices, for example through pricing policies, transparent information and clear labeling.

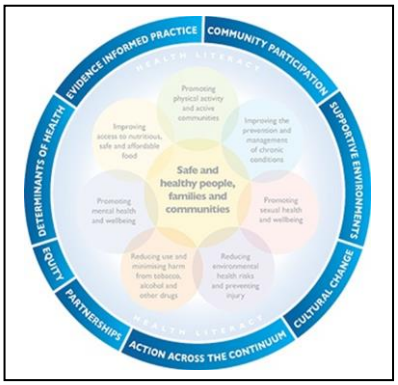
• The Declaration emphasizes the need for healthy urban policies that promote social inclusion, issues that are further strengthened in the Mayors' Consensus.[7]

FIVE CORE PRINCIPLES HAVE GUIDED HEALTH PROMOTION STRATEGIES

1. Health promotion is context driven: Focuses on health and its underlying social and economic determinants for analyzing socioeconomic, gender and ethnic gaps in health and disease patterns in populations.
2. Health promotion integrates the three dimensions of the WHO health definition: Promoting health means addressing the multi-dimensional nature of health: its physical, social, and mental dimensions (and often, spiritual health).
3. Health promotion underpins the overall responsibility of the state in promoting health. All levels of government have a responsibility and accountability for protecting, maintaining and improving the health of its citizens, and need to include health as a major component.
4. Health promotion champions good health as a public good.
Good health is beneficial to the society as a whole, its social and its economic development.
5. Participation is a core principle in promoting health. The participation of people and their communities in improving and controlling the conditions for health is a core principle in promoting health.[7]

WORLD HEALTH ORGANIZATION PRINCIPLES OF HEALTH PROMOTION
Empowerment - a way of working to enable people to gain greater control over decisions and actions affecting their health.
Participative - where people take an active part in decision making.
Holistic - taking account of the separate influences on health and the interaction of these dimensions.
Equitable - ensuring fairness of outcomes for service users.
Intersectional - working in partnership with other relevant agencies/organizations.
Sustainable - ensuring that the outcomes of health promotion activities are sustainable in the long term.
Multi Strategy - working on a number of strategy areas such as programmes, policy.[9]

PRINCIPLES OF HEALTH PROMOTION PRACTICE
Eight principles of practice underpin working in health promoting ways and help to ensure that interventions for health promotion are effective.



- Evidence informed practice
- Determinants of health
- Equity
- Partnerships
- Action across the continuum
- Cultural change
- Supportive environments
- Community participation.[10]

IMPLEMENTATION OF CORE HEALTH PROMOTION PRINCIPLES IN THE REPUBLIC OF MACEDONIA AS AN EXAMPLE

Health promotion, in the Republic of Macedonia, is very important and significant and has several key areas of action: human health, schools, faculties, working environment, municipalities, etc.

Institute for Public Health, which is one of the main institutions that work on health promotion in the Republic of Macedonia, trough the Department for Health Promotion, Analysis and NCD Prevention, works on the health promotion, organization, planning, monitoring and evaluation of the health activities throughout the year. In the area of health promotion, the Department works on educational campaigns that are aimed to prevent malignant diseases, coordinating and monitoring the work of Counseling Centers for sexual and reproductive health, Counseling Center for HIV / Aids and Counseling Centers for cessation of smoking within 10 Centers for Public Health. The Department organized trainings for health professionals in order to promote communication skills, educate health workers for patients' rights, actively participate in the organization of promotional campaigns with special emphasis on marking appropriate world days, weeks, etc. (World heart day, World diabetes day, Anti-smoking day, World day of remembrance of road traffic victims, Days against violence of women, etc.), production, printing and distribution of brochures and many others activities related to health promotion. Institutions dealing with prevention of human health are health care homes, institutions that perform social-medical activities and promote health. Departments of social medicine within Centers for Public Health measures activities that will keep and improve the health of the citizens as the main instrument in improving the health status of the population. There are Counseling Centers for HIV / AIDS, for sexual and reproductive health and Counseling Centers for cessation of smoking that are working on health education and prevention.

There are major achievements and positive results in the field of prevention when the attention is paid from the earliest age, for example, education for health prevention in the schools, where the teaching is held continuously and students learn about specific health problems that are connected with their age. Schools promote health education for students because they should learn how to keep and promote the health, not only to prevent the occurrence of the disease. Macedonia is member of the network "Healthy Schools in Europe", which aims to support organizations and professionals for the further development and promotion of healthy schools in every country where it operates.

There are not only the schools that work on health promotion of students, but also the faculties throughout the country. More attention is paid on subjects and topics that are related with the health promotion of the population. For example, Medical Faculty in Skopje in 2014, implement curriculum for the implementation of the subject "Health Promotion" for students in medicine, who start learning since 2015. Also, subject "Promoting health and health education" is studied at the Faculty of medicine in the University of Shtip. Topics in the field of health promotion are present in many other subjects at the Faculties of Psychology, Pedagogy, Social Work and Social Policy, etc.

Health promotion is important in the field of employment and working environment, which is implemented through the Law of safety and health at Work, Law for Labor, etc. Each employer is obliged to protect the health of the employee by providing appropriate working conditions, as well as, appropriate informations that will help utilizing their rights. The law is connected with the improvement of the quality of health services by the authorized health institutions that carry out the occupational medicine labor, strengthening the mechanism of control, determining the standard minimum of health controls. Labor Medicine prepares preventive health examinations in order to determine the health status of the employees and their working ability, whether the worker can work without any danger to his / her health and

to other employees health. The purpose of the controls is to see if there is an occupational disease, work-related illness or other health diseases that will affect the work at the particular job place.

Municipalities throughout the country are also important areas of action when it comes to health promotion. Every city and municipality take care of people's health by building parks, green areas, bike paths, playgrounds, renovation of existing facilities including schools, organizing educational workshops, lectures for climate change and how to protect from them, organizing actions for cleaning school yards, parks, recycling, supporting campaigns connected with health of the people, organizing free sport competitions and many other activities.

Conclusion

The New Public Health is not so much a concept as it is a philosophy which endeavors to broaden the older understanding of public health so that, for example, it includes the health of the individual in addition to the health of populations, and seeks to address such contemporary health issues as are concerned with equitable access to health services, the environment, political governance and social and economic development. The New Public Health includes all possible activities known to be useful and effective in promoting health and in prevention, treatment, and rehabilitation of diseases for the individual, the community and the population as a whole. Core health promotion principles bring together elements of public health that are community-oriented with personal care that is individual-oriented.They bring possibility to address the health needs of individuals and society in the 21st century.

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2. HEALTH PROMOTION AS A TOOL FOR STRENGTHENING LOCAL COMMUNITIES

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Health promotion as a comprehensive and holistic approach is oriented towards empowering individuals and communities with aim to improve health. It deals with various determinants of health modifying personal, social, economic and environmental factors and their influence on health status. It is specific way to contribute to society, and is characterized by a set of competencies that involve integrating interdisciplinary theories. In order to accomplish aims and support salutogenic resources on personal and population level health promotion involves basic strategies: development healthy public policy, development personal skills, strengthening community action, creating supportive environments, and reorientation health services.

Outcomes of health promotion activities tend to contribute to social equity and justice by promoting social responsibility for health, the empowerment of individuals, support community capacity, development partnerships for health, and increasing investments for health developments in all sectors.

Health promotion is based on core values and principles which describe overall philosophy and provide a common basis for the practice of health promotion:

1. Health promotion includes the population as a whole in the context of individuals' everyday lives, rather than focusing on persons at risk for specific diseases;
2. Health promotion is directed toward action on the causes or determinants of health requiring engagement of all sectors and involvement of national and local governments;
3. Health promotion combines diverse but complementary methods or approaches, including communication, education, legislation, fiscal measures, organizational change, community development, and local activities against health hazards.
4. Health promotion is particularly aimed at effective and concrete public participation.
5. Health care professionals —particularly in primary health care—have an important role in nurturing and enabling health promotion.

Setting approach

Further elaboration and application basic principles led to development of the concept of the health setting as the place or social context in which people engage in daily activities and in which environmental, organizational, and personal factors interact to affect health and wellbeing. Health promotion programs are planned, implemented, and evaluated for specific sites, reflecting the unique characteristics of the environment as well as the individuals at the site.

Considering setting as place or social context in which people engage in daily activities in which environmental, organizational and personal factors interact to affect health and wellbeing, this approach sees health as the dynamic product of interactions between individuals and their environments. It emphasis the links that exist between different settings and recognizes that people do not live or interact in just one setting, their lives straddle a range of different settings. Because of that, it reinforces the need for a 'joined up' approach between the various settings at every level to enable effective health promotion action to happen. The settings approach facilitates health promotion interventions to focus more on the broader determinants of health rather than simply addressing individual and/or population behavioral risk factors. It is underpinned by key health promotion values such as empowerment, public participation, equity and partnership. This concept moves interventions

upstream from defining goals and targets in terms of populations and people only, towards identifying goals that focus on changes in organizations, systems and the environment. In this context, all of the opportunities for influencing health within a setting can be considered priorities for change, which can be clearly identified, and plans can be developed that lead to maximized health gain.
It recognizes ecological perspective on health, which takes into account the cultural, economic, and social determinants of health; a commitment to equity, civil society, and social justice; a respect for cultural diversity and sensitivity; a dedication to sustainable development; and a participatory approach to engaging the population in identifying needs, setting priorities, and planning, implementing, and evaluating practical and feasible health promotion solutions to address needs.

Community-based programs

In past decades implementation of community-based programs involving multilevel cross sectoral interventions became dominant trend in order to achieve population-level change in risk behaviors and health. Main shift was in emphasizing environmental and social factors on individual's health. Several socio-ecological models have been used to explain individual's behavior through dynamic interaction of the interpersonal, organizational, community, and policy factors which came from different levels (micro, meso, macro level).
Community-based programs are integrated and comprehensive, use multiple interventions, incorporate strategies to create policy and environmental changes, involving community leaders, social networks, and broad spectrum of communication channels. Some of key aspects of such programs include mobilizing communities to actively participate in achieving program goals and implementing interventions in multiple community settings. Understanding and a sharing of power between the community and other partners is factor contributing to successful community interventions. There are also significant challenges in management of preventive programs. Focus primarily on individuals with interventions and messages which are not sufficiently tailored to reach various population subgroups can be an obstacle in order to reach sufficient coverage. Implementation of a comprehensive intervention model, targeting also social environment, is difficult to accomplish, and many programs did not address normative and policy changes that could produce a wider impact. The lack of strong evidence supporting the relationship of community participation in health promotion programs to positive changes in health-related outcomes also points to the difficulty in developing community capacity to address health issues, assess needs and propose adequate solutions.

Partnership approach

As previously highlighted, health promotion is focused on influencing the determinants of health and reducing health inequalities. It is obvious that the determinants of health and health inequalities cannot be influenced by the health sector working alone; therefore, an inter-sectoral or partnership approach is essential. Many definitions of partnership exist and a range of words are used to describe ways of working together which include: alliance, network, cooperation, collaboration, coalition, multi-sectoral, inter-sectoral and partnership. Partnerships for health come in all shapes and sizes and can be formal or informal and partners can achieve more by working together than each could achieve on their own. This is known as 'synergy' and is at the heart of all partnership working within the health sector and between different sectors. Synergy is the degree to which the partnership combines the strengths, perspectives, resources and skills of all the partners in the search for better solutions. This means enabling others to promote their own and other people's health, using various means such as sharing skills and information and building up confidence and trust.

These competencies are particularly important when working with communities. They are also vital for working with other agencies and forming partnerships for health that cross barriers of organisations and disciplines.
The added value of collective action is that it:
- focuses on the promotion of the health of population instead of on individuals or groups at risk;
- reflects the awareness that infrastructure and social norms influence individual behavior;
- encourages organizations and decision makers to consider the health consequences of their policies;
- increase sense of ownership of programs by communities;
- leads to empowerment at individual and community level;
- makes contribution to decreasing socioeconomic differences to health.

Strengthening local communities
As important building blocks for creating a healthy community are recognized: community involvement intersectoral partnerships, political commitment, and healthy public policy. The strategic linking of these four key approaches could constitute local strategy for improving population health. Evidence suggests that empowerment of individuals, which usually has a reciprocal and reinforcing relationship to empowerment of communities is in and of itself good for the health of those who are empowered. Such a process of empowerment is in fact the very essence of health promotion and it is absolutely fundamental to the process of creating healthier communities. Process of community involvement is a long, slow process that requires and builds on small steps and growing trust and experience. Work of creating a healthier community has to extend well beyond government; a "whole of society" approach is needed. This also clearly needs to involve not just organizations but individual citizens.
The concept of asset-based community development was created and applied in practice in many communities as opposite to the needs-, and problem- based approach. In a needs-based system most often outside experts and providers come in to address the needs with specific programs and services and that leads to disempowering to the people of the community who become passive clients of services. Instead of focusing on needs and problems, in assets base approach by shifting to a capacity oriented emphasis, communities take ownership of the issues. Community development takes place only when local people are committed to investing themselves and their resources into efforts of improvement. Communities are never built from the outside in or the top down, but from the inside out, or the ground up. Outside assistance is often required but this should be aimed at helping developing the communities assets. Asset-based development could be the key mechanism by which communities can build human, social and economic capital, enhance personal and community resilience, and improve the level of population health and human development.

Health promotion program in Belgrade
The City Institute of Public Health, is health care facility responsible for public health issues in Belgrade, the capital city of Republic of Serbia. Basic work method in the Institute comprises of multidisciplinary and multisectoral approach, focus action and intervention in the field. Important area of work is health promotion, affirmation of healthy life styles, partnership strengthening in development of healthy environments, and in reduction of inequalities in health. Achieving solidarity and equality in health for all, with special focus on vulnerable social groups is of primary significance. Cooperation with sectors outside health care sector in mutual verification of public health priorities and problems, focus on citizens, with development of participatory principle as well as application of "health in all policies" is of special significance. Important precondition for efficient action and intervention within

community are flexibility, timeliness and adequacy of response to current and also to future public health challenges. Areas of activities of public health within which the Institute realizes its coordination, professionally methodological, research, analytical, consultation and educational functions are physical, mental and social health of citizens, health promotion and disease prevention, environment and population health, risk factors in environment as well as in occurrence and development of chronic non communicable diseases, organization and functioning of health care system and response in crisis and emergency situations. The Institute, as a protagonist of activities in areas of public health, is planning, conducting, monitoring and valuing public health programs, projects and activities; it coordinates, harmonizes and professionally connects the work of all participants in public health system on the territory of Belgrade city, and it has an important role in support and coordination of society's responsibility for health.

Health promotion activities of the IPH Belgrade are oriented towards:

- participation in development of strategic and program documents and good practice guides in the area of health promotion;
- development, implementation and evaluation of health promotional programs, projects and activities in the community;
- planning, monitoring and coordination of health promotional and health educational activities conducted by health care institutions;
- education of educators in the field of health promotion;
- informing and education of public in cooperation with mass media;
- development of educational and promotional materials, publications and multimedia presentations;
- development of partnerships for health in local community;
- participation in creating environments which promote health and healthy choices.

Important area is management of health promotion programs in community which is expected to contribute to improvement of awareness of population about most important risk- and protective factors influencing health and effective preventive actions. Activities are oriented to health education, promotion of healthy behavior, participatory approach, development of partnership and intrersectoral collaboration. There are several areas of actions: coordination and monitoring of health education activities provided through the network of primary health care, education of educators in health promotion, implementation of communication campaigns in local communities, cooperation with mass media, health education in preschools, primary and secondary schools. There is strong orientation to involvement of target population groups in planning and implementation of activities, building broad coalition with stakeholders, strengthening partnership for health in communities, support to development of healthy local policies, and enabling network of healthy settings. Some of examples are: organizing thematic events according to the public health calendar, strong cooperation with mass media, implementation of public lectures and exercises for various target groups, continuous education of professionals from different sectors on priority topics based on population needs, development of guidelines and recommendations on health promotion activities, support to early child development and coordination of home visiting program, coordination and support to healthy kindergarten program, coordination of health education activities in schools on prevention of PAS abuse, gathering partners on priority public health issues in order to propose mutual solutions, organizing health promotion conferences and meetings to increase awareness of public and professionals on actual trends and movements in public health agenda.

Health promotion activities are planned annually and contracted with the Ministry of Health, and with local authorities also. Monitoring of activities is based mainly on process indicators according to requests of stakeholders, and annual reports contain detailed description of

realized activities together with achieved outputs compared to expected values. Information on health promotion activities is available on the web site of the Institute which records high number of visits.

Future tendencies in management of health promotion program in Belgrade will be oriented towards more rigorous evaluation approaches, stronger involvement of decision makers and representatives of communities during planning process, implementation of projects based on theoretical models, building network of stakeholders and key players in health promotion. Further more, special attention will be put on the empowerment of local communities, as well as the development of digital health and application of modern e-communication and educational tools. It is expected that stated health promotion program further contribute to improvement of health status and determinants of health of population in Belgrade.

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ORAL PRESENTATIONS

1. SOCIAL ENVIRONMENT AND RISK FACTORS AMONG SCHOOL AGED CHILDREN IN REPUBLIC OF SRPSKA

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Objectives: To determine social environment and risk factors (smoking, alcohol and drugs) among school aged children in Republic of Srpska.
Matherials and Methods: Survey is conducted as a cross-sectional study on a sample of 3132 first grade school aged children. Survey is a part od European Survey Network of smoking, alcohol and other drugs in schools (ESPAD). Instrument was a standardized questionairre. **Results:** One fourth of students have more friends who smoked (24,3%),and 61,8% have friends who periodically smoked. More than half of respondents' friends drank alcohol (54,5%) and one fourth of them overdosed alcohol (27,9%). One fifth of friends used marijuana (19,6%) and 13,0% used tranquilisers and sedatives. Ecstasy and inhalants consumed 7,2% of respondents' friends. In family environment 24,0% of students had sisters and brothers who smoked, 36,5% drunk alcohol, 5,3% consumed sedatives and 4,4% marijuana and ecstasy. Scor of risk assessment for daily smoking is 3,07 and periodicaly 2,34, but for daily usage of marijuana is 3.37 and periodicaly is 2,97, more girls than boys(t=4,767, p=.000),.
Conclusion: There are risk factors in social environment (family and friends) for smoking, alcohol drinking and usage of illicit drugs among school aged children in Republic of Srpska.

Keywords: school aged students, smoking, alkohol drinking, illicit drugs, social environment

2. FREQUENCY OF DRUG USE AMONG SCHOOL AGED CHILDREN IN REPUBLIC OF SRPSKA

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Objectives: To determine frequency of using illicit drugs among school aged children in Republic of Srpska.
Matherials and Methods: Survey is conducted as a cross-sectional study on a sample of 3132 first grade school aged children. Survey is a part od European Survey Network of smoking, alcohol and other drugs in schools(ESPAD). Instrument was a standardized questionairre. **Results:** One fifth of students can easy purchase marijuana (19,2%), but for half of them is marijuana not available (34,9% impossible and 13,2% so hardly). During life time cannabis used 4,5% pupils, signifficant more males than females (χ^2=22.818, p=.000), pupils with low school grade (χ^2 =24.027, p=.000) and with highest prevalence in Banjaluke (6,4%) and lowest in Foca (1,4%) (χ^2=24.589, p=.000). During last 12 months marijuana was used by 3,3% of pupils but in previous 30 days1,4%. The highest percent (40%) reported that it was so hardly available amphetamines and ecstasy, but 32,7% founded sedatives easy available. Inhalants were consumed by 5,3% pupils, 2,6% during last 12 months, and1,2% during30 days. The highest percent of youngers age 14 and more had first experience with amphetamins, sedatives and alcohol, but inhalants consumed youngers (59,5%) age 13 years and lower.
Conclusion: Easy available illicit drugs for most of students are significant reason to introduced preventive measures
Systematic through health promotion programmes in primary and secondary schools.

Keywords: school aged students, survey, illicit drugs, Republic of Srpska

3. EVALUATION OF HEALTH PROMOTION IN SCHOOLS – CHALLENGES AND PERSPECTIVES

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Objectives: Assessment the strenghts and difficulties of conducting school health promotion and raising issues in the develepment and evaluation of school health programmes.
Materials and methods: Cross sectional study; data analysis from the school health promotion programmes reports from 2007 to 2016 in Rasina District.
Results: Most of the school health programmes are focused on improvements in health-related behavior specific to a group diseases (cardiovascular diseases) or health problems (injuries and drug abuse). Very few programmes concentrating on aspects of health, rather than behaviour. The aim of reducing the prevalence of particular diseases was more common that of improving aspects of wellbeing. Almost all programmes aimed to increase pupils´ knowledge of the relevant health issues and included a classroom component, but the intensity and delivery of programmes varied significantly. Only few programmes (for accident and injury prevention, and, to a lesser extent, nutrition) aiming to develop skills and used a variety of tecniques. Most evaluated programmes used interventions developed outside the school.
Conclusion: Evaluation of school health promotion programmes need to take account of the nature of the intervention. Evaluation of delivery requires qualitative research. Different research methodologies are more likely to be successful in the long run.

Keywords: health promotion, schools, evaluation

4. EXPERIENCE OF WOMEN IN CROATIA IN DIFFICULT STRUGGLE FOR LEGALIZATION OF TERMINATION OF PREGNANCY AT REQUEST

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Today, at the international level, as a fundamental human right recognized by the UN Convention on the Elimination of All Forms of Discrimination against Women from 1979 (Article 16 (1) e) + General Recommendations (No. 21), which represents the international human rights charter for women, the women are able to "decide freely and responsibly on the number and spacing of their children and to have access to the information, education and means to enable them to exercise these rights" /Art. 16 (1). For two years, the unavailability of pregnancy termination at the request of the patient has occurred in 6 out of 28 health care institutions in Croatia (due to conscientious objection, implied consent of the politics), and the following has been disputed as well:contraception, prenatal diagnostics, fetal diseases and in vitro fertilization. When women are denied the right to autonomy, dignity and choice regarding thetermination of pregnancy, the door is open for coercion against women in terms of pregnancy and birth (punishment due to different lifestyles, refusal of recommended medical procedures, avoidance of prenatal diagnostics...). Women in Croatia have no experience of a difficult struggle for legalization of termination of pregnancy at request because in 1978 it was legalized pursuant to Art.191 of the SFRY Constitution (Official Gazette of SFRY 9/74) and Art. 272 of the Constitution of the Republic of Croatia / (Official Gazette of the Republic of Croatia 7/74), which read: “One has the right to decide freely on childbirth. The subject right may be limited only in order to protect the health”. Today they are in a position to defend the right acquired 40 years ago. The help and support of today's doctors is of priceless significance. Doctors of the World (MDM) in France in September 2014 published the signatures of 421 doctors of different specializations from various countries: “WE, DOCTORS, WANT FREEDOM TO CHOOSE ABORTION!”
Conscientious objectors in reproductive medicine are reluctant to introduce criteria for establishing the authenticity of the conscientious objection (they refer to the right to privacy, and to religious freedom). The same conscientious objectors deem it necessary and opportune to examine and evaluate a woman's reasons for termination of pregnancy, in fact, many would introduce such a procedure to the laws. The cases of refusing a timely medically induced procedure are especially concerning, as in cases of incomplete miscarriages and ectopic pregnancies, as well as other urgent procedures related to pregnancy. In 2012, the case of dentist Savita Halappanavar, where the delay of completing the miscarriage in the 17th week of pregnancy due to fetal heartbeat resulted in sepsis and death of that 31-year-old pregnant woman in an Irish hospital, is very indicative and represents a warning. Some of the conclusions:1) The need for the establishment of the "Women's Reproductive Rights Committee" at the Ministry of Health in accordance with the platform defined in the UN Conference on Population and Development, Cairo, 1994 and 4th Conference on Women, Beijing, 1995, which Croatia accepted, but has not sufficiently implemented by now 2) Seek urgent sanctioning of the so-called "abortion clinics" which falsely represent themselves 3)Education of youth through health/sexual education 4) Adopt a law on the right to conscientious objection in medicine/health care, which shall regulate the right to conscientious objection in the whole health care activity in an integral and equal manner 5) Prescribe the procedure for submitting and approving the application for recognition of the right to refuse performing certain standard medical procedures due to conscientious objection.

5. REPRODUCTIVE HEALTH OF ADOLESCENCENT GIRLS IN PIROT DISTRICT - KNOWLEDGE, ATTITUDE AND BEHAVIOR

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Reproductive health is very sensitive to adverse effects in adolescence, which leads to an increasing incidence of sexually transmitted diseases, unwanted juvenile pregnancies and sexual abuse. Responsibility of young people towards their own health is often insufficient, and behavior in the sphere of sexuality is risky, so the prevention is the prerequisite for preserving and improving reproductive health.
Objective: Assessment of knowledge, attitudes and behavior that affect the reproductive health of girls aged 15-19: first sexual experience (in which age), number and age of sexual partners, ways of protection from unwanted pregnancy and sexually transmitted diseases, Information in the field of sexuality and sexually transmitted diseases and responsibility for reproductive health.
Method: Research using a questionnaire on a random sample consisted of 636 students from the first to the fourth grade within Secondary schools in the Pirot district.
Results: A statistical analysis of data shows that 16.2% of girls had a sexual experience of an average age of 16.3 g. However, 71.6% of girls think that the right time for sexual intercourse is after their 18th.
The most common reason for getting into a sexual relationship is love (80.8%).Most had a sexual relationship with one partner 70.6%, more often with an older man 70.7%,using the condom 78.4% of respondents.
86.6% know that the condom protects from pregnancy and sexually transmitted diseases, 72.7% know that the first full relationship can lead to pregnancy, but knowledge is not consistent with its application, as about 20% of the full active never use contraceptives, And about 30% do not see the risk of pregnancy due to unprotected first sexual intercourse. 71.2% of students have the opinion that the condom is the best protection at their age and that the both partners are responsible for the use of the contraceptives - 85%. Pillules for contraception are taken only on the doctors' advice 60.5%, but about 33.2% do not know, and 6.3% think they are harmless. Knowledge of sexually transmitted diseases is not at an enviable level, 56.2% of students know all the ways of transmitting the AIDS virus, while others have incomplete knowledge (risk of infection). 54.9% do not have knowledge about other sexually transmitted diseases. Only 46.7% of girls think that they are well informed, which is a particular risk for sexually transmitted diseases. Information is most frequently received via media (40.8%),peers (11.0%) and parents (20.6%) and health workers (27.5%).Youth counseling was visited only by 12.9% of while the gynecologist had 20.0% primarily due to menstrual problems (80.9%) while the counseling on contraception they only claimed 4.6% of 16.2% of sexually active people.
Conclusion: Early sexual intercourse, lack of knowledge about safe sexual intercourse and sexually transmitted diseases, risky behavior (drugs, alcohol, and frequent changes of sexual partners), unreliable information from the media or peers, imposes the need for a more serious preventive action of institutions of education and Health system. It is desirable to implement the field of reproductive health in a regular school program, and better organization and innovation in the work of the existing counseling center for young people (opening a gynecology clinic) is needed. The availability of counseling centers, the use of modern methods of health education and active participation of young people in preventive programs. Health education, in addition to acquiring knowledge, aims at adopting social skills (recognizing and avoiding risks) and developing self-esteem and positive attitudes towards responsible sexual behavior and healthy lifestyles.

6. RELIGION AND FAMILY PLANNING

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All religions in a similar way look at family planning. However, there are some differences between them. The aim is to look at the similarities and differences of different religious direction in relation to family planning, especially in relation to contraception and abortion.
According to Islam, family planning is not contrary to marriage and the birth of children, but only helps a person to find the path to his own happiness. Reversible methods of contraception are allowed: oral contraceptives, local mechanical or chemical agents. Intrauterine spirals are not allowed in principle. The use of contraception is allowed under the following conditions: an agreement between spouses; that husband and wife have the same attitude; not to cause damage; not to become a permanent practice but to be periodic. Islam forbids any attempt to terminate pregnancy after successful fertilization and considers such a procedure a major sin. The extent of sin increases after a successful pregnancy progression.
According to the Catholic Church, any attempt to prevent conception is sinful (apart from the rhythm of the method and abstinence). In this opinion, contraception is amoral and can lead to marital infidelity and humiliation of a woman. The principle of "responsible parenting" (Humanae vitae §10) is accepted in 2016. and requires that couples determine how many children will have and when they will have them, taking into account physical, economic, psychological and social conditions, as well as the availability of health care, education and other resources. The Catholic Church banned artificial abortion in 1930.
The Christian Orthodox Church learns that the embryo has a soul from the moment of its conception, and its abolition is a mankind. Contraceptives are indirect murder and perversion, as it distorts God's idea of man and married. Most contraceptive methods represent abortive drugs, and the difference in relation to surgical abortion is only in the killing process and the age of the killed child. The Sixth Parliamentary Council brings the official attitude of the church that has not changed to this day: "A woman who supplies drinks to use them for abortion and women using embryo killers are subject to the law and punished for murder.“ Synod of the Greek Orthodox Church in 1986 officially condemned abortion as legalized infanticide. Patriarch Pavle in the Christmas Epistle in 1994 has condemned abortion as an attack on God, man and nature.
Conclusion: Differences between particular religions exist in the use of contraception, and abortion does not allow any religion.

7. SMOKING IN HOSPITALITY SECTOR-EXPOSURE TO TOBACO SMOKE AND ATTITUDES OF CITIZENS OF SERBIA

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Objectives: Analysis of exposure to tobacco smoke in hospitality sector and related attitudes of citizens of Serbia.
Materials and methods: Cross sectional study included 1200 citizens of Serbia aged 18-64 years that have visited hospitality sector in the last six months. Sample was created aiming to include 50% of smokers and 50% of non-smokers. Probability proportional sampling was applied. Data were collected in July 2017 with computer assisted personal interviewing.
Results: In the last 12 months, 89.9% of adults were exposed to tobacco smoke in cafes and 78.1% in restaurants during the time spent in hospitality sector. Hospitality sector adult visitors were also exposed to tobacco smoke in high percentage in non-smoking areas of hospitality sector that had both smoking and no smoking areas (14.8% always, 29.8% very often or often). Exposure to tobacco smoke bothers majority of citizens; 52.1% in cafés, 48.4% in restaurants, 42.9% in their own house and 48.3% in friend's house. Only 5.9% of them have ever asked another person not to smoke because smoke bothered him/her.
Conclusion: Results confirm necessity of complete smoking ban in hospitality sector which is in line with evidence based tobacco control measures.

Keywords: Smoking, attitudes, exposure to tobacco smoke, hospitality sector, smoking ban

8. INVESTIGATION OF INTERNET BEHAVIOR DISORDER IN ADULTS

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The development of Internet technology and their impact on social, work, family, financial and economic functionality of the person have led to a new form of addiction where the use of the Internet has become the dominant life activity.
The aim of the paper was to investigate the correlation between the Internet behavior and physical activity and the symptoms of depression and anxiety.
Method: 136 respondents aged 18-40 years participated: active members of the Sports Association of Pančevo who filled out the online questionnaire and other citizens who filled out the questionnaire online. Standardized questionnaires were used: Internet Addiction Test, Beck Depression Inventors and Zung Anxiety Scale.
Results: occasional or frequent problems with the use of the Internet had 9 (6.6%) respondents, all from the group of active athletes. Mild mood disorder was present in 24 (17.5%) subjects, borderline clinical depression at 7 (5.1%), modern depression at 4 (2.9%), and 1 (0.7%) respondent had severe and 1 (0.7%) extreme depression. Significantly less subjects had mood disorder in a group of sports ($\chi 2 = 15{,}813$, $p = 0{,}0006$). Mild anxiety had 9 (6.8%), modern anxiety 2 (1.5%), without significant differences between active sports and those who were not ($\chi 2 = 4.401$, $p = 0.111$).
Conclusion: There were statistical significance in two internet behavior by people with depression and physically active persons, and anxious persons had 14 behavioral disorders related to the use of the Internet.

Keywords: Internet addiction, behavioral disorder, anxiety

9. THE ROLE AND IMPORTANCE OF HEALTH PROMOTION IN REDUCING THE INCIDENCE OF BREAST CANCER ON THE TERRITORY OF PIROT

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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 incidence of new breast cancer sufferers in the Pirot municipality and suggestions for prevention of breast cancer as relevant social-medical issue.

Method: Application of descriptive-epidemiologist studies of breast cancer for the female population in Pirot municipality for period between 1999. to 2012.

Analysing: The incidence from breast cancer considering regions and the age of group samples for chosen time period in Pirot municipality.

The results of the work and discussion: In Pirot region the rate of incidence from breast cancer is showing a growth from 1999. (88,5) to 2012. (141,4/100.000). The average growth rate for breast cancer incidence rate in the Pirot municipality for observed time period is 116,4/100.000 and it is similar average incidence rate for central Serbia which was 117,7/1000.000 in the year 2012.

Between the municipalities in the Pirot region, has the highest average incidence rate: Dimitrovgrad municipality (132,7/100.000), followed by Pirot municipality (125,7/100.00), Bela Palanka municipality (93,3/100.000), the lowest rate of incidence has the Babušnica municipality (86,6/100.000).

The average specific-increase in incidence from breast cancer in regions of Pirot municipality shows that the disease is rare in the age of women up to 35 years old: the Pirot municipialtety (1,8%), followed by Dimitrovgrad municipality (1,7%), Babusnica municipality (1,1%). The risk of illness increases with age, with a sudden jump of incidence of 35 to 50 years old: the highest percent of woman sick is in the municipality of Pirot (21,4%), followed by Bela Palanka municipality (20,9%), the Babušnica municipality (18,9%), and lastly Dimitrovgrad municipality (16,9%).

The highest risk of illness is in women over 50 years old: the municipality of Dimitrovgrad (81,6%), followed by Babušnica municipality (79,9%), then Bela Palnka municipality (78,9%) and lastly Pirot municipality (76,2%).

Conclusion: It is necessary to apply primary prevention measures together with as well as the reduction of risk factors and the application of protection measures should be carried out at the individual and population levels.

10. THE INFLUENCES OF SOCIAL FACTORS AND HEALTH-CARE SERVICES ON THE CHARACTERISTICS OF THE EATING HABITS OF THE ELDERLY

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Introduction

The ageing of a human being is closely connected with many complex biochemical processes, which bring changes in the functioning of all the vital systems of the human body: digestive disorders, bone mass loss, immune system weakening. Eating habits and nutrition are of particular importance to the proper functioning of all the systems in the old age, all the more so when the fact that the majority of the elderly population on average suffer from about five chronic diseases (cardiovascular disorders, diabetes, osteoporosis, rheumatism and other diseases) is taken into account. Eating habits are one of the ten most significant factors which influence the health of the elderly. On the other hand, eating habits themselves are influenced by a number of factors: socioeconomic factor, the level of both general and health awareness and informedness, tradition, making use of health-care services and many others.

The aim of the paper

The aim of this paper is to highlight the characteristics of the eating habits of the residents of the city of Niš aged 65 and over and their connection with certain factors.

Materials and methods

The data from the survey in which 1295 people older than 65 years of age had taken part were used. The data about socioeconomic conditions, eating habits and the role of health-care institutions in providing adequate services contributing to the improvement of eating habits and nutrition were analysed.

Results

According to the data provided by the World Bank, the socioeconomic conditions in our country are most unfavourable (twice lower than in Croatia), which makes it impossible for the people to meet the adequate expenses for proper nutrition specified by the Consumer Basket of Goods. The surveyees' answers show that the elderly whose state of health is worst are those with the lowest incomes, expressed via significance test: χ^2=2477,37> χ^2=(4 i 0,05)=9,488;p<0.05. In our country, illiteracy is still present, mostly with the elderly population (about 4%, according to the most recent population census), which gives peculiarity to their low health awareness and clearly influences the effect eating habits have on health. The data obtained in the analysis of our survey are very similar to those derived from the 2012 National Health Survey for the Republic of Serbia, conducted by the Institute of Public Health of Serbia "Dr Milan Jovanovic Batut": 82.7% have breakfast every day, 61.4% have all the three meals daily, every third person in the elderly population uses animal fats, the most educated use three times less animal fats than the least educated. In Niš, as in Serbia, white bread is mostly used. 12.3% of men and 11.9% of women recognize wrong eating habits and malnutrition as one of the health risks. Every fifth elderly person in Serbia, and every fourth in Niš, the majority of them being older than 75 years of age, does not, when preparing food, think about the role nutrition plays in maintaining good health. More women than men (23.3:18.6) have changed their eating habits during the past year. Only one half of the surveyees are satisfied with the medical information on proper nutrition they obtain from their physician. Those who are not feel that they are not provided with good advice on what kind of nutrition would be adequate for their health condition, so they often use information from unmedical sources.

Conclusion and measures proposal

Our elderly population do not have healthy eating habits, which is conditioned by numerous reasons. Solving the problem should involve many different factors, the most important of them being: education, economy, medical care, social protection and mass media.

Keywords: social factors, the elderly, eating habits and nutrition

11. THE MAIN FACTORS RELATED TO THE OF HEALTH BEHAVIOURS: A LOOK FROM THE PERSPECTIVE OF HEALTH PSYCHOLOGY

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This paper discusses concisely the main factors that are closely associated with the performance of health behaviours.
Health behaviours have been generally defined as overt behavioural patterns, actions and habits that relate to health maintenance, to health restoration, and to health and well-being improvement. A large range of behaviours fall within such a broad definition including medical service usage, compliance with medical regiments and self-directed health behaviours.
In order to predict particular health behaviours and to understand the reasons *why* some individuals perform or not perform health behaviours, a considerable body of research has been conducted with the aim to examine the various factors which underlie such behavior patterns. This research has been focused on the various forms of health behaviours – from health-enhancing and health-protective behaviours, trough avoidance of health-harming behaviours, to sick-role behaviours. In this review paper it is pointed out that a variety of factors account for significant individual differences in the propensity to undertake health behaviours. The main factors that may explain a considerable variation in *who* performs these behaviours include demographic factors, socio-cultural factors, emotional factors, personality factors, cognitive factors, perceived symptoms and factors relating to access to medical care. A summary of the existing health psychology literature strongly suggests that these factors are both predictive and open to change. Hence, they represent one route to influencing the performance of health behaviours. The knowledge of these factors is important for the promotion and maintenance of human health.

Keywords: health behaviour, health-related factors, health promotion, health maintenance, health psychology.

POSTER PRESENTATIONS:

1. AWARENESS SEVENTH GRADE PUPILS ABOUT PERSONAL HYGIENE

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Personal hygiene is very important especially in puberty.
Aim: To consider the extent of informing students of the seventh grade on personal hygiene, identifying problems and proposing solutions.
Method: The population comprised 369 seventh grade students of primary schools in the municipalities of Novi Bečej and Žitište (Central Banat). Used his own survey questionnaire with questions 8 in the field of personal hygiene products as well as the input and output test.
Results: showed that the level of knowledge about personal hygiene significantly higher after health education work. Entrance test showed that knowledge about personal hygiene significantly less, especially on issues that the disease can be transmitted by dirty hands (32,39%), how many times a day should be at least brush your teeth (39,89 %), and diseases which occur most frequently on the nails (35,79%). After health education work, output test showed that the correct answers were almost twice more than in the entrance test. On the other survey questions, the percentage of correct responses was about 20% higher at the exit test in relation to the inlet.
Conclusion: The results show that it is necessary to improve knowledge, attitudes and behaviors regarding personal hygiene while constantly informing students to adopt right attitudes and behavior within the proper implementation of personal hygiene.

Keywords: personal hygiene, school children, seventh grade

2. RISK DRINKING ALCOHOL IN THE YOUTH POPULATION

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Aim of study: Assessment of risky drinking of young in regard to age, sex, financial situation and place of living.
Study method: Observational cohort study. The sample included 1340 examinees, 680 girls (50,7%) and 660 boys (49,3%) from Niš and its surroundings: from city 778 (58,1%), from villages 319 (23,8%) and from suburbs 243 (18,1%). Examinees are classified in 4 categories: under 14 years (279 examinees (20,8%)), from 15 to 17 years (308 examinees (23%)), from 18 to 20 years (324 examinees (24,2%)), and over 21 years old (429 examinees (32%)).
Results: Four-fifths of respondents drank alcohol (79.7%) at different time intervals. Nearly a third of respondents drank once a month (34.9%) less than half the age of 18 (46.4%) and twice as many girls than boys. Almost one in five respondents drank several times a month (18.9%) quarter is less than 18 years -24.3% and slightly more boys than girls. One sixth of the respondents drank once a week (16.7%) over two-fifths (38.3%) under the age of 18, and two times more boys than girls. Nearly one-tenth of respondents drank a few times a week (9.2%) quarter is less than 18 years (26%) and almost four times more boys than girls. There was a statistically significant difference in the structure of the responses related to the frequency of alcohol consumption among young people: by age (χ 2 = 93.010, p <0.001), gender (χ 2 = 141 567, p <0.001). Large quantities of alcohol were in few hours consumed by 61,6% of examinees. Older than 21 years (76,1%), were the most numerous consumers of 5 or more alcoholic drinks in short period of time. Examinees under 14 years (25,4%) were the rarest consumers of large quantity of alcohol. There is statistically significant difference between examinees of different age in relation to, whether they consumed 5 or more alcoholic drinks in short period of time (χ^2 =126.409; p<0.001). Boys consumed larger quantity of alcohol more often (72,9%) than girls (48,8%), so there is statistically significant difference in relation to sex (χ^2=65.231;p<0.001). Among respondents with poor economic situation, 78.3% have consumed a larger amount of alcohol in a short period of time. It also has made 63.6% of good and 57.7% of medium economic status. There is statistically significance in relation to financial status (χ^2=16.906;p<0.001). Nearly two thirds of youth who drank more drinks in short period of time come from cities or villages (po 62%), while 59,5% come from suburbs.
Conclusion: Large quantities of alcohol in few hours were consumed by more 3/5-rds of examines.

Keywords: alcohol, alcoholism, youth

3. ALCOHOL (AB)USE IN THE STUDENT POPULATION OF NOVI SAD AND PREVENTIVE MEASURES

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Objectives: To find out the current alcohol use trend among the first and third year students attending the University of Novi Sad.
Methods: Research was conducted among students of the University of Novi Sad from October 2016 until February 2017. We used an uniquely designed questionnair. 560 students have participated, 300 first year: 143 (47,7%) male and 157 (52, 3%) female; and 260 third year: 127 (48,8%) male and 133 (51,1%) female. Data was analysed with SPSS(20.0 Version).
Results: Alcoholic beverages in general were consumed by 73.2% of first year students (74,1% male; 77,5% female). Among the third year students, 76,6% students consumed alcohol (82,7% male; 75,3% female). Alcoholic drinks were consumed on a weekly basis by 8,9% first year students and 10,3% third year students. On a monthly basis 67,5% first year students consumed alcohol and 70,3% third year students.
Conclusion: Results of our study show almost eaqual numbers of female and male students that consume alcohol wich is a new trend in our society. Results also indicate the need for an increase of preventive activities such as pro-social bonding, teaching "life" skills and providing caring and support for young highly educated people that are our future.

Keywords: public health, students, alcohol, prevention

4.FREQUENCY OF HEALTH PROBLEMS IN PRIMARY SCHOOL CHILDREN WHO ARE ENGAGED IN SPORTS IN THE CITY OF POŽAREVAC

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According to the 2016 Sports Law, pupils and students cannot be engaged in extracurricular sports activities and competitions unless their physical competence for school sport has been previously determined. Evaluation of physical competence of pupils aged 6-14 is carried out by a selected doctor–paediatrician from the Health Centre during the mandatory physical examination (first, third, fifth and seventh grades of primary school), or a sports medicine doctor or a paediatrician when the physical competence is examined regardless of the mandatory physical examination (previous, periodical and targeted examinations). The costs of evaluation of physical competence for sports activities of pupils aged 6-14 are included in the obligatory health insurance, whereas before they were paid, at best, by the local community.

The aim of this paper is to determine the frequency of health problems in children who are engaged in sports activities, either recreationally or competitively, in several sports clubs in Požarevac. The research was carried out at the end of September, 2016.

The findings reveal that 8.3% of young athletes have some medical problems. Two thirds of the children get engaged in sports because of their parents' initiatives or their own interests, 15% under the influence of teachers or friends, and 3.3% after the doctor's recommendation.

The children included in the survey had medical problems such as asthma, heart murmur, insulin dependent diabetes and allergies, but these serious medical conditions indicate that health problems are not necessarily an impediment for doing sports.

Keywords: sport, medical problems at school-age children, evaluation of physical competence

5. MORBIDITY AND MORTALITY RATE AMONG SCHOOLCHILDREN AND ADOLESCENTS IN THE MUNICIPALITY OF TREBINJE IN 2012-2015

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[2]Faculty of Medicine Niš, University of Niš, Republic of Serbia

Aim: The aim of this study was to present morbidity and mortality rate among schoolchildren and adolescents in the municipality of Trebinje in 2012-2015.
Method: The data obtained from the Public Health Institute of the Republic of Srpska, Regional Unit-Trebinje as well as from the Institute of Statistics of the Republic of Srpska were used in the study.
Results: The respiratory diseases were the most prevalent diseases in the population of schoolchildren and adolescents in Trebinje in 2012-2015. The most frequent diagnosis was acute tonsillopharyngitis. Its rate per 1000 children was smaller in 2015 compared to 2012, with the insignificant oscillations in the observed period. The vague diagnosis of patients requiring health services for examination and testing was also highly represented. This diagnosis had shown a trend of increasing in the observed period. During the same period, no deaths were recorded among this population.
Conclusion: In order to improve schoolchildren and adolescents′ health in Trebinje, health education about risk factors for respiratory diseases is necessary. Also, there is a need to keep precise and accurate medical records in order to improve quality of data on health condition of the observed population.

Keywords: morbidity, mortality, schoolchildren, adolescents

6. PHARMACY STUDENTS' PERCEPTIONS OF ELECTRONIC CIGARETTES: A CROSS-SECTIONAL STUDY.

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Objectives: E-cigarettes use has increased considerably worldwide. Although e-cigarettes are promoted as a mode of tobacco harm reduction, the limited scientific knowledge on the potential adverse health effects has sparked concern. The purpose of this study was to assess the use of e-cigarettes among pharmacy students.
Materials and methods: In 2016, we conducted a cross-sectional study among pharmacy students enrolled at University of Kragujevac (Serbia).
Results: The study involved a total of 404 pharmacy students (participation rate: 419/433, 96.8%; response rate: 404/433, 93.3%). E-cigarettes use was relatively frequent, with an overall prevalence of 9.9% (n=40). 27% of pharmacy students consider e-cigarettes safer for the user, compared to conventional cigarettes, and 44.6% believe e-cigarettes are safer for the environment, compared with conventional cigarettes. 14.4% of students think e-cigarettes help people successfully quit smoking, and 27% think e-cigarettes successfully reduce the use of conventional cigarettes. It is promising that only 7.7% of pharmacy students believe that e-cigarettes do not cause dependence.
Conclusion: There is a need to improve the knowledge about the possible health effects of electronic cigarettes.

Keywords: e-cigarette, pharmacy students, prevalence study.

SESSION: ENVIRONMENT AND HEALTH

INVITED LECTURES

1. SUSTAINABLE HEALTHCARE WASTE MANAGEMENT AND HEALTH CARE PROVISION

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ABSTRACT:

Background:
This article provides an assessment of health-care waste management (HCWM) in healthcare facilities in the public healthcare settings in the Republic of Serbia. Analysis of the gathered data showed that the practices of HCWM are present in primary healthcare centres and hospitals at all levels of healthcare provision, primary, secondary and tertiary. This is an overview of practice of healthcare personnel in healthcare facilities and a report on correlation with organisation of HCWM in healthcare facilities, healthcare personnel, training activities, as well as HCWM plans concerning achievement of sustainable HCWM. For maximum effectiveness, all healthcare facilities should be with high level of awareness on importance of hazardous waste management. Hospitals as a significant generator of pharmaceutical waste should be an example to society by managing their waste in a manner defined to prevent hazardous waste generation in future in order to protect health and the environment.
Healthcare waste has become a serious health hazard in many countries. Healthcare is vital for our life, health and wellbeing. But the waste generated from healthcare activities can be hazardous and toxic because of their high potential for diseases transmission. Improper disposal has become one of the challenging problems of urbanization. Hospitals and other healthcare facilities generate waste which is chemically hazardous, infectious and often radioactive. Such waste because of inappropriate disposal/treatment strategies contributes to serious health hazards in the community.
Healthcare waste is generated within daily activities of healthcare institutions, and it’s composed of two components: non-hazardous healthcare waste (75% of the total quantity) and hazardous waste (25%). In the previous ten years the practice regarding healthcare waste management has been improved across mentioned institutions, in accordance with the Law on Waste Management and with the Rulebook on the management of healthcare waste in the Republic of Serbia. Changes in the management of healthcare waste (HCWM) are based on the implementation of procedures for the safe handling of hazardous healthcare waste from the point of its generation to its disposal.
Method: The study is a prospective and retrospective type survey on a representative sample of healthcare institutions in the public health sector, on the territory of the Republic of Serbia without Kosovo and Metohija, which differ from one another in relation to the type of institution, the level of health care and territorial affiliation. The research tools used in the study are standardized questionnaires for testing HCWM in health care systems. A total of 116 institutions were included in the survey, with proportional representation of all types of health institutions (health centers, general and special hospitals, clinic and hospital centers, clinical centers, institutes and public health institutes, other institutions) from three levels of health care.
Results: The study was used to define the key factors of HCWM that influence the quality of health care services in healthcare institutions at different levels of healthcare (primary,

secondary, tertiary) as well as in the different types of health institutions (health center, general hospital, clinical center, clinical hospital center, institute or Public Health Institute). This study has identified the differences between health institutions concerning HCWM. The factors for the HCWM at a primary level of healthcare are the number and type of health services, while at the levels of secondary and tertiary health care, the key factors are the number of beds and their respectful occupancy.
Conclusion: The study found that infectious medical waste is the most frequent stream of hazardous healthcare waste generated in all types of healthcare institutions (about 95% of the total amount of hazardous healthcare waste). The total number of hospital days, as well as the duration of the hospital treatment, is distinguished as the most important indicator of the amount of HCWM dealt with in stationary healthcare institutions.
The study highlighted the implementation of HCWM plans and the appointment of persons responsible for waste management, as well as the establishment of an HCWM team in healthcare institutions, as very important factors of proper HCWM in all types of healthcare institutions.

Keywords: Healthcare waste management, hazardous healthcare waste, factors

INTRODUCTION:

Health-care waste (medical waste) includes all the waste generated within health-care facilities, research centres and laboratories related to medical procedures. According to literature between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste and usually called “non-hazardous” or “general health-care waste”. The remaining 10–25% of health-care waste is regarded as “hazardous” and may bring a variety of environmental and health risks. All healthcare facilities including hospitals generate hazardous healthcare waste during provision of inpatient health-care. One of the important objective of proper healthcare waste management in hospitals in total is prevention of generation of hazardous health-care waste including infectious waste. But accumulation of segregated infectious waste is an indicator of existing HCWM practice in the hospital. All personnel dealing with health-care waste should be familiar with the main categories of health-care waste as set out in either national or local regulations on waste classification [1].
In the Republic of Serbia the key legal framework for healthcare waste management consist of the Law on Waste Management, Strategy of Waste Management and various Rulebooks including a Rulebook on health-care waste management (Rulebook).
Legal framework for the health-care waste management in most countries consists of Law on waste management and additional regulations concerning healthcare waste management [2].
This Rulebook on health-care waste management prescribes in details the method for management of hazardous health-care waste. Provisions of this Rulebook do not apply to radioactive waste management, including radioactive pharmaceuticals.
According to above mentioned Rulebook healthcare waste is waste generated in the course of providing healthcare services to humans and it comprises hazardous and non-hazardous waste defined in the Serbian Waste Catalogue as waste categories and classification. Serbian Waste Catalogue is developed according to EU Waste Catalogue. According to the Rulebook on health-care waste management there are two categories of healthcare waste in Serbia: 1) non-hazardous healthcare waste and 2) hazardous healthcare waste. The hazardous health-care waste requires special handling of (1) patho-anatomical waste, (2) sharps, (3) pharmaceutical (4) cytotoxic and cytostatic waste (5) waste contaminated by blood and body fluids (6) infectious waste (7) other hazardous healthcare waste (chemical waste, waste with a high content of heavy metals and waste pressurized containers) (8) chemical waste (9) waste with

a high content of heavy metals - subcategory of chemical waste (10) waste pressurized containers [3].
As the “Blue book” of WHO clearly states Pharmaceutical waste includes expired, unused, spilt and contaminated pharmaceutical products, prescribed and proprietary drugs, vaccines and sera that are no longer required, and, due to their chemical or biological nature, need to be disposed of carefully. The category also includes discarded items heavily contaminated during the handling of pharmaceuticals, such as bottles, vials and boxes containing pharmaceutical residues, gloves, masks and connecting tubing.
Healthcare waste management pertains to a group of measures encompassing collection, segregation, packaging, labelling, storage, transport, treatment and safe disposal of healthcare waste. One of the most important tasks of the staff from all healthcare facilities including hospitals is to prevent generation of big quantity of this waste stream. Also, minimization of the amount of healthcare waste, as well as measures for reusing the waste, is strategy to be provided for at the place of origin, whenever possible. Segregation is very important practice for the safe HCWM.
Segregated pharmaceutical waste is packed in the red containers or red bags while cytostatic waste is packed in purple containers or bags.
4) infectious waste - in yellow bags or containers; 5) waste contaminated by blood and body fluids - in double grey bags or yellow containers; 6) other hazardous waste (chemical) - in red containers;

All personnel from healthcare facilities dealing with health-care waste should be trained for HCWM. After training personnel become familiar with the main categories of health-care waste and required procedures for handling of waste. As a minimum, managers responsible for healthcare waste should conduct audit activities through of the facility to identify the medical areas that produce these waste streams, to obtain an initial estimate of the types and quantities of waste generated, and to assess how the waste is handled and disposed of. A rapid assessment, combining observations with interviews and survey questionnaires, provide sufficient data to identify problems and begin the process of addressing them.
Health-care personnel from hospitals are committed to the protection of human health and the environment and obliged to participate in the development of sustainable HCWM.

METHODS:
The research has been conducted as a cross-sectional study in healthcare facilities of the state health-care sector in November 2014. Data were collected from 116 state healthcare institutions at primary, secondary and tertiary health-care level in the Republic of Serbia by using a standardized questionnaire (UN–WHO HCWM Rapid Assessment Tool) for rapid assessment of HCWM.. The questionnaire was distributed to the hospitals and each questionnaire was completed by the person responsible for the management of health-care waste in the institution.
All institutions have responded to the questionnaire, which makes it a special database for the research on HCWM..
All institutions have been located in 4 regions in Serbia (Belgrade, Vojvodina, Sumadija and Western Serbia, Southern and Eastern Serbia).
All statistical analyses were performed using IBM SPSS Statistics for Windows Software Version 20.0. Results were presented as mean and standard deviation (mean ± standard deviation). Along with a descriptive analysis, Mann–Whitney U-test and Spearman's correlation were used as methods of checking for correlations within pertinent questions. P-values under 0.05 were considered statistically significant.

The Ethics Committee of the Institute of Public Health of Serbia gave their approval for conducting this research.

RESULTS:

116 healthcare institutions were located in 4 regions (Belgrade, Vojvodina, Šumadija and Western Serbia and Southern abd Estearn Serbia) at two referrals, secondary level and tertiary level of health –care. Of the total of 116 facilities 60 facilities belong to secondary and tertiary level of healthcare.

Analysis of data has shown that Clinical centres were generating the biggest quantity of pharmaceutical and cytostatic waste in all regions.

Analysis shown that statistically significant difference was found with regards to the level of health-care, when it comes to medical waste generation in total ($U=198$, $p=0.006$). Tertiary healthcare level hospitals produce statistically significantly bigger quantity of medical waste than secondary level hospitals. Hospitals are identified as the most generators of hazardous HCW.

The largest number of staff trained for HCWM was registered at tertiary level of healthcare institutions (94% of tertiary level institutions). Still, every fifth hospital did not have any staff trained for HCWM.. Training was conducted through two training curricula, one was training for HCWM- Technicians and the other training for HCWM- Managers (Table 1).

Table 1. Trained personnel for HCWM - Technicians and Managers

Spearman's rho statistical test proofed that there is significant and direct correlation between the number of beds, number of hospital days and the number of trained personnel for managers and technicians for HCWM.

Based on the calculated value of the rank correlation Spirman coefficients authors can conclude that the amount of hazardous healthcare waste significantly correlate directly to number of services provided by hospital, number of beds, number of trained personnel for HCWM. This means that health care institutions that have a larger number of bed days and more trained persons for HCWM generate a bigger amount of both waste streams and in the same time segregate bigger amount of these two waste streams.

DISCUSSION:

Promotion of the safe handling and disposal of healthcare waste is an important activity of each healthcare facility. Separation of healthcare waste, on daily basis after provision of medical services is of upmost importance for the quality of HCWM [1]. Nowadays, many developing countries and undeveloped countries increased segregation of health-care waste in order to implement safe disposal and management of hazardous waste streams, which are usually infectious, pathological waste and pharmaceutical waste.

The primary regulation on waste in many countries is the key instrument for the improvement of HCWM [1].

Research has shown that in Serbia particularly in hospitals are generator of significant quantity of pharmaceutical waste. Research also underlined that there is a direct correlation between the number of realized hospital days, number of realised outpatient services and quantity of separated cytostatic and pharmaceutical waste.

Training for the proper and safe management of health-care waste in hospitals is of great importance for dealing with these types of hazardous health-care waste. This training is in accordance with legal framework and guideline of good practice on HCWM developed in accordance with WHO recommendations [4-5].

Training for Health-care Waste Management in Serbia takes place as an external training, as continual medical education, organized by the Institute of Public Health of Serbia and as an internal training program organized by hospitals.. Results from the research shows that there

is a direct correlation between the numbers of trained personnel and management with pharmaceutical waste which is at the moment measured by quantity of generated waste.
In cooperation with international development assistance programs, it is planned to increase public and professional awareness regarding proper pharmaceutical waste management.
Knowing the types and quantities of waste produced in a health-care facility including hospitals is an important first step in safe disposal. Waste-generation data are used in estimating the required capacities for containers, storage areas, transportation and treatment technologies. Waste-generation data can be used to establish baseline data on rates of production in different medical areas and for procurement specifications, planning, budgeting, calculating revenues from recycling, optimization of waste-management systems, and environmental impact assessments [1] These measures are present in Serbia but still there is a need for improvement with an multidisciplinary approach and inter-sectoral cooperation.

CONCLUSION:

– Healthcare institutions in the Republic of Serbia are implementing the legal framework concerning health-care waste management including procedures for safe hazardous healthcare waste management. These procedures are sometimes incomplete and need further improvement according to WHO recommendations and EU Directives.
– Practices of different healthcare facilities concerning healthcare waste management are different.
– Infectious medical waste is the most frequent stream of hazardous healthcare waste generated in all types of healthcare institutions (about 95% of the total amount of hazardous healthcare waste).
– The factors for the HCWM at a primary level of healthcare are the number and type of health services, while at the levels of secondary and tertiary health care, the key factors are the number of beds and their respectful occupancy.
– Bigger quantity of hazardous medical waste is produced in tertiary level hospitals since the medical technologies and number of hospital days in those hospitals is bigger.
– The further improvement of healthcare waste management is to be achieved through more frequent training opportunities and, consequently, a larger number of trained specialists in the field of dealing with pharmaceutical waste.
– HCWM plan is a very important instrument for the achievement of sustainable HCWM.
– Financing of proper HCW is very important factor for achieving of sustainable HCWM

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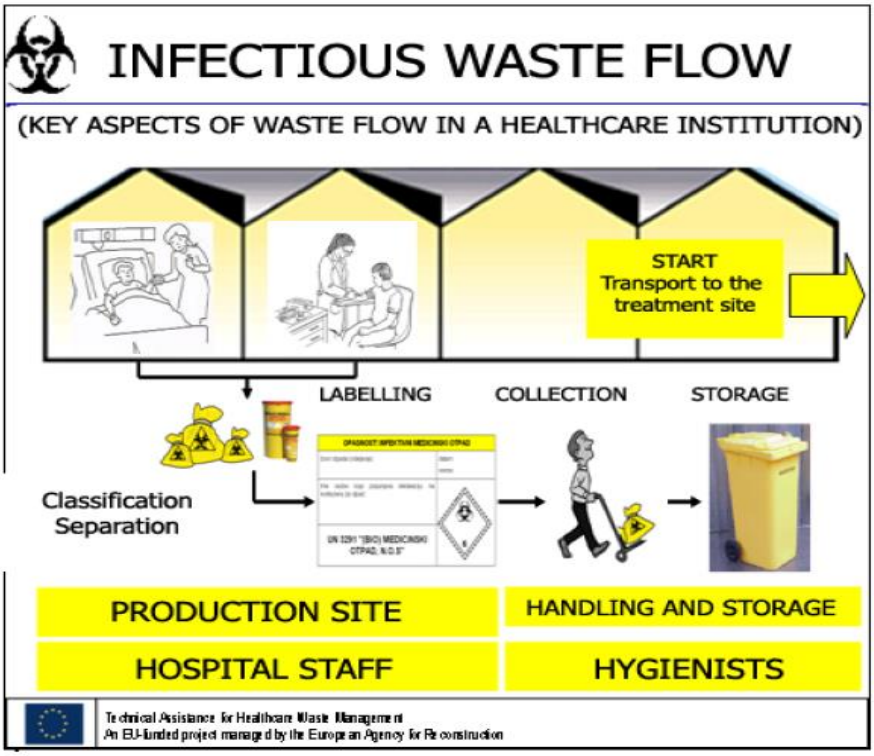
Table 1. Trained personnel for HCWM - Technicians and Managers

	Secondary level		Tertiary level	
	N	Sum	N	Sum
Number of trained HCW Managers	43	27	17	16
Number of trained HCW Technicians	43	28	17	15



Graf 1. Infectious healthcare waste flow

2. AMBIENT AIR QUALITY IN NIS IN THE PERIOD 2007-2016

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Introduction: Air pollution is probably one of the most serious environmental problems confronting our civilization today. More than 80% of people living in urban areas that monitor air pollution are exposed to air quality levels that exceed the World Health Organization (WHO) limits (1).

Air pollution has serious effects on the human health. Depending on the level of exposure and the type of pollutant inhaled, these effects can vary, ranging from simple symptoms like coughing and the irritation of the respiratory tract to acute conditions like asthma and chronic lung diseases.

Epidemiological studies continue to associate air pollution with increases in human morbidity and mortality. Increasing evidence suggests that short- term or long-term exposure to ambient air pollution may adversely affect respiratory and cardiovascular system (2, 3)

Monitoring air pollution in Niš: For more than half a century, the Institute of Public Health (since 1965) has been involved in the systematic control of the quality of ambient air in the territory of Nis, on the basis of contractual obligations with the Ministry of Environmental Protection and Local Government Units which, according to the Law on Air Protection.

The purpose of the monitoring:

- to collect certain data on the quality of ambient air,
- to evaluate the impact of polluting substances on the health of the exposed population and the environment
- to obtain the processing data so that they are useful for the public, scientists, planners and decision makers.

Geographical position and climate characteristics of Niš: The city of Niš is located at the bottom of the valley at 43 º 19 'north latitude and 21º 54' longitude, at an altitude of 200 m. The Niš basin occupies an area of 597 km^2, of which the City of Niš occupies an area of 32 km^2.

City of Niš has moderate continental climate (warm summers and moderate cold winters) with average annual air temperature of 11.5 °C. Temperature inversions are most common in the period from October to March. In such conditions - comes to the formation of "smog“. Under the influence of the dominant wind dispersal of pollutants takes place directly in the urban part of Nis valley. The largest air pollution sources in Nis are heating and traffic. The industry is also a significant source of air pollution.

The aim of this paper was to present the results of the monitoring of concentrations and trends of pollutants in ambient air in the territory of the City of Nis in the ten-year period (2007-2016).

Method: Concentrations of the basic pollutants of sulfur dioxide, soot and precipitants were monitored at six measuring sites in Nis, while concentrations of suspended matter (PM_{10} fraction of suspended particles with concentrations of heavy metals in them) as well as photochemical smog concentrations were carried out at a single measurement site.

Sampling of ambient air and laboratory testing was done by accredited methods, and the results of the tests were interpreted in accordance with the current legislation.

The paper presents the average annual concentrations of these pollutants, percentage of days with pollutant values over, valid legislation, prescribed values, trend of average annual concentrations of tested parameters, as well as values of air quality index AQI_2.

Results: Sulfur dioxide is a colorless gas of a sharp odor, well soluble in water. It is one of the most commonly occurring pollutants in ambient air. The largest anthropogenic source of sulfur dioxide is the burning of fossil fuels. High levels of sulfur dioxide and particles lead to episodes of winter smog, when poor airflow and temperature inversion prevent vertical mixing of the air and dilution of pollutants in the lower layers of the atmosphere. This pollutant contributes to respiratory illness, particularly in children and the elderly and aggravate preexisting heart and lung diseases, especially asthma (4).

It was found that the average annual concentrations of sulfur dioxide at all measuring points in Niš were below the validity values , and that during the investigated period there were no days with values that exceeded the prescribed values. In the ten-year period, there was a significant decreasing trend in average annual concentrations of sulfur dioxide at all measuring points, except at the measuring site in Niska Banja, where the trend of average annual concentrations of sulfur dioxide increased (Table 1).

The soot is considered as unwanted byproducts derived from incomplete combustion of carbon-containing materials (5). Soot particles are nuclei that absorb individual gas components present in the air, and also have the ability to condense with sulfur, nitrogen compounds and water vapor. In the winter months, the soot creates a toxic fog, winter smog, because then the conditions for dispersion and transport of soot and sulfur dioxide are reduced and they accumulate in the air. The soot reduces visibility and warming due to the sun's rays. Research shows that soot can cause human mortality and disability (6, 7).

The average annual concentration of soot was above the maximum allowed only in 2009 and only at one measuring point, but the daily concentrations of soot at all measuring points often exceeded the maximum allowable value (Table 1).

In the ten-year period, as in the case with the average annual concentrations of sulfur dioxide, there was a significant increase in the average annual concentration of soot on the measuring site in Niška Banja. At the others measuring points the trend of average annual concentrations of soot shows a decreasing trend.

Table 1 Average annual concentrations of sulfur dioxide and soot (μg /m^3) in the period 2007 - 2016

Measuring points	Trg Kneginje Ljubice		MK "B. Adžija"		Palilulska rampa		MK "R. Pavlović"		Bul. 12. februar		Niška Banja - ZS	
Year	SO2	soot	SO2	soot	SO2	soot	SO2	soot	SO2	soot	SO2	soot
2007.	31	47	10	19	7	43	7	18	24	15	1	3
2008.	16	35	10	15	8	35	9	15	18	10	2	3
2009.	14	51	9	24	5	39	6	26	13	19	2	7
2010.	10	44	5	19	5	25	5	18	8	16	2	6
2011.	11	27	9	18	8	26	6	8	8	13	4	9
2012.	6	12	6	15	6	23	5	4	6	11	5	8
2013.	5	19	4	20	4	27	5	7	6	13	5	13
2014.	6	20	5	20	5	32	4	12	5	16	5	16
2015.	7	19	-	-	-	-	-	-	-	-	-	-
2016.	7	15	-	-	-	-	-	-	-	-	-	-

The air quality index (**AQI)** is widely used to characterize the quality of ambient air. Determining the air quality index is important because it assesses the harmful effects of polluting substances in the air on health and the environment. Based on the AQI_2 value that

takes into account the concentrations of soot and sulfur dioxide, the assessment of air quality goes from favorable to very unhealthy (Table 2).

Table 2 Air quality assessment based on AQI_2 value

	Numeric indicator	**Descriptive indicator**
AQI_2	<0.4	favorable
	0.4-0.6	sightly polluted
	0.6-0.8	middle
	0.8-1.0	unhealthy
	>1.0	very unhealthy

By calculating the air quality index (AQI2) at Trg Kneginje Ljubice (Table 3), it was determined that the air was very unhealthy in the period from 2007 to 2010.

Table 3 Air quality assessment based on AQI_2 value in the period 2007-2016
Trg Kneginje Ljubice

Year	2007.	2008.	2009.	2010.	2011.	2012.	2013.	2014.	2015.	2016.
AQI_2 (num. ind.)	1.56	1.02	1.3	1.08	0.78	0.40	0.46	0.52	0.52	0.44
AQI_2 (desc.ind.)	very unhealthy	very unhealthy	very unhealthy	very unhealthy	middle	sightly polluted	sightly polluted	sightly polluted	sightly polluted	sightly polluted

At the other measuring points, it was found that the highest values of this index were recorded at the measuring point Palilulska rampa, especially in the period from 2007 to 2009, while the lowest values on the basis of which assesses air quality as favorable, recorded at the measuring site in Niska Banja (Table 4).

Table 4. Air quality assessment based on AQI_2 value in the period 2007-2014

Year/ Measure point	2007.	2008.	2009.	2010.	2011.	2012.	2013.	2014.
MK "Božidar Adžija"	0.57 sightly polluted	0.50 sightly polluted	0.48 sightly polluted	0.49 sightly polluted	0.53 sightly polluted	0.41 sightly polluted	0.48 sightly polluted	0.49 sightly polluted
Palilulska rampa	1.01 very unhealthy	0.86 unhealthy	0.88 unhealthy	0.60 sightly polluted	0.68 middle	0.58 sightly polluted	0.62 middle	0.74 middle
MK "Ratko Pavlović"	0.49 sightly polluted	0.47 sightly polluted	0.64 middle	0.45 sightly polluted	0.28 favorable	0.17 favorable	0.24 favorable	0.33 favorable
Opština Crveni krst-Bul. 12. februar	0.78 middle	0.57 sightly polluted	0.64 middle	0.42 sightly polluted	0.43 sightly polluted	0.34 favorable	0.38 favorable	0.43 sightly polluted
Niška banja-zdr. stanica	0.09 favorable	0.10 favorable	0.17 favorable	0.16 favorable	0.27 favorable	0.26 favorable	0.35 favorable	0.43 sightly polluted

The precipitates are pollutants of organic and inorganic origin whose particles are larger than 10 μm, and their weight is deposited on the surface. Concentrations of precipitants change depending on meteorological conditions. Lower concentrations are recorded when there are atmospheric precipitation, and they increase in the summer months.
The average annual values of total precipitants at all measuring points, except at the measuring center MK "Ratko Pavlović", were more than prescribed. The highest average annual value of total precipitants was twice higher than the prescribed value, and was recorded in 2008 at Trg Kneginje Ljubice (Table 5).
In the ten-year period, the decreasing trends of average annual values of total precipitants were recorded in all measuring points except at the measuring center MK "Božidar Adžija" where the concentrations in the investigated period were uniform.

Table 5 Average annual values of total precipitants (mg / m^2 / day)

Year / Measuring points	2007.	2008.	2009.	2010.	2011.	2012.	2013.	2014.	2015.	2016.
Trg Kneginje Ljubice	276	404	269	262	266	168	122	153	113	164
MK "B.Adžija"	154	174	201	237	156	183	164	172	-	-
Palilulska rampa	184	191	247	236	137	194	120	162	-	-
MK "R. Pavlović"	197	125	175	161	160	124	99	217	-	-
Bul. 12. februar	275	250	202	211	120	147	228	188	-	-
Niška banja- zdr. stanica	156	270	204	267	136	114	109	118	-	-

Particulate matter is a portion of air pollution that is made up of extremely small particles and liquid droplets containing acids, organic chemicals, metals and soil or dust particles. Studies show an increase in morbidity and mortality related to PM exposure (6). The World Health Organization estimates that particulate matter concentration contribute to approximately 800 000 premature deaths per year, ranking in the 13th leading cause of mortality worldwide (7).

In the period from 2010 to 2016, the average annual concentration of PM_{10} fraction of particulate matter was above the limit and tolerance value (Table 6). During the test period an upward trend of average annual values of PM_{10} fraction of particulate matter was determined (Graphic 1). Also, a large percentage of days with concentrations above the allowed values was recorded. The presence of an additional emission source (boiler room and individual firebox) during the heating season significantly influenced the increase in the concentration of suspended PM_{10} particles, so the average and maximum values were found to be significantly higher than the values after the heating season. Daily concentration of PM_{10} in more than 50% of the measurements in the heating season, were above limit values (Table 7).

Table 6 Average annual values of PM_{10} and heavy metals in PM_{10} fraction ($\mu g/m^3$)
Public Health Institute Nis

Year	2011.	2012.	2013.	2014.	2015.	2016.
PM_{10}	43.3	53.3	50.9	51.4	51.3	56.1
Pb	0.031	0.010	0.010	0.011	0.008	0.009
Cd	0.003	0.001	0.001	0.002	0.002	0.003
As	0.003	0.003	0.003	0.002	0.001	0.002
Ni	0.006	0.004	0.003	0.002	0.002	0.002

Graphic 1

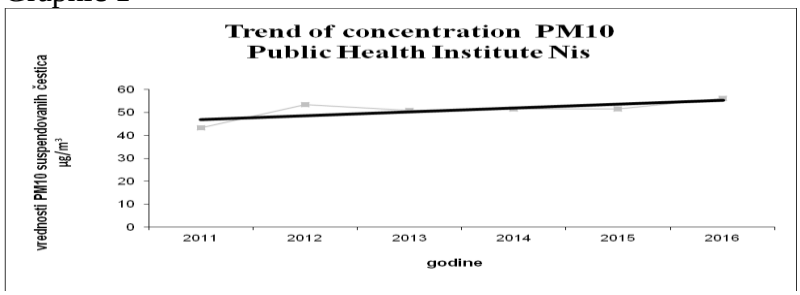

Table 7 Concentration of PM_{10} in heating and off- heating season
in the period 2011-2016 ($\mu g/m^3$)

PM10	Public Health Institute Nis											
	2011.		2012.		2013.		2014.		2015.		2016.	
	Heating season	Off heat. season	Heating season	Off heat. season	Heating season	Of heat. season	Heating season	Of heat. season	Heating season	Of heat. season	Heating season	Of heat. season
X	83,45	26,45	80,62	27,05	69,06	35,35	65,54	39,32	71,7	30,17	83,3	26,9
Min	25,54	13,76	27,90	15,57	18,5	3,6	27,2	18,19	18,8	8,8	22,83	6,7
Max	228,70	54,17	257,74	38,40	161,1	75,37	193,2	99	176,8	54,35	295,15	59,6
Num (%) above GV-daily	14 (58)	2 (7)	15 (60)	0 (0)	14(58)	2(7)	14(56)	5(18)	15 (54)	2 (7)	15(54)	2(8)
Num (%) of above TV-daily	11 (46)	0 (0)	11 (44)	0 (0)	7(29)	1(3,5)	9(36)	1(3,7)	10(36)	0 (0)	9 (32)	0 (0)

Photochemical smog appears in clear, sunny days with low humidity of the air, in the presence of high concentrations of pollutant. One of the most important pollutant, which is produced in the atmosphere by photochemical reactions, is ozone. Because ozone is highly reactive, it has the ability to oxidize and destroy lung tissue. Acute ozone exposures cause pulmonary function decrements, school absenteeism in children, injury and inflammation, cardiovascular events, and disease exacerbation, while chronic exposures to ozone have been associated with increased incidence of asthma and increased mortality due to cardiovascular and pulmonary disease, as well as reproductive effects (8).
In this investigation it has not been found concentrations of ozone, nitrogen oxides and formaldehyde above the limit value (Table 8).

Table 8 Concentrations of ozone, nitrogen oxides and formaldehyde in the period 2007-2016 ($\mu g/m^3$)

Year	MK "Božidar Adžija"		
	Ozone	Nitrogen oxides	Formaldehyde
2007.	3.07	17.98	1.93
2008.	4.04	25.31	2.14
2009.	8.54	23.42	9.85
2010.	8.90	30.20	6.40
2011.	7.80	15.40	2.50
2012.	5.70	22.40	1.70
2013.	8.80	36.70	4.6
2014.	1.11	30.60	2.9
2015.	14.00	26.10	<6.0
2016.	14.20	30.30	<6.0

Conclusion: Implementation of monitoring is very important for: improving knowledge about air pollutants and their influence on the health, planning and implementation measures that will lead to improvements in air quality at the local level, redefinition of regulations including limit values for air pollutants. 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. Research of harmfull effects is also very important.

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3. EFFECTS OF OUTDOOR AIR POLLUTION ON CHILDREN'S HEALTH IN ZASAVJE REGION, SLOVENIA: METHODOLOGICAL APPROACHES

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Objectives: Numerus epidemiological studies have demonstrated that the quality of outdoor air pollution is the most important environmental public health issue. The aim of this study was to assess with different methodological approaches the association between exposure to outdoor air pollution and children's health, adjusted to potential environmental and social-economics confounder's factors.
Materials and methods: Mixed methods design was used to assess the association between observed phenomena. Study was divided into six phases, of which first four phases were preparative descriptive studies for preparing the fifth and sixth analytical studies. In the first three studies, availability and quality of health and environmental data were assessed. The establishing small spatial units with models of spared of air pollution for linkage to health data in a complex terrain in fine resolution were also prepared. Cross sectional study of school children has been done to identify the potential demographic, socio-economics and environmental confounder factors, contributing to respiratory diseases. In analytical part, the time-trend study using Poisson regression models and spatial multiple-group study using the Bayesian hierarchical models was performed.
Results: The results of our study show some deficiencies in the routinely collected health and environmental data. In multivariate logistic regression analysis family history, child health complications just after delivery, breast-feeding duration and humidity of dwelling place were assessed as statistically significant confounders. In analytical part of study an association has been observed with PM_{10} and O_3 when assessing the temporal association and with SO_2 when assessing the spatial association.
Conclusion: The presented methodological approach could be useful and important for planning and implementation environmental public health activities in the observed area and similarly complex terrain.

Keywords: environmental public health, air quality, health effects, methodological approach, Slovenia, Zasavje

ORAL PRESENTATIONS

1. TOOL FOR DECISION-MAKING REGARDING GENERAL EVACUATION DURING A RAPID RIVER FLOOD

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Objectives: To propose a simple and effective tool for decision-making regarding general evacuation during a rapid river flood.
Study design: Virtual testing of a tool in a real event.
Materials and methods: A four-component tool was applied to build an alternative scenario of the catastrophic river flood in Obrenovac, Serbia, on May 2014. The components of this tool are: (1) the amount of precipitation above the 95th percentile of all previous measurements; (2) upstream river discharge above the 95th percentile of all previous measurements; (3) upstream river level above the 95th percentile of all previous measurements; and (4) worsening of the hydrometeorological situation in the following 48 h.
Results: In the early morning of 16 May 2014, a rapid river wave flooded 80% of the Obrenovac
territory. There were 13 deaths due to drowning. Application of the study tool shows that these lives could have been saved, as the score to recommend general evacuation was reached 1 day before the flooding. The application of this tool to two previous great floods in Serbia shows that the score to recommend general evacuation was reached either 1 day before or on the onset of flash flooding.
Conclusions: Due to its simplicity, this tool is universally applicable to facilitate decisionmaking
regarding general evacuation during a rapid river flood, and it should be further tested in future similar catastrophes.
Source: Vladan Radosavljevic, Goran Belojevic, Nevenka Pavlovic. A tool for a general evacuation decision during a rapid river flood. Public Health 2017; 146: 134-139

2. LEAD IN ERYTHROCYTES OF THE GENERAL POPULATION EXPOSED TO TOXIC METAL FROM THE ENVIRONMENT

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Objectives: The objective of this study was to determine whether erythrocytes lead (Pb) content in the population exposed to environmental Pb varies depending on gender, age, smoking status, and level of physical activity.
Materials and methods: The study included 52 healthy individuals living in Belgrade, of both gender, aged between 30 and 74 years. Venous blood samples were taken and thereafter erythrocytes were separated. After the microwave digestion of erythrocyte samples in the presence of HNO_3 and H_2O_2 (7:1; v/v), Pb content was determined by ICP-MS.
Results: The measured values of Pb ranged from 0.4 to 34 μg/dL and are higher than values in other countries. Lead level in men group was significantly higher compared to female group ($p<0.05$). There were significant differences in Pb level in women of different age groups ($p<0.05$). No significant difference in Pb level was found between smokers- and non-smokers group ($p>0.05$), nor between groups which differed by physically activity ($p>0.05$).
Conclusion: The results have shown that the blood erythrocytes level of Pb in people living in Belgrade, who are not occupationally exposed to toxic metal, varies considerably in relation to gender and ages, while habits such as smoking and physical activity have no influence.

Keywords: lead, erythrocytes, general population, gender, age, habits

3. FIVE YEAR TREND OF GROSS ALPHA/BETA ACTIVITY IN DRINKING WATER FROM VOJVODINA REGION

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Objectives: Gross alpha/beta analyses are widely used as the first step of the radiological characterization of drinking water safety. Screening levels have been set to 0.5 Bq/ l and 1 Bq/l for gross alpha/beta activity, respectively. The objective was to determine the concentration and trends of gross alpha/beta radioactivity in five-year period in drinking water from the settlements in Vojvodina region (APV).
Materials and methods: The 323 drinking water samples were taken true 2012-2016 in 99 settlements of APV by IPHV. Simultaneous measurement of gross alpha/beta activities was done in accredited laboratory of UNS by liquid scintillation counting technique. The average values of gross beta activity were established by determination, because in 73% samples they were below the laboratory limit value. For statistical analyses linear trend line, ANOVA and Pearson correlation were used.
Results: The average value of gross alpha/beta activity was 0.09±0.14 Bq/l / 0.221±0.13 Bq/l, minimum <0.005 Bq/l / <0.03 Bq/l and maximum 1.20 Bq/l / 0.94 Bq/l, respectively. In five controlled samples the gross alpha/beta radioactivity were above the national limit values (NLV), however the activity of radionuclide (^{226}Ra, ^{232}Th and ^{137}Cs) were not above the NLV. Linear trend of the average and minimum values of the gross alpha/beta activity was negative, confirmed by the ANOVA (for gross alpha: $F=10.06$, $p<0.01$ and for gross beta: $F=65.50$, $p<0.01$). The linear trend of the gross beta activity maximum values showed an increase ($R^2 = 0.59$). Pearson's coefficient of correlation revealed a statistically significant positive correlation ($r = 0.249$, $p <0.001$) between gross alpha/beta activity.
Conclusion: Although in the five year period the average concentrations of gross alpha/beta activity in drinking water are below the NLV, the increased linear trend of the maximum values for gross beta activity, as well as exceeded gross alpha/beta activity in five samples, point the importance of continuous monitoring of drinking water in order to minimize possible risks for human health.

Keywords: Water, drinking; Water Pollutants, Radioactive; Environment and Public Health

4. INFLUENCE OF POLLUTED AIR ON HUMAN HEALTH IN SLAVONSKI BROD (CROATIA)

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Objectives: Air in Slavonski Brod is in the second category regarding $PM_{2,5,}$ PM_{10} and H_2S. The purpose of this paper is to analyse the correlation air quality data with the number of emergency medical interventions and the number of patient visits to emergency clinic of the Integrated Emergency Hospital Admission as well as to analyse the quality of life in exposed areas of Slavonski Brod.
Materials and methods: The analysis was conducted on data from 1 January to 31 August 2016, obtained from: System eHitna,patients' visit to General Hospital data from the Environmental Protection Agency regarding air quality. Research included the total of 630 of examinees (333 polls from more exposed area and 297 polls from less exposed area).
Results: Examinees from more exposed areas evaluated their quality of life significantly worse, often consider their environment unhealthy, think polluted air harms their health, assess movements outside their homes worse and significantly are irritated by the unpleasant smell, soot or smoke, smog, dust.
There was a statistically significant weak correlation (r_S =0.333, p<.05) between PM2.5 and the number of patients per day, weak correlation (r_S =0.334, p<.05) between PM10 and the number of patients per day and a weak correlation (r_S =0.171, p<.05) between H_2S and the number of patients per day.
Conclusion: Further researches on influence of polluted air on human health are necessary.

Keywords:air pollution, health, Slavonski Brod

SESSION: NUTRITION AND HEALTH

INVITED LECTURE

1. IS A FOOD SAFETY CULTURE A KEY FOR BETTER FOOD SAFETY?

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Objectives: The impact of food safety culture on food supply chain is discussed.
Materials and methods: The innovative approaches, which should be in the food supply chain contributed to raising food safety culture among employees, are highlighted.
Results: It presents the tools and techniques of encouraging employees to make a positive impact on raising the level of employee qualifications and motivation to work according to the principles of food safety. Food business operator or person which is responsible for food safety is a key factor in identifying weaknesses in the food safety, changing entrenched habits of employees and introducing an innovative approach to effectively and rapidly respond to changes in the internal and external environment.
Conclusion: This can build a new dimension of food safety, the so-called food safety culture, which has the foundation of ethics in the field of food safety.

Keywords: food safety culture; food bussines operator; food handler; training; behavior

ORAL PRESENTATIONS

1. SIMILARITY AND DIFFERENCES IN SERBIAN AND HARMONIZED EUROPEANUNION APPROACH TO TOY SAFETY

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Objectives: A comparative overview of Serbian and European Union(EU) Regulations in terms of protecting children's health from toys and justifying the role of the health sector. Identify main hazards to children's health from toys.
Materials and methods: A comparative analysis of the regulations in Serbia and the EU in the field of safety of toys. Analysis of testing results of safety of toys from Public Health Institute Belgrade in the period 2012-2016.
Results: According to the analysis of Serbian Regulation and Rulebook on the health safety of items for general use, and the EU Toy Safety Directive, as well as "horizontal" legislation that must be taken into account e.g. safety of cosmetics, food contact materials, chemicals, general product safety.., despite big differences on first sight, there are many similar approaches. In the EU there is no unique competent authority for toy safety. According to results, the main reasons of toys unsafety were pulling hairs, small size, colors removing from toys (6,4%) and phtalates (2,6%).
Conclusion: The results indicate that in the process of harmonization with TSD requirements there is no requirements for excluding the health sector from this field but only for further improvement.

Keywords: toys, safety, child health

2. THE ROLE OF WATER MONITORING IN WATER SAFETY PLAN

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One of the greatest risks to public health is exposure to human pathogens in drinking-water. Water quality monitoring and safe management of water supplies ensure drinking-water safety and thus protect public health.
The WHO Guidelines for Drinking-water Quality (GDWQ) recommend that countries apply the safe drinking water framework ensuring drinking water safety. Water Safety Planning (WSP), part of this framework, is the most effective means of consistently ensuring the safety of a drinking-water supply through the use of comprehensive risk assessment and risk management that encompass all steps in water supply, from catchment to consumer. Monitoring should be applied as part of the WSP approach to managing drinking-water safety, as articulated in the WHO Guidelines for Drinking-Water Quality.
Objectives: The aim of the paper is to demonstrate how to operate and organize monitoring in the WSP framework.
Materials and methods: The data from archives IPH Niš was processed using the analytical method (results of drinking water analisys (public health control) and datafiles about water suppling systems).
Results: An analysis of the monitoring results was made in relation to the condition of the water supply systems. The paper presents the types of monitoring that need to be introduced according to the WSP. The WHO is continuously developing supporting materials for implementation of WSP for all types of drinking water supplies. A number of countries' regulations for drinking water quality now specify a requirement for water suppliers to implement a risk assessment and risk management (HACCP) approach to the production and distribution of drinking water. For regulations requiring WSP implementation to be effective it is essential that water suppliers understand the approach fully.
Conclusion: In order to protect the health of people, water suppliers should introduce WSP even before legal obligations in Serbia.

Keywords: monitoring, water, safety, plan

POSTER PRESENTATIONS:

1. ASSOCIATION OF NEIGHBORHOOD ENVIRONMENT AND CHRONIC DISEASES

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Objective: It was only recently that the scientific research related to the risk factors for NCDs shifted its focus on the study of the spatial context, i.e. how the facts about the neighborhood environment are associated with NCDs morbidity.
Aim: To explore the association between the individual, household and municipal characteristics and presence of any chronic disease in the adult population of Serbia, whereby using a univariate and multivariate two-level logistic regression.
Materials and methods: This study utilized data from the following datasets: the Serbian Population Health Survey, conducted in 2013 (as a cross sectional study, on a representative sample of adults aged 20 and older); results of the Census of Population conducted in 2011 (for the level of municipalities); and the data from municipal profiles for 2013. Above surveys involved questionnaires, as instruments for the data collection.
Results: By municipal characteristics, the multivariate two-level logistic regression models clarified 8% of variations concerning any chronic disease, and showed that, on average, or a median, the risk for any chronic disease in adults increased by 34,9% among adults living in municipalities with "worse" demographic, economic and social conditions.
Conclusion: Neighborhood environment (municipality) can represent a factor significant for the understanding of the variations in population’s morbidity.

2. INFLUENCE TO EXPOSURE TO AIRBORNE PARTICLES ON BIRTH WEIGHT

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Objectives: The aim of our study was to examine influence to exposure to airborne particles on birth weight
Materials and methods: The study sample consisted of 370 nosmokers pregnant women, who were divided into two groups: the exposed group (n=179) and control group (n=121) on the basis of the exposure to air pollution during the firs trimester of pregnancy. Air pollution data were provided by the Public Health Institute of Niš. Blacke smoke ($\mu g/m^3$) was measured by the refractometry method. Data on the birth weight were taken from registration of Gynecology clinic in Niš.
Results: There was no statistically significant difference in the occurrence of low birth weight of newborne between exposed and control groups of pregnant women ($\chi^2 = 1.04; p > 0.05$).
Conclusion. Results showed that exposure to airborne particles in the firs trimester of pregnancy had not influence on birth weight.

Keywords: air pollution, newborn, birth weight, pregnancy.

3. ASSESSMENT OF THE RISK FOR WATER SAFETY FOR DRINKING AND WATER SUPPLY IN THE OSLOMEJ REGION KICHEVO - R. MACEDONIA IN THE PERIOD FROM 2007-2016y.

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Objective: The objective is to give a realistic assessment of the development and quality of the water supply in the Oslomej region, to illustrate the movement of intestinal infectious diseases and to propose preventive measures.
Materials and methods: Water supply will be shown through static-information data, continuous inspection of water supply facilities, statistically processed laboratory analyzes of the hygienic quality of drinking water in the period 2007-2016y.Epidemiological report on the movement of intestinal infectious diseases. The results will be displayed in tabular and graphical form.
Results: Since the conducted laboratory analyzes of the waters from the region from 2007-2011y. all showed healthfulness and proper chlorination. Residual chlorine ranges from 0.2-0.3mg/liter. By interrupting disinfection, the number of bacterial malfunctions drastically increases to 64% in 2015y.The morbidity of diseases associated with drinking water varies considerably.
Conclusion: The rural population of 8.518(82%) inhabitants received safe drinking water, which was permanently and quality disinfected until 2011y.Since 2012y.of the total of 16 water supply facilities 10.420(100%) inhabitants drink hazardous waters with insecure quality. It is necessary that the local communities in the region fight for the reintroduction of regular disinfection, especially because there are technical conditions and staff, so that the morbidity of diseases related to drinking water does not increase.

Keywords: Water supply, hygienic quality, disinfection

4. WATER QUALITY OF SCHOOL WATER SUPPLY

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Objectives: Drinking water according to its hygienic characteristics is one of the environmental risks to the health of the population especially the youngest. If the school's water system contaminated by pathogens of intestinal infectious diseases it may cause waterborne epidemics. The school environment is important place where we should provide access to drinking water. This study was set up with the aim to show the current status of the water quality of the local water supply and wells as well as water quality after sterilization by UV lamps in the Tuzla Canton
Materials and methods: The study was conducted in 2016/2017. in primary schools in five cities TK Tuzla, Srebrenik, Kalesija, Zivinice and Lukavac. Sampling and analysis of 53 samples of the drinking water are made by accredited methods. In 44 local water supply system was built in UV lamp, after which the water quality improved.
Results:. 77.3% of the samples in June were improper, where in 75.4% didn't fit microbiologically while 7,5 % did not correspond physical-chemically in September, even 81.5% were invalid. After installing the UV lamp and the sterilization of water samples taken in March met the criteria in all samples
Conclusion: In order to strengthen supervision of school water supplies decrease downward trend in infection that is transmitted by drinking water needs constant supervision and monitoring in order to protect the health of users of school facilities as well as with the launch of the Program monitoring with continuous financial support.

Keywords: school water supply, water quality, programs

5. STUDY OF THE MOVEMENT OF CHRONIC LUNG DISEASES IN RELATION TO AIR QUALITY

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Objectives: Multi-year scientific studies show that air quality affects the occurrence and distribution of a certain number of diseases, primarily respiratory diseases.
The aim of this study is to monitor trends, the incidence of chronic obstructive pulmonary disease population in relation to a registered air quality.
Materials and methods: Diseases data was obtained by analyzing medical records for the period 2011 - 2016. Air quality was observed over the mean annual concentration of soot, as this is one of the parameters for studying the level of air pollution in zones and agglomerations where there are industrial plants. The mass concentration of the soot was measured reflektometrically**.**
Results:. The analysis of medical documentation includes data on the health status of newly infected people in the area of Kolubara County and the city of Valjevo. It was found that the total number of newborns in Valjevo is 34,67% of the total number of newborns in the entire district in the above-mentioned time period. The trend of decreasing the city's new urban population coincides with the same trend in the entire district's education. Mean annual concentration of chadiae is within allowed legal frameworks (GV = 50μg/m^3) and during the course of time it shows a uniform decrease.
Conclusion: Improving air quality is an important preventive activity that helps preserve and improve the health of the population today. The reduction in the number of reported new-born patients coincides with the improvement of air quality, registered with measuring instruments.

Keywords: Chronic lung disease, air quality, soot.

6. INFLUENCE OF AIR POLLUTION ON THE HEALTH OF CHILDREN IN NORTHERN KOSOVSKA MITROVICA

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Objectives: Of this study was to determine whether there was an association between air pollutant levels and daily examinations children due to respiratory diseases in primary health facility in northern Kosovska Mitrovica.
Materials and methods: The investigation was carried out during over a 5-year period (2009 to 2013) in the area of Kosovska Mitrovica. The number of daily reporting respiratory diseases (ICD-10: J00-J99) examinations for childrens aged 0 to 18. years, was collected at primary health facility. Associations between air pollutants and number of reporting in primary health facility due to respiratory problems were analyzed by the use of the nonlinear models with distributed delay DLNM by Gasparini.
Results: The delayed effect of soot concentration on the increase in the number of consultations childs with respiratory diseases was highest for the sixth to the eleventh day and amounted to 0.7% for an increase in the 10 $\mu g/m^3$ soot (RR = 1.00655-1.00709). The cumulative effect of soot in air on increasing the number of consultations of childs with respiratory diseases was the highest fifteenth day (RR =1.0952). There was no correlation between the concentration of NO_2 and SO_2 and number of examinations children with diseases of the respiratory system.
Conclusions: This study shows a significant positive association between number of examinations due to respiratory diseases and soot concentrations

Keywords: children, respiratory diseases, soot.

7. MICROBIOLOGICAL QUALITY OF WATER SUPPLY IN TK AREA IN PERIOD BETWEEN 2010 – 2015

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Objectives: One of the measures to prevent diseases that are transmitted by contaminated water whitch citizens consume is controlling the quality of water. Different diseases can be caused by the use of microbial contaminated water. The aim of this study is to present the microbiological quality of water in Tuzla Canton in the period 2010-2015.
Materials and methods: The data were processed by retrospective analysis of water samples from the database of the Institute of Public Health of Tuzla Canton. The total sample was 6229 water analyzes from the area of Tuzla Canton. All water samples were analyzed in an accredited laboratory according to ISO 17025
Results:. The data were processed by retrospective analysis of water samples from the database of the Institute of Public Health of Tuzla Canton. Of the total number of analyzes carried out, 32.12% (2001) did not correspond to the applicable legal regulations. The most common cause contaminated water are coliform bacteria. In 2015 30.36% samples where inproper; in 2014 47.44% samples where inproper; in 2013 30.57% samples where inproper; in 2012 29.14% samples where inproper; in 2011 28.06% samples where inproper; and in 2010 20.78% samples where inproper. The largest number of microbiological contaminated water analyzes was in 2014 due the floods that occurred in May of that year.
Conclusion: The crucial importance is to monitor constantly the water supply in the area of Tuzla Canton, sanitation of water facilities, to cooperate with local authorities, sanitary inspection and to continuously control the quality of water.

8. PREVENTION OF RHEUMATOID ARTHRITS AND ENVIRONMENTAL FACTORS

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Objectives: The purpose of this paper is to present the current medical literature theories about the relationship between the environmental factors (exposure to tobacco smoke, air pollution, infections, some dietary habits, etc) and the development of rheumatoid arthritis.
Results:. Rheumatoid arthritis is a chronic systemic autoimmune, inflammatory disease that affects the joints, connective tissues, muscles, tendons, and fibrous tissue. It is characterized by pain, islet inflammation, stiffness and gradual damage to the function of the joints and reduced quality of life. Available data suggests that 0.5% of the population of Serbia is suffering from this disease. Interaction between genetic factors and the environment is considered to be responsible for the development of rheumatoid arthritis.
Conclusion: Identifying and modifying these risk factors in individuals with an increased risk of rheumatoid arthritis is necessary for the correct implementation of prevention programs.

Keywords: rheumatoid arthritis, environment, prevention

9. POTENTIAL NEGATIVE EFFECTS OF COPPER IN METALWORKING INDUSTRY

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Objectives: Copper is an essential metal that can be toxic in high doses of exposure. Negative effects of copper can be expressed in endogenous intoxication in which the increased amount of copper in the body is the result of metabolic disorders and disorders at the level of the gene (Wilson's and Menkens's disease). Poisoning by exogenous copper occurs in cases of occupational exposure, accidental, suicidal, and iatrogenic ingestion of copper. The given research indicates the importance of the potential toxic effects of copper on the exposed population and suggests establishing statistical correlations of copper concentrations, age and length of service.
Materials and methods: Biomonitoring is based on the determination of the concentration of copper in biological samples (serum and urine) in exposed and control groups of patients. The applied analytical method is the retrospective epidemiological cohort study type. We used data from the annual reports of social medicine services and medical statistics, medical records of the professional primary and specific health care of employees and expert findings of the Public Health Institute in Nis. The analyses of biological material in exposed and control groups were analyzed in the Public Health Institute in Nis and the Military Medical Academy in Belgrade.
Results: The level of copper in serum and urine of exposed groups during the study period was positively correlated with the age ($r=0.757$, $p<0,01$ and $r=0.873$, $p<0,01$ respectively). The correlation is high and positive, which indicates the significance of the connection. The high correlation between the concentration of copper in serum and urine and the exposed length of service in exposed subjects during the time of study was also determined, ($r=0.771$, $p<0,01$ and $r=0.903$, $p<0,01$, respectively).
Conclusion: A retrospective cohort epidemiological study showed that the systematic effects of copper exposure result in an increase of its concentration in biological material, but copper intoxication has not been established within this research. The level of copper in serum and urine of the exposed group during the study period was positively correlated with the age, and the exposed length of service. These data confirm the connection between the occupational exposure to copper as well as the age and length of exposed service.

Keywords: copper, potential negative effects, metalworking industry.

10. THE IMPORTANCE OF THE CONTINUOUS MONITORING OF WATER SUPPLY FOR THE HEALTH OF THE POPULATION ON THE TERRITORY OF THE MUNICIPALITY OF OPOVO

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Objectives: The aim of paper is to indicate the importance of continuous monitoring of water supply in order to prevent the occurrence of diseases caused by the use of unhygienic drinking water. In this study I will present the results of water supply in Municipality Opovo from year 2012th to 2016th. Sampling was done by the authorized professional using precisely regulated methodology.
Materials and method: Retrospectively analyzed and statistically processed data.
Results: In the period from 2012th to 2016th, 454 samples of drinking water were tested in the municipality of Opovo. By analyzing the physical-chemical parameters, 23 samples are incorrect or 9.62% due to the increased concentration of manganese, ammonia, turbidity, color, residual chlorine, iron, nitrite, potassium permanganate and odors. Analysis of microbiological parameters shows that the largest percentage of contaminated samples are due to an increased number of aerobic mesophilic bacteria (59 samples) of a total of 72 contaminated samples.
Conclusion: Water supply should be controlled and continuously monitored in order to react preventively and protect health of population.

Keywords: water, health, population.

11. MEDICAL WASTE IN IPH- RISK MANAGEMENT

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The Waste Management Plan at the Institute of Public Health Podgoricaaims to describe policies and procedures for the safe management of medical waste that arises in the performance of the Institute's activities and includes all activities from the production, classification, marking, transport and final treatment.
Objective: The aim of the paper is to present the Waste Management Plan of the Institute of Public Health Podgorica. An important element of improving the quality of health services is the adequate disposal of medical waste.
Materials and method: The mechanism of medical waste management complies with the legal regulations and the basic principles of professional practice of medical waste management. In this direction, a plan has been drawn up and fully taken into account all the requirements of the Law on Waste Management ("Official Gazette of Montenegro", 39/16). Ordinance on conditions, manner and procedure for treatment of medical waste (Official Gazette of Montenegro 49/12).
Determination of the average daily amount of waste was based on experience from the previous period, taking into account the possibility of occasional generation of a higher amount of hazardous waste due to epidemics and other emergencies.
Results: Most of the waste generated in all organizational units of the Institute is a general (municipal) and a minor part of hazardous medical waste that occurs in some organizational units, consists predominantly of infectious, sharp objects and potentially infectious, as well as smaller quantities of pharmaceutical and chemical waste.
Conclusion: The reduction of waste to the lowest possible extent is a key part of the waste management system, safe for health, save money and contributes to a cleaner and more secure environment

Keywords: medical waste, health, safety, environment

12. A CHEMICAL ASPECT OF THE APPLICATION OF NEW REGULATIONS ON SWIMMING POOL WATERS

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Objectives: Comparison of the Regulations on the healthfulness of swimming pool water (Official Gazette of RS, No. 30/2017), according to which the number of parameters is reduced with the Ordinance on hygienic correctness of drinking water (Official Gazette of FRY, 42/98 and 44/99).
Material and methods: Since the adoption of the new rulebook in the Sanitary Chemistry Division, 484 samples of pool water have been analyzed. For chemical analysis, accredited methods were used and the frequency of monitoring and analysis was once a week during the bathing time period.
Results: Out of 484 samples of pool water, 156 showed chemical defects: 108 at increased pH, 1 at reduced pH, 23 at increased consumption of KMnO4, 13 at increased chloride concentration, 7 at increased residual chlorine concentration, 3 at turbidity and one at an increased concentration of Trihalomethane. In 14 samples there were two parameters of chemical malfunction, and in 4 causes 3 chemical defect parameters.
Conclusion: The adoption of the Rulebook on the healthfulness of pool water has diminished the problems that existed in the previous period as a result of inadequate preparation and treatment of water by various disinfectants.

Keywords: Pool water, pH, residual chlorine.

13. SOME CHARACTERISTICS OF NUTRITION OF CHILDREN AGED 15 TO 17 YEARS IN THE REPUBLIC OF MACEDONIA

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Introduction: To ensure the quality of children's life during the school age, it is necessary to ensure proper and adequate nutrition.
Objective: The aim of this study is to determine the manner of feeding children and eating habits of children); what would be the basis for a comprehensive proposal of measures whose ultimate aim was to correcting diet and nutrition, the preservation and promotion the health.
Materials and methods: The study included 22 students from SS Gostivar (at age 15,16 and 17 years) in the Republic of Macedonia. The study was conducted quechionary students. The results were presented to average values, standard deviation (x ± SD) and the percentile values.
Results: Research were covered the children aged 15,16 and 17 years old. The largest number of respondents and research (16) have 3 meals a day, 3 patients have a more than 5 meals a day, one interviewee 4 meals and 1 respondent 5 meals a day. In relation to diet, only one respondent carries food from home, and 20 patients eat snacks. Most number of respondents (14) eat fried and baked dishes, 6 respondents dry food, but only one respondent eat cooked food.
Conclusion: The largest number of respondents in research have irregular and unhealthy diet. Therefore, it is necessary to undertake measures for securing and procuring the healthy life of children and enable proper nutrition.

Keywords: children, nutrition, school

14. CHANGES IN NUTRITION OF THE ADULT EXAMINEES BECAUSE OF THE HEALTH REASONS

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Objective: To demonstrate the correlation of demographic and socio-economic characteristics with changes in nutrition for health reasons (HR).
Materials and method: The cross section study includes a sample of adult inhabitants of northern Kosovska Mitrovica and Gracanica. The Questionnaire used for the Health Research in Serbia was used in 2014, which provided demographic and socioeconomic data, as well as changes in nutrition for HR. The hi-square test, Kruskal-Wallis i Mann-Whitney test, with a significance level of 0.05, was used.
Results: 740 subjects (374 women) were included. Changes related to reduced sugar intake due to HR are statistically significant among respondents in the city ($p = 0.008$), with primary education, in widowers ($p = 0.001$) and respondents with monthly income up to 60.000 dinars. The reduced salt intake is more common in highly educated and those who are married ($p < 0.001$). Increased consumption of fruits and vegetables is more common in women ($p = 0.004$), respondents in the city, with elementary education and who are married. Reduced consumption of alcoholic beverages is more common in men ($p < 0.001$), and lowering of fat intake in subjects with primary education and widow ($p < 0.001$).
Conclusion: There is a link between more demographic and socio-economic characteristics with changes in nutrition for HR, with reduced intake of fat, sugar and salt, as well as reduced consumption of alcoholic beverages and increased consumption of fruits and vegetables.

Keywords: nutrition, adults, health reasons

15. ASSESSMENT OF FLUORIDE INTAKE IN PRESCHOOL CHILDREN IN NIŠ AND KRUŠEVAC

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Objectives: According to the fact that fluoride (F^-) has an important role in the prevention of tooth decay, the objective of this study was assessment of fluoride intake through drinking water and toothpaste in preschool children in Niš and Kruševac.
Materials and methods: The questionnaires (n=184, 106-Kruševac, 78-Niš) for parents were used to obtain information about the type of water that children drink, toothpaste they use and frequency of teeth brushing. Fluoride intake was estimated using a mathematical model given by the US Agency for Environmental Protection.
Results: The estimated mean values of total daily fluoride intake in children aged 2 to 7 years are respectively: 0.305/0.518/0.47/0.462/0.463/0.176 mg F^-/day for Niš and 0.381/0.362/0.552/0.413/0.436/0.234 mg F^-/day for Kruševac, which is significantly lower than tolerable upper daily intake (1.3 to 2.2 mg F^-/day, WHO), even lower than the recommended daily intake (0.7-1.0 mg F^-/day, WHO). Calculated 95-percentile of the estimated daily intake of fluoride for a two-year in Niš and two- and four-year in Kruševac is higher than optimal (0.05 mg F^-/kg/day, EFSA).
Conclusion: In most of the examined children fluoride intake is suboptimal for prevention of dental caries, while sporadically increased intake suggests a need to control teeth brushing by parents.

Keywords: fluoride, intake assessment, preschool children, Niš, Kruševac

16. APPLICATION OF INDUCTIVELY COUPLED PLASMA OPTICAL EMISSION SPECTROMETRY IN Fe, Cu, Zn, Cd, AND Pb ANALYSIS IN WHEAT AND FLUOR SAMPLES FROM SEVERAL REGIONS OF SERBIA

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Objectives: Wheat and flour are the major staple food in European countries, and the risks associated with their metal contamination are of great concern. In the present study, we investigated the levels of Fe, Cu, Zn, Cd, and Pb in wheat and flour samples from various regions of Serbia, and evaluated possible impact of the production process on content of those elements.
Materials and methods: All samples were collected directly from small manufactures. Microwave digestion method was applied for sample preparation and concentrations of heavy metals were determined by inductively coupled plasma optical emission spectrometry (ICP-OES).
Results: The range of Fe, Zn, Cu, Cd, and Pb in wheat was 22-58; 21-44; 3.8-5.2; 0.05-0.1 and 0.05-0.1 mg/kg, respectively, and in flour 5–51; 4–34; 1.1–3.8; 0.05-0.1; and 0.05 mg/kg respectively.
Conclusion: The results of this study have shown that the concentrations of metals in wheat are within the allowed limits defined by the Regulation of Republic of Serbia and European Directives. The content of heavy metals in flour samples is also within the allowed limits, with the exception of the sample from Užice where the values are higher for metals, which could indicates that the production process is not adequate.

Keywords: heavy metals, wheat, flour, ICP-OES, human health

17. COSMETICS – WHAT THE NEW REGULATIVE BRINGS?

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Objectives: Harmonization of our legislative and EU legislative. The new regulative is a real need when it comes to both, cosmetics and all consumer goods. In this paper will be presented all the benefits of the new legislative.
Materials and methods: Review of literature and regulations.
Results:. In European Union cosmetic products were originally defined by Cosmetics directive 768/1976, with number of changes. Afterwards it was defined by Cosmetic products statute 1223/2009. The last change was made on 10th of February in 2017. Regulation EU 1223/2009 have 8 Annex. First Annex is Cosmetic product safety report (Part A – Cosmetic product safety information, Part B –Cosmetic product safety assessment).
Conclusion: In Serbia is still in use the Act on conditions concerning consumer goods safety attended for the market (Official Gazette SFRJ No. 26/83… 18/91).
Nowadays the Act is in process of production, this Act should be in harmony with the Legislative of European Union about cosmetic products, therefore all the rules mentioned in Acts would be in use in our country too.

Keywords: Cosmetics, regulation, health

18. ARSENIC IN RICE-BASED FOOD FOR INFANTS AND YOUNG CHILDREN

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Objectives: Consideration of arsenic content in rice-based food for infants and young children.
Materials and methods: Two samples of organic rice-based food for infants and young children, produced in the EU. Determination of total arsenic by inductively coupled plasma-mass spectrometry after microwave digestion.
Results: Total arsenic content, referring to the product as sold, was 0.135 and 0.140 mg/kg, well above the respective maximum allowed level set at 0.080 mg/kg by Serbian legislation. EU regulation defines inorganic arsenic as a specie of interest, with a limit of 0.10 mg/kg in rice destined for the production of food for infants and young children. Thus, analysis of the final product requires recalculation of the results to the raw material, challenged by availability of processing factors. Due to the described differences, compliance assessment of the analyzed products with the EU regulation was not feasible. However, accordingly to the literature data showing moderate to very high proportion of inorganic arsenic in rice, product compliance is under serious suspicion.
Conclusion: Taking into account immense importance of inorganic arsenic adverse health effects, introduction of sophisticated analytical instruments and methods in control laboratories, although financially demanding, as well as broadening of analytical skills, has to be considered indispensable.

Keywords: arsenic, rice, food, infants, young children.

19. ANTIOXIDANT PROPERTIES OF PHENOLICS IN ORIGANUM HERACLEOTICUM EXTRACTS OBTAINED BY SUPERCRITICAL FLUID EXTRACTION

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Objectives: Aromatic herbs are probably the most important source of natural antioxidants. *Origanum heracleoticum* belongs to the *Lamiaceae* family and is defined as Greek oregano. The main objective of this study was the investigation of the antioxidant properties of Greek oregano extracts obtained using supercritical fluid extraction (SFE) with CO_2 as a solvent.
Materials and methods: The extracts were obtained by SFE at pressure of 10 MPa and temperature of 40^{o}C (I fraction), and extraction of the higher molecular weight fractions followed at pressure of 30 Mpa (temperatures of 40^{o}C (II fraction) and 100^{o}C (III fraction). Antioxidant activity of extracts were evaluated using ferric reducing antioxidant potential (FRAP) and β-carotene bleaching assays. The total phenolic content (TPC) was determined by a modified Folin-Ciocalteu method.
Results: Plant phenolics have received considerable attention because of their potential antioxidant activity. The TPC values for SFE fractions extract were III fraction (170.57 ± 0.70) I fraction (142.12 ± 0.32) and II fraction (65.13 ± 0.26), all as mg GAE/g dry extract, respectively. All extracts exhibited antioxidant activity in the two assays. The most effective was the supercritical extract obtained by fractional extraction at 30 MPa and 100^{o}C, based on FRAP assay (0.73 ± 0.01 mmol Fe^{2+}/g dry extract) and *β*-Carotene bleaching assay (IC_{50} value was 0.25 ± 0.03 mg/ml).
Conclusion: CO_2 is generally recognized as safe (GRAS) solvent thus the extract obtained using this solvent are considered as safe with respect to human health. Applying supercritical CO_2 extraction, higher pressure and temperature were showed as better condition for TPC and antioxidant activity of *Origanum heracleoticum* extracts.
Acknowledgement: This research was financially supported by the Serbian Ministry of Education, Science and Technological Development, Grant No III 45017.

Keywords: *Origanum heracleoticum*, supercritical fluid extraction, phenolics, antioxidant activity

20. AGE-RELATED MACULAR DEGENERATION AND ASSOCIATED DISEASES - WHAT PROPER NUTRITION AND SUPPLEMENTATION WE CAN ACHIEVE?

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Objectives: Age-related macular degeneration is the leading cause of irreversible vision loss of people older than 65 years. The pathogenesis of the disease involves inflammation and oxidative stress. Associated diseases - hypertension, diabetes mellitus, cerebrovascular disease are among the risk factors. Aim of the work is to point out the risk factors, clinical forms and possibilities of treatment of age-related macular degeneration
Materials and methods: Ophthalmic examination of patients (visual acuity, biomicroscopy by checking the intraocular pressure, indirect ophthalmoscope examination with photo documentation of changes in the retina in the Department of fluorescein angiography) was implemented at the Department of Ophthalmology, Clinical Center Nis, in the period January 2015 - December 2016.
Results:. Of the 380 patients with age-related macular degeneration were 165 (43%) male: 215 (57%) females; from this with cerebrovascular incident had 76 (20.53%), cardiovascular disease 134 (35.33%) and with hypertension 106 (28%) patients.
Conclusion: The therapeutic strategy of age-related macular degeneration depends on the present stage of the disease. Proper nutrition and supplementation are basically therapy, especial for dry form of the disease

Keywords: age-related macular degeneration, risk factors, the therapy, the supplements, nutrition

21. MICROBIOLOGICAL CONTAMINALS OF SMALL FRUIT IN FRESH AND CLEANED STATE IN ZLATIBOR DISTRICT

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Objectives: to evaluate the safety and application of special hygiene conditions by the subjects involved in the production, processing and marketing of small fruits based upon results of microbiological analyzes of small fruit samples in fresh and frozen state.
Materials and methods: Sampling of fruits in fresh and frozen state were carried out in accredited laboratories of the Institute for Public Health of Uzice and the Institute for Meat Hygiene and Technology Belgrade accordance with the current legal regulations
Results: During 2016 microbiological analyzes of 199 small fruit samples were carried out in fresh and frozen state. The parameters of the bacteriological examination were in accordance with the current government regulations. Norovirus analysis of 31 fruits, confirmed the presence of norovirus in 7 (22.58%). Hepatitis A virus is not isolated in any of the 9 analyzed samples.
Conclusion: Result of testing microbiological contaminants in sampled fine fruit in Zlatibor district indicates that adequate conditions have not been fully met in accordance with the principles of good hygienic and good manufacturing practice by the entities engaged in production, processing and trade in food, due to which consumer health may be endangered. There is a need for regular education of people involved in the production and marketing of food.

Keywords: microbiological contaminants, fruit, Zlatibor district

22. ANALYSIS OF α-TOCOPHEROL AND β-CAROTENE IN *ROSA CANINA* L. FRUIT EXTRACTS

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Objectives: The aim of this work was to investigate the presence of α-tocopherol and β-carotene in different rose hip extracts. These vitamins are powerful antioxidants; they reduce oxidative stress and premature aging of the skin caused by solar radiation.
Materials and methods: Rose hips were macerated by using three different solvents (methanol, 70% ethanol and acetone). The simultaneous analysis of the vitamins was achieved by high performance liquid chromatography (HPLC) method with UV/VIS and FLD detectors. Solid-phase extraction was used for the sample preparation.
Results: In methanolic extracts α-tocopherol was found in average concentration of 7.35 μg/ml, while extracts obtained by using 70% ethanol had 9.27 μg/ml of this vitamin. β-Carotene was detected in acetone extracts with the average concentration of 0.31 μg/ml. The extraction solvent plays an important role in isolating the vitamins from the rose hips. Methanol and 70% ethanol are selective for α-tocopherol, while acetone is more efficient for β-carotene.
Conclusion: *Rosa canina* fruits contain α-tocopherol and β-carotene among the other phytochemicals with dermatological benefits, therefore, these extracts can be used as cosmeceuticals for the prevention of many skin conditions.

Keywords: *Rosa canina*, fruit, α-tocopherol, β-carotene, HPLC.

23. WILD *ROSA CANINA* FRUIT EXTRACTS AS A RICH SOURCE OF PHYTOCHEMICALS WITH ANTIOXIDANT PROPERTIES

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Objectives: The aim of this work was to evaluate various rose hip extracts: contents of phenols and flavonoids, in order to valorise extracts as sources of antioxidants.
Materials and methods: Extracts were prepared from the fresh fruits, with four different solvents (methanol, 45% propylene glycol, water and 70% ethanol). Total phenolic content was determined using the Folin-Ciocalteau reagent. The amount of total flavonoids was analyzed by Aluminium chloride method.
Results: The highest phenolic content was found in aqueous extract (10.16±0.16 mg GAE/g of dry extract), while extracts obtained by using 45% propylene glycol and methanol had 8.59±0.18 and 7.63±0.67 mg GAE/g of dry extract, respectively. The aqueous extract had also the highest quantity of flavonoids - 9.86±0.16 mg RE/g of dry extract. The lower values were for extracts with 70% ethanol (8.45±0.19 mg RE/g of dry extract) and 45% propylene glycol (7.66±0.23 mg RE/g of dry extract).
Conclusion: The data suggest that extracts of rose hips should be used as potential source of natural antioxidant agents. Aqueous extract showed the highest content of phenols and flavonoids. Practical application of the extract in the sunscreen formulations is something that would be very useful.

Keywords: *Rosa canina*, fruits, extraction, skin, antioxidants

24. STABILITY STUDY OF WILD APPLE FRUIT EXTRACT: PHENOLIC AND FLAVONOID CONTENT

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Objectives: Wild apple (*Malus sylvestris* (L.) Mill., Rosaceae) is a medicinal plant tradicionally used in phytopreparations for prevention and treatment of many oxidative stress-related diseases. Phenols and flavonoids are the most important bioactive antioxidant substances of these drug and contribute to the overall efficacy. The aim of our study was to monitor stability of phenolic and flavonoid content within the wild apple fruit extract (EWAF), originated from Serbia, during the six months.
Materials and methods: Extract was prepared by percolation using 70% ethanol as solvent (EEWAF-P), 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.
Results:. The evaluation of active substances content was performed immediately after preparation and after six months of storage at room temperature.
EEWAF-P showed a good content of bioactive polyphenolic compounds immediately after preparation (TPC-1151.84±1.27 mgGAE/100g dw and TFC-52.40±0.77 mgRE/100g dw) and after six months (TPC-1141.29±5.61 mgGAE/100g dw and TFC-51.38±1.43 mgRE/100g dw), therefore it can be used as a source of antioxidant substances. Investigation confirmed that phenolic and flavonoid content in the EEWAF-P was constant during the six months and the differences were in the acceptable range of ± 1%.

Keywords: wild apple fruit, ethanol extract, phenols and flavonoids, stability study

Acknowledgements: This research was supported by Serbian Ministry of education, science and technological development supported this study (Project No III 45017) and by Faculty of Medicine University of Niš (Internal Scientific Project No II 11-14629-4/2)

25. MONITORING OF THE INTAKE OF IRON AMONG PREGNANT WOMEN IN NIŠ

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Objectives: Pregnant women are prone to iron deficiency because additional iron is required to support the mother's expanding blood volume and growth of the placenta and fetus. Iron deficiency anemia is associated with increased incidence of premature birth, and low birth weight. High level of hemoglobin may also be harmful because it is associated with increased incidence of placental infarction and intrauterine growth retardation.
Material and methods: 108 respondents from city Niš were interviewed with questionnaire in anonymous survey which was conducted in 2016. The questions were about demographical information, screening for anemia, food intake of iron rich food, iron self-medication, and symptoms of anemia.
Results: In our study, in 21,3% (23) pregnant women was diagnosed iron deficiency anemia in second part of pregnancy, 18,52 % (20) had anemia before pregnancy and 12,96% (14) did not visit doctor and think about anemia. The observed respondents were not well informed about iron rich diet and rather used prescribed supplements 37,96% (41). 9,26 % (10) of respondents were on iron supplement self-medication.
Conclusion: There is an imperative need to strategically and generally inform the female population on the importance of the iron intake as well as the consequences that can appear due to insufficient intake.

Keywords: iron, pregnant women, self-medication, anemia

26. INTERACTION OF HERBAL DIETARY SUPPLEMENTS WITH CHRONIC PATIENT THERAPY

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Objective: Food can alter the absorption, distribution, metabolism, and elimination of a drug via physiological and physical-chemical mechanisms. Age, malnutrition, malabsorption, liver disease, renal insufficiency, chronic therapy administration, and pharmacogenetics are known risk factors for the occurrence of drug-drug and drug-food interactions. The aim of this paper is to evaluate the possible interactions between chronic patient therapy and herbal substances.
Material and methods: The research is presented as a descriptive study which included patients 45 to 75 years of age, who were randomly selected in Niš in 2017. and who agreed to be interviewed. 134 correctly completed questionnaires were selected and they were the subject of further analysis.
Results: Of the total number of respondents who used dietary supplements, 36 of them (26,87%) used Ginkgo biloba in combination with chronic treatment. A somewhat smaller number, 25 (18,66%) of them, used products based on St John's wort, while 21 of them (15,67%) consumed ginseng. Other supplements, which are not as interesting for this research, were used by 52 respondents (38,8%).
Conclusion: It is imperative that pharmacists and doctors ask patients what they are using within their chronic illness treatment and estimate the possible use of a dietary supplement based on the data obtained.

Keywords: food, herbal dietary supplements, nutrition, drug interactions

27. THIAMIN AND RIBOFLAVIN CONTENTS IN WILD GARLICS EXTRACTS

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Objectives: *Allium ursinum* L. (Liliaceae), European wild garlic is a perennial edible plant with its own, unique aroma. Despite the fact that fresh leaves or dried herb of wild garlic are used traditionally as food, spice and natural remedy, there are only a few data regarding its vitamins content.
Materials and methods: Leaves of *A. ursinum* subsp. *ucrainicum* Kleopow & Oxner, wild-growing, were collected in the blossoming phase on Kamenica hill in the vicinity of the city of Niš, Serbia. Dry plant material was reduced to a fine powder and extracted with ethanol (70%, v/v) and distilled water by percolation, as described in the European Pharmacopoeia 9.0. HPLC quantification of thiamine (vitamin B1) and riboflavin (vitamin B2) was performed in dry extracts.
Results: Riboflavin and thiamin contents were 20.4 μg/g and 0.316 μg/g in water extract and 15.6 μg/g and 0.246 μg/g in ethanolic wild garlic extract, respectively. As expected, water extract seem to be reacher in detected hydro soluble vitamins than hydroethanolic extract.
Conclusion: Bearing in mind that wild garlic could be consumed in significant amounts during its harvesting time, detected levels of thiamine and riboflavin could contribute to overall health effects of this functional food.

Keywords: wild garlic, extract, HPLC, thiamin, riboflavin

Acknowledgements: This research was supported by the Medical faculty University of Niš internal scientific project No 2 (11-14629-4/2) and Ministry of Education and Science of the Republic of Serbia (Grant No. III 41018 and III 46013).

28. THE PHENOLIC CONTENT AND ANTIOXIDANT ACTIVITY OF SELECTED SERBIAN HONEYS

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Objectives: Honey has a very complex chemical composition that varies depending on the botanical source. It has been used both as a food and as a medicinal remedy for the of wounds, skin ailments, and various gastrointestinal diseases since ancient times. Many authors have studied the phenolics content of honey and it has been suggested that its levels depend on floral and geographical origins. In the present study we investigated the total phenolic content (TPC) and antioxidant activity of selected honey samples originated from Serbia.

Materials and methods: The samples were collected in 2016 directly from professional beekeepers who declared their botanical origin. TPC was determined by a modified Folin-Ciocalteu method. Antioxidant activity were evaluated using 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity and ferric reducing antioxidant potential (FRAP) assays.

Results: The highest TPC (1220.7 ± 8.1 mg GAE/kg) was obtained in honeydew honey while lower content were measured in meadow and linden honey (274.1 ± 4.5 and 605.0 ± 8.3 mg GAE/kg), respectively. All honey samples showed antioxidant potential in both methods. The dark honeydew honey obtained from the Sićevo Gorge exhibited the highest antioxidant activity based on results of DPPH (1.7 ± 0.2 mmol TEAC/kg), and FRAP (4.6 ± 0.9 mmol $Fe^{2+/}$kg) assays.

Conclusion: Phenolic compounds in particular are considered as one of the most important antioxidants in honey. The TPC in Serbian honey was in close agreement with the results previously reported for other European honeys. A darker coloured honeys has been associated with a higher content of phenolic compounds and a higher antioxidant activity.

Acknowledgement: This research was financially supported by the Faculty of Medicine University of Niš Internal Scientific Project No 2 (11-14629-4/2).

Keywords: honey, phenolic content, antioxidant activity

29. ANTIOXIDATIVE ACTIVITY AND VITAMIN C CONTENT OF RED CURRANT (*Ribes rubrum* L.) JUICES

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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 atributed to the presence of phenolic compounds. The aim of the research was to determine the antioxidative activity and vitamin C content in the of red currants (*Ribes rubrum* L.) juices varieties Red pool, Rolan, Rondom and Jonker.
Materials and methods: Determination of vitamin C was performed by high performance liquid chromatography and antioxidative activity was determined by 2,2-diphenyl-1-picrylhydrazyl-method. All experiments were conducted in triplicate.
Results: The best antioxidative activity exhibited red currant cultivar Red pool juice (0.62±0.07 mg/ml), and the weakest of cultivar Rolan (0.96 ± 0.12 mg/ml). The highest content of vitamin C was shown by red currant juice of cultivar Red pool (33.15±2.56 mg/g), and the lowest red currant juice of cultivar Rolan (5.42 ± 0.97 mg/g). Statistical analysis was performed using SPSS software version 17 and using Student t-test ($p<0.05$).
Conclusion: Presented data could be used as baseline for further research of red currants juices that would examine chemical composition, biological activity as well as design and use as dietary supplements.

Keywords: red currant, antioxidative activity, juice, vitamine C.

30. *IN VITRO* ANTIOXIDANT POTENTIAL OF THE FENNEL LEAVES EXTRACT, *Foeniculum vulgare* Mill.

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Objectives: Fennel, *Foeniculum vulgare* Mill., has been usually used in folk medicine for digestive disorders relief and as a spice. The aim of the research was to examine antioxidant activity of the fennel leaves extracts and to determine the content of total polyphenols and tannins.
Materials and methods: The plant material, collected in Nis, was extracted with water, 80% methanol and absolute methanol in an ultrasonic bath in 1:10 ratio. The contents of total polyphenols and tannins were determined by Folin-Ciocalteu method. Antioxidant capacity was estimated by 1,1-diphenyl-2-picrylhydrazyl assay.
Results: The results showed that the content of the total polyphenols was the highest in the extract prepared with 80 % methanol (89.79±5.85 mg gallic acid equivalent (GAE)/g), and the extract prepared with absolute methanol was the richest in total tannins (36.19±1.12 mg GAE/g). The extract with the greatest polyphenolic content exerted most powerful antioxidant effects with the concentration which inhibited 50% of free radicals of 42.52±1.20 μg/ml.
Conclusion: The levaes fennel extracts contained high levels of total polyphenols and tannins, and expressed powerful antioxidant activity, particularly the 80% methanol extracts. Therefore, these extracts could play an important role in the prevention of the diseases which are in direct relation to oxidative stress.

Keywords: *Foeniculum vulgare* Mill., extracts, polyphenols, tannins, antioxidant activity

31. THE CONTENT OF TOTAL HYDROXYCINNAMIC ACID DERIVATIVES AND FLAVONOIDS IN *Salvia nemorosa* L. EXTRACTS

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Objectives: The aim of the research was to determine the content of total hydroxycinnamic acid derivatives and flavonoids in the *S. nemorosa* extracts obtained using ethanol solutions with different polarities and techniques.
Materials and methods: The extracts were made with dried, above-ground parts of the herb, collected in Nis, with ultrasonic extraction, high-temperature extraction and single-stage maceration using concentrated ethanol, 80% ethanol and 60% ethanol. The total flavonoids content was determined with $AlCl_3$ method, and total hydroxicinnamic acid derivatives were quantified according to Ph.Eur. 7.0.
Results: The results show that the highest amount of total hydroxycinnamic acid derivatives was found in the extract which was prepared by ultrasound method using 60% ethanol, while the extract made with concentrated ethanol using ultrasound extraction contained the highest amount of total flavonoids.
Conclusion: The increase of the ethanol polarity as a solvent used in the extraction increases the quantity of the total hydroxycinnamic acid derivatives in the extracts. Flavonoids were better extracted with less polar ethanol solutions. The extracts with high amount of investigated compounds may express considerable pharmacological effects, especially strong antioxidant and antimicrobial effects.

Keywords: *Salvia nemorosa* L, extracts, hydroxycinnamic acid derivatives, flavonoids

32. THE CONTENT OF TOTAL POLYPHENOLS AND TANNINS AND ANTIRADICAL ACTIVITIES OF THE UNRIPE SEEDS EXTRACTS FROM *Foeniculum vulgare* Mill.

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Objectives: Fennel, *Foeniculum vulgare* Mill. has been traditionally used due to many pharmacological effects since ancient time. The aim of the research was to determine the content of total polyphenols and tannins in the extracts made of fennel unripe seeds (fruits) and to estimate their antiradical activity.
Materials and methods: Extracts were prepared from dried and crushed seeds, collected in Nis, with water, absolute methanol and 80% methanol in an ultrasonic bath. The content of total polyphenols and tannins was determined by Folin-Ciocalteu method. Antioxidant capacity was evaluated by 2,2-diphenyl-1-picrilhydrazyil (DPPH) test.
Results: Significant amounts of polyphenols and tannins were present in extracts, whereby the greatest content was found in the 80% methanol extract (96.71±2.94 mg gallic acid equivalent GAE/g and 40.82±1.38 mg GAE/g, respectively). All extracts expressed significant antiradical activity. The most superior effect was expressed by the extract prepared with absolute methanol which concentration that inhibited 50% of free radicals was 40.63±2.42 μg/ml.
Conclusion: The fennel unripe fruits extracts were rich in polyphenols and tannins with highly expressed antioxidant activity. Therefore, they could be used in the prevention of various diseases caused by oxidative stress. Nevertheless, further toxicological and clinical studies are necessary to confirme those findings.

Keywords: *Foeniculum vulgare* Mill., polyphenols, tannins, extracts, antioxidant activity

33. ESTIMATION OF ANTIOXIDANT ACTIVITY OF SAGE (*Salvia officinalis* L.) SUPERCRITICAL EXTRACTS

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Objectives: Oxidative stress is believed to be a major contributor to the pathogenesis of a number of chronic diseases, and it is for this reason that antioxidant activity is one of the most commonly determined biological properties in plant extracts. The objective of this study was to estimate the antioxidant activity of sage supercritical extracts obtained under different extraction conditions.
Materials and methods: The sage extracts were obtained by supercritical fluid extraction (SFE) with CO_2 as a solvent at pressure of 30 MPa and temperature of 40^{o}C (SO1 extract) and 100^{o}C (SO2 extract). Antioxidant activity of extracts were evaluated using DPPH (2,2-diphenyl-1-picrylhydrazyl) radical (DPPH assay) and ferric reduction activity potential (FRAP assay). The total phenolic content (TPC) was determined by a modified Folin-Ciocalteu method.
Results: The amount of TPC was found to be higher for SO2 (91.92±0.62 mg Gallic acid equivalent (GAE) /g dried extract) in comparison to SO1 (55.56±0.33 mg GAE/g de). SO2 extract demonstrated better antioxidant activity (IC_{50} 0.84±0.10 and FRAP 1.21±0.09 mmol Fe^{2+}/g de) than SO1 extract (IC_{50} 2.13±0.12 and FRAP 0.72±0.03 mmol Fe^{2+}/g de).
Conclusion: The results from this work suggest that extraction conditions may have a great influence on antioxidant activity of obtained extracts. Sage has a potential as natural antioxidant due to its satisfying antioxidant activity which can be significantly improved by optimization of extraction process parameters.
Acknowledgement: This research was financially supported by the Serbian Ministry of Education, Science and Technological Development, Grant No III 45017.

Keywords: *Salvia officinalis,* supercritical fluid extraction, phenolics, antioxidant activity

34. COLLECTIVE NUTRITION OF PRESCHOOL CHILDREN

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Objectives: Obectives of this paper were determination the energy value, as well as value of macronutrients and the presence of salt in collective nutrition of preschool children.
Materials and methods: In the kindergarten facilities "Radosno Detinjstvo", during 2011-2015, 2632 meals were controlled, by random selection method, sampled in front of the child. The energy value and the percentage contribution of nutrients in the whole day meal (breakfast, snack, lunch) and the presence of kitchen salt in lunch were analyzed.
Results: Controlling the energy value of the meal, tolerant deviations were established. In some analyzed years the percentage of proteins was below the lower limit of the recommendation. The share of other nutrients was within the recommended values. Determined salt content in one meal (lunch) in both age categories of children meets more than half the total daily amount of salt recommended for children.
Conclusion: In order to reduce the risk of chronic diseases development, it is necessary to continuously implement the distribution of high biological value meals (whole grain cereals, fresh vegetables (including varieties) and fruits, eggs, meat, milk, milk products, fish, and less food sources of simple sugars.

Keywords: collective nutrition, energy value, nutrients, salt, preschool children

35. THE CONTENT OF BOR IN MINERAL WATERS FROM THE MARKET

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Objectives: Mineral waters are largely represented in the daily diet of people. There are in the market a large number of different mineral water whose mineral content is significantly different each others. The concentrations of some anions and cations are prominent on the labels.
Many of them contain in boron in their composition. As the bor content is not declared on the labels of mineral water, the aim of this study was to determine the boron content in some mineral waters from the market and to show that the mineral waters are and in what quantity contain boron.
Materials and methods: Mineral waters from the market. Method of detrmination boron with carminic acid.
Results: It has been analysed 16 samples of mineral waters from the market. Boron is found in 6 samples.
Conclusion: Significant amounts of boron are found in water with high concentration of minerals. Elemental boron, boron oxide, boric acid, borates, and many organoboron compounds are relatively nontoxic to humans and animals. Single medical doses of 20 g of boric acid for neutron capture therapy have been used without undue toxicit. Boric acid is more toxic to insects than to mammals, and is routinely used as an insecticide

Keywords: bor, mineral waters**,** carminic acide

36. CHEMICAL CONTAMINANTS OF FOOD

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Contaminants are substances not intentionally added to food but are the result of contamination during its manufacture, processing, packing and transport, or the result of some natural processes. Chemical contaminants of food can be divided into:
-a natural contaminants (natural toxins in plants and animals);
-contaminants from the environment (pollution of food due to the pollution of air, water and land) and resulting
-contaminants by treating the food (frying, baking and grilling food).
Natural toxic substances in food can be inhibitors of the enzyme, cyanogen glycosides, pyrrolizidine alkaloids, mushrooms, shellfish and fish histamine.
Chlorinated hydrocarbons, PAHs, PCBs, heavy metals, radioactive elements pollute air, water and soil and all these can lead to food contamination.
The big problem in food contamination are pesticides, veterinary drugs and heavy metals which are residues after the protection of the health of plants and animals and are used to increase yields, and improve the quality of agricultural products.
Thermal treatment of the food at a high temperature leads to the formation of certain types of toxic substances, such as acrylamide, heterocyclic amides, polycyclic aromatic hydrocarbons...
Food form a good breeding ground for various microorganisms. In principle we distinguish between two types of harmful effects of microorganisms on human health: intoxication and infection. When intoxication victuals poisoning caused by toxins that are formed as products of their metabolism in foods: bacterial enetrotoxins and mycotoxins molds

Keywords: contaminants, PAH, PCB

37. MICROBIOLOGICAL FOOD SAFETY IN MONTENEGRO IN 2016 ANALYZED INDICATORS-POSSIBLE HEALTH RISKS

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Objectives: The transfer and implementation of European legislation in existing conditions of food production and retail in Montenegro set the question of whether the possible health risks associated with hygiene and microbiological indicators are actually diminished by the change of control, especially for vulnerable groups.
Materials and methods: Regulation on Microbiological Criteria for for foodstuffs RMNE No 26/16 prescribes the scope, method and type of analysis. When controlling subjects and parts of official controls, other recommended criteria are also used according to the Guidelines on Microbiological Criteria for Food Safety the Ministry of Health.
Results: Out of a total of 6550 analyzed samples in laboratories in Montenegro, 697 samples or 11% were unsatisfactory. According to, from internal traffic, 13% and only 0.2% of imported foods did not fit the prescribed standards. When prescribed safety criteria, official controls and / or self-control are performed, the percentage of malfunction is significantly lower than when the process hygiene criteria and recommended criteria are considered. The percentage of malfunction of the samples by increasing the scope of the analysis significantly increases, in the case of ready meals 35%, dairy products 25%. Identified microbiological flora, Enterobacteriaceae, coagulase positive staphylococci, E. coli, increased number of aerobic colonies, mold indicates an inadequate use of food hygiene measures based on HACCP principles.
Conclusion: Until complete implementation of food hygiene standards, the health risk of microbiological food safety, especially vulnerable groups, should not be ignore be neglected, and the recommended microbiological criteria are a significant help in assessing the sanitary and hygiene measures applied.

Keywords: food hygiene, microbiological food safety, vulnerable groups

38. QUALITY OF TRAFFIC SQUARES SOIL ON THE TERRITORY OF BELGRADE

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Objectives: Traffic squares are public spaces framed by traffic infrastructure and, as such, are exposed to adverse effects of pollutants that predominantly derive from traffic, although, like other public areas, they are also exposed to other emission sources in the urban environment.
Materials and methods: The results of the soil quality survey shown in this paper were collected during the implementation of the Programme of Soil Pollution Survey on the territory of Belgrade in the period 2011-2016, and refer to the locations of traffic squares.
Results:. The results showed that, at most sites, in the superficial soil layer at depths of 10 and 50 cm, there was an increase in the concentration of some pollutants, most commonly heavy metals. Concentrations of certain heavy metals have exceeded both marginal and remediation values.
Conclusion: Traffic is one of the dominant sources of soil contamination in urban areas, which is reflected in the increased concentrations of pollutants along traffic roads, with the green areas of traffic squares particularly vulnerable.

Keywords: Traffic square, Soil quality survey

39. ARE SOME OF NATURAL WATER OF SOUTH EASTERN SERBIA POTENTIAL FOR HEALTH TOURISM

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Objective: to present the current tests of the waters of broad known, as well as less known, springs in the surrounding Nis. On the basis of a professional attitude, give the answer to the question contained in the title of the paper.
Method: by retrospective method have been presented tests of water springs "Popšica", "Topilo", "Krivi Vir" and "Vidrište"; as well as of 8 sources around "Topilo,,". Period of testing was from 1981. to 1992. year.
Results: the waters are oligomineral, with constant composition, and varying the temperature in the prescribed range. "Radioactive are so much that ought to be drinked." The number of sources of thermal water is higher.
Conclusion: all tested water are the potential of health, and tourism in general.

Keywords: natural water, oligomineral water, thermal water, composition, temperature

SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF COMMUNICABLE DISEASE EPIDEMIOLOGY

INVITED LECTURES

1. IMMUNIZATION, PUBLIC HEALTH, THE PUBLIC - CONTROVERSY OF THE PRESENT MOMENT

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Introduction

Infectious diseases continue to prevail. Vaccines for preventable illness still account for about 3 million lives a year, accounting for around 5% of the total number of deaths globally. In the world, 10.6 million children under the age of five die of age, 1.4 million of them ill from the disease which can be prevented by vaccines (13.2%). Each year, 3 million lives are saved, 750,000 children are disabled due to vaccines (11,15).

Vaccines have made a strong contribution to public health both individually and socially, and certainly economically, and therefore represent one of the greatest achievements in medicine. What the vaccines have achieved the best can be illustrated by the following data: The Smallpox eradicated,Polio (America, Europe, Western Pacific) - eliminated, Measles (America, most of Europe) - controlled, in other diseases, dramatic reduction-tetanus, diphtheria, pertussis, rubeola, meningitis (caused Haemophilus influenzae type b), meningitis (challenged Neisseria serogroup C), liver cancer (caused by hepatitis B). Vaccination can prevent 27 infectious diseases and group immunity leads to global protection (1,2,3).

Vaccines for the economy are of great importance, because good organization and quality vaccines reduce hospitalization as well as the need for expensive therapy, and also reduce lasting consequences and limit the long-term effects of the disease. In addition, reduction of the epidemic reduces productivity reduction (6.7). With the exception of pure drinking water, vaccines are the most effective way of reducing and preventing the onset of infectious diseases.

Objective, material and methods

The aim of the paper is to determine, on the basis of relevant data and information, the underlying causes of partial not understanding the importance of immunization in the public and the exclusion of the antiviral lobby.The basis of

the material data consists of the scientific attitudes of the reference institutions, associations and individuals and the data of the media, from some Internet portals as well as individual representatives of anti-infectives. Epidemiological descriptive, sociopsychological and economic-analytical method.

Work and discussion

The antiviral movement is insisting on autism as a result of vaccination against smallpox, although there are no such scientifically confirmed evidence. Many studies, and certainly the latest ones, which are highly likely to indicate the genetic and neurological side of this problem, do not deter or reduce the militancy of this lobby (4).

So, vaccines have always caused controversy. In the history of medicine for centuries his is not a new situation. In the mid-nineteenth century, after several explosions of the smallpox, the United Kingdom Government passed a set of laws that introduced a mandatory vaccination - first for babies, but then for all children under 14 years. The offenders were

subjected to ever greater penalties. These measures were faced with solid resistance and caused a series of clutter. This social upheaval led to the formation of the Anti-Compulsory Vaccination League in 1867. Its founders were particularly worried that they considered compulsory vaccination a futile violation of their own choice and freedom. "Vaccination is the suffering of impurities - a virus or blood poisoning, which often leads to serious malignant effects. It has been in fashion for more than a hundred years, and most people are receiving it without question. Nevertheless, it highlights the time when people in blind faith will accept that medical dogma "(From the essay of John Pitkerne, younger-John Pitcairn, Jr.- " The Misleading Vaccination "The Fallacy of Vaccination of 1911. John Pitkern was a prominent industrialist in Pennsylvania and the president of the Anti-Vaccination League of America.

The resistance to vaccines constituted in the last decade, in particular, was based on knowledge of Th1 - Th2 paradigms, on the use of vaccines such as cellular pertussis vaccine, contagious diseases associated with the Gulf War. Thereafter, the views on better immunity following natural infections as well as some ambiguities in the scientific settings on vaccines and the immune system. Also, the application of the vaccine according to the strict recipe and the application of a strict protocol, as well as the fight against any remark on the vaccine, was noticed, whereby the individuality of the organism and the diseases from which someone is ill, as well as the current state of the organism.Prenatal development, genetics and epigenetics and hygienic hypothesis contributed to the creation of not always scientifically provable countervisions.

The question arises why people do not want to be vaccinated? Diseases are forgotten, or are not considered serious. There is an increase in skepticism towards the pharmaceutical industry and government bodies. Individual risk and social benefit are often seen as opposing factors. It is also evident that the risk of infection is very low in those countries where they have been properly vaccinated (8,9).

The opinion is that in many cases vaccinations, the benefit to an individual is small. However, the vaccine is a risk that is always borne by an individual. Nobody wants to be a person who is carrying that risk. When they see that there is a risk of a vaccine, many will tolerate the risk of illness because the disease is natural. Risk understanding is a strong motive for behavior in favor of vaccination (10). Public distrust in risk assessment and risk perception encouraged by the media is contributing to it. If we add to the pseudo-science and misinformation as well as the evident conflict of interest, then the situation in the last ten years in this the area can be understood as chaotic. It has certainly contributed to the lack of information in the wider public, even though there is scientific evidence in many studies. The lack of information has produced wrong information about the safety of the vaccine. As more data - scientists reach a consensus that data go "in favor of the rejection of the hypothesis "- that is, association is probably coincidental. However, parents who are convinced that scientists are sinning trying to discredit scientists. The media describe the contradiction. While scientific controversy is rarely communicated, parents are confused. It is clear that the disease occurs when the coverage of the vaccine falls (collective immunity is reduced). At the same time media and social networks have suggested concerns about an unsafe vaccine. The media report that there may be a problem. Some parents are confused. Already, as all relevant and quality research into specific situations has not been done, scientists will not say that the vaccine did not cause adverse effects because information insufficient. It creates an impression of scientific insecurity. It brings parents into a dilemma (14).

Why did not vaccination against a pandemic flu? There are many interpretations.The new type of flu is the first pandemic in the informational era, and there was evident incompatibility with the new information age. There was a lack of trust in the institutions, especially the authorities. Different irresponsible statements of public figures were also

implemented. The pandemic itself was experienced as mild, which was contributed by the poor organization of the health system as well as poor vertical passage in the health system. The analysis service did not analyze the data. The health promotion service did not deal with the promotion of vaccination. Epidemiologists were lonely and the media dictated the dynamics of conflict. What was the problem? Did poor communication and sensational media coverage and the impact of anti-infective campaigns? Questions for critical review of news in the media. Questions to ask when reading newspaper articles, TV shows or Internet vaccine internet sites: Who wrote it and why? (evaluate the expertise and who is the author). Who is the purpose of writing? Is the facts confirmed or incorrectly and sensitively? Is the information current? Is the information biased, or did the author use time to represent only one particular view?

When public / national health says - it's safe, what does it mean? How do health officials decide - is it certain? What is trust in experts? Public health and the public speak different languages. Part of the risk and benefit of the vaccination is society and How can we achieve that people believe in scientific explanations? We need to learn to speak the same language, or we should believe that an expert knows what a layman does not know. Formation of communication between experts and the public - trust in one's own experts (after all, politicians made us not to believe when they speak, and this nation also transfers to experts, but there are few experts among politicians). It is about explaining to the nation what is the health goal. To clarify that every departure to a doctor is the consent of a doctor to help us - a signature is not needed (12).

However, if you know little about the smallpox and you care about them - you should thank Edward Jenner for this (Edward Jenner Vaccination against the smallpox and her later adaptations have proven to be so successful that the WHO declared variola vera for the first a viral disease, thanks to global efforts in the field of vaccination, has no medicine yet. Vaccination is the only method of preventing it.Commentary on the anti-vaccine lobby J.Moore: "If you want to remove the brakes from the car, that's your personal decision. "(satirical text on vaccine opponents). So, it follows that resistance to vaccination is primitivism, but it is primarily an introduction to new epidemics.

Despite the very strong pressure of the anti-infectious lobby, the US Supreme Court, in the proceedings of Jacobson v. Massachusetts, ruled that the need for the protection of public health was more serious than the right to privacy, except in cases of religious reasons (13).

Internet as an opportunity for a communicator about health can be very important as an opportunity for the health of the communicator. But searchers for information are looking for consequences in the first place. Only half ask for the probability of information. The advantage is that something has been created and not how likely it is. Special parents are subject to narrative information. (Betsch & Renkevitz, 2009). The parents want to know how vaccine unwanted events are happening and not whether it's likely. People are looking for stories, especially when it is assumed (the story) that the risk of a vaccine is high. Spells or narratives are easy available thanks to social networks. The output is in the need for more research into the settings that assess the actual impact of the information received - rather than collecting self-report on "importance" on the internet. As a result of the information of the Internet search, a need for long- term surveys is made to evaluate the development and change the perception of vaccine risk (5).

The advantage of narrative information is obvious and irreplaceable. The only question is: How can we use the natural propensity to social media narratives to help in decision-making about vaccinations? Much greater activity in this field of experts and professionals is the only way to achieve the goal - to arrive at the argument of the truth about immunizations rather than arguments of force or repression.

Conclusion

Recommend as a stance arising from the doctrine of medical science to all doctors - learn about preventable infectious diseases.

To develop awareness of additional risk factors for particular diseases, to understand the pathophysiology of the disease and mechanism of action of vaccines, not to use blind protocols, and to incorporate into their knowledge the decision on the vaccination of a healthy person or patient.

It is necessary to integrate one's own experience with the experience of colleagues. "The safety signal" is not a proof that the vaccine is the cause, the facts are to be examined, the evidence is collected and sent to the experts. Notice that there is no absolute safety (risk equal to 0), because there is no such thing in nature and the "sit and wait" approach increases the theoretical risk, beyond the real risk, do nothing, it means taking the risk.

And at the very end we should remind ourselves that medicine rests on trust between medical staff and citizens. Only strong and flexible vaccination programs are able to respond to the challenges of future epidemics or pandemics.

"Whoever wants a permanent success must change the way of working with time." (Nikola Makijaveli)

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2. EXPERIENCES OF PERTUSSIS SURVEILLANCE IN VOJVODINA

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Abstract

Introduction: Although pertussis has been a preventable disease in Vojvodina (Serbia) since 1960 with significant low incidence rates, most cases have not recognized. We showed the incidence of pertussis in Vojvodina and in the city of Novi Sad (the main administrative centre of the Vojvodina) and estimated the predictive values of the certain signs and symptoms after implementation of a new clinical case definition of pertussis, proposed by the Global Pertussis Initiative.
Material and Methods: A prospective epidemiological study was carried out between October 2013 and October 2014. Data in parallel fields obtained from the primary and at the tertiary health care levels. Laboratory confirmations of pertussis were obtained by PCR or serology tests.
Results: Pertussis cases were notified in almost all age groups. The highest age-specific incidence rate of pertussis among the outpatients was registered in 10-14 year olds (1618.1/100,000), while in the hospital surveillance the highest hospitalization rate of pertussis was recorded in the children 7-9 years old (137.1/100,000). In infants, younger than 3 months, the hospitalization rate was 97.0/100,000. The most common signs among patients 0-3 months old were apnoea and pneumonia (60%). Apnoea was slightly more frequently registered among hospitalized pertussis cases than among outpatients aged 4 months to 9 years old ($p = 0.0408$). Among laboratory confirmed cases, aged 10 years and older, post-tussive emesis was more frequently registered in outpatients ($p = 0.0111$), and worsening of symptoms at night in the hospitalized patients ($p = 0.0383$).
Conclusion: A large number of confirmed pertussis cases can be considered as a result of implementing of a new clinical case definition of pertussis. Introducing at least one further booster dose at school entrance in the Serbian immunization programme should be considered.

Keywords: pertussis, sentinel surveillance system, hospitalization rate, clinical case definition

Inroduction

Despite the high coverage of vaccination, pertussis is still presents as one of the most important public health problem trough the world (1). Underrecognition of pertussis cases is results of influence several factors: heterogeneity in disease expression, poor surveillance system, absence quality laboratory confirmation of pertussis, modification of clinical characteristics by immunization and the absence of more sensitive clinical case definitions of pertussis (1, 2). The estimate of pertussis burden globally and evaluation of difference immunization programs, was initiated in 2001, by the Global Pertussis Initiative (GPI) forum with the goal to improve control of pertussis (2). In Serbia, mandatory vaccination against pertussis with whole cell pertussis vaccine started in 1960. Their combined vaccine against tetanus, diphtheria and pertussis was used (DTwP - whole cell pertussis vaccine). Primo vaccination against pertussis is conducted with three doses vaccines for all children of the age of 2 months and must be completed by 6 months with a minimum interval of 4 weeks

between subsequent doses and revaccination one year after the third dose of vaccine. If for any reason immunization was not completed than should be completed by the age of 5 years. According to the Law on protection of population against communicable diseases, in 2015, the DTwP vaccine was replaced by the DTaP-IPV-Hib (combined diphtheria—tetanus—pertussis—polio—Hib vaccine). Surveillance of pertussis in the Autonomous Province of Vojvodina (Vojvodina), which is the northern region of Serbia and have a population of 1,916,889 (26.9% of the Serbian population) is conducted since 1948. Before introducing of immunization, pertussis was one of the most common respiratory childhood diseases in Vojvodina with the average incidence rate (1948-1960) of 122/100,000 population and 125 deaths caused by pertussis. After introducing the DTwP vaccine, incidence rate of pertussis continuously declined with notified only 13 deaths caused by pertussis (3). However, in a situation where pertussis cases were registered only by clinical characteristics mostly among hospitalized patients, without a specific clinical case definition and laboratory confirmation of pertussis, the true burden of pertussis in Vojvodina was considered as unknown. For this reason, during the 2012/13 season (from October, 2012 to October, 2013, 52 weeks) in some parts of Vojvodina was implemented an improved pertussis surveillance as a specific Public Health Program. In the surveillance of pertussis were included all hospitals in the Vojvodina and sentinel physicians in the Health Centre (the city of Novi Sad). The results of this active surveillance of pertussis in Health Centre, during 2012/13 season, showed that incidence rate of pertussis (21.7/100,000) was the highest in comparison with incidence rates of pertussis in the last 10 years (2004-2013) of surveillance in Vojvodina. In contrast to the period before implementation of the active surveillance, when pertussis more frequently registered among unvaccinated children younger of 5 years old, during the first years of active surveillance pertussis mostly registered among completely vaccinated children in the 7–14 years age group (4).

Materials and Methods

We analysed surveillance data on reported cases of pertussis for the period from 1948 to 2014 collected in the Centre for Disease Control and Prevention, Institute of Public Health of Vojvodina. Also, we analysed data for pertussis immunization coverage in Vojvodina for the period between 1960 and 2014.

Further, for determining of specificity an active surveillance of pertussis, we covered population of the City of Novi Sad, Vojvodina, Serbia, during one year (from October, 2013 to October, 2014). Data for this prospective epidemiological study were obtained from the sentinel (outpatients) and hospital (patients those hospitalized at tertiary health care level) surveillance of pertussis, with respect to the GPI clinical case definitions of pertussis among the population in Novi Sad, which is the main administrative centre of the Vojvodina with 341.625 citizens (census of 2011). All information about patients was anonymized and de-identified. Questionnaires were filled immediately by epidemiologists, general practitioners and paediatricians as well as by internists-pulmonologists those included in the research. There used a standardized questionnaire to collect data on sociodemographic characteristics, vaccination against pertussis date of cough onset and other clinical features of participants who fulfilled the inclusion criteria. According to recommendations for improved surveillance of pertussis proposed by GPI (5), in the research were included only respondents those fulfilled criteria of clinical case definitions for age groups (0-3 months; 4 months-9 years; 10 years or older). Sentinel surveillance of pertussis at the primary health care level was covered ten general practitioners and five paediatricians of Health Centre Novi Sad (encompassing about 7% of the total population of the city of Novi Sad). Hospital surveillance for the whole territory of the city of Novi Sad (345.027 inhabitants) was conducted in the two sentinel health care facilities: pulmology clinic of Institute of Health Care of Children and

Adolescents of Vojvodina (for children admission) and Institute of Pulmonary Diseases of Vojvodina (for the admission of adults). The main characteristics of conducted surveillance system of pertussis showed in Figure 1.

1.1.There are written informed consent was acquired for each participant. The study protocol was approved by the ethics committee of the Institute of Public Health of Vojvodina, Novi Sad and from all participating centres.

Laboratory procedures

Laboratory for surveillance of pertussis was the Centre for Microbiology of Institute of Public Health of Vojvodina, Novi Sad. According the GPI propositions (5), the type of laboratory method (PCR or serology tests) depended on the duration of coughing and of respondent's age those included in our study (Figure 1). The specimens transport from sentinel and hospital physicians to the laboratory in the Institute was organized daily and transported in hand refrigerator, together with the previously fulfilled questionnaires. Immediately after finishing of testing, the results of laboratory tested samples were sent by a messaging system through a special network communication between all participants those included in this improved surveillance of pertussis. Testing of nasopharyngeal swabs was performed by PCR. The following commercial kits were used: Bordetella R-geneTM (ARGENE, BioMerieux, France) and *Bordetella pertussis (B. pertussis)*/*B. parapertussis*/*B. bronchiseptica* RealTM (Sacace, Italy). The results were interpreted according to manufacturer's instructions. For laboratory confirmation of pertussis by serology tests we used ELISA IgA and IgG test with following commercial kits: Anti-*B. pertussis* toxin ELISA (IgG) with 4 calibrators 5 IU/ml, 25 IU/ml, 100 IU/ml and 200 IU/ml; Anti-*B. pertussis* toxin ELISA (IgA) with 4 calibrators 2 IU/ml, 10 IU/ml, 25 IU/ml and 50 IU/ml (Euroimmun, Germany). According the duration of the cough (less or more than 3 weeks), as confirmed cases of *B. pertussis* infection were considered all patients by laboratory confirmation of pertussis based on PCR-positive for B. *pertussis* or anti-PT IgG antibodies titers with cut-off values ≥100 U/mL for all ages and with no vaccination in the previous 12 months. Participants with PCR negative results and with anti-PT IgG antibodies titers with cut-off values < 40 U/mL were considered as negative. Among all patients, those serology ELISA IgG tests had values between 40 to < 100 IU/ml, for definitive laboratory confirmation of pertussis serology IgA ELISA test was used. According to age-dependent reference ranges for groups (ADR), the age-specific cutoff values for laboratory confirmation of anti-PT IgA (measured in ELISA international units per milliliter - IU/mL) by age group were as follows: 2 IU/mL, 0-4 years old; 6 IU/mL, 5-10 years old; 12 IU/mL, > 11years.

1.2.Using described clinical criteria and laboratory procedures as a confirmed case of pertussis was considered every suspect case of pertussis with a positive laboratory confirmation (PCR or ELISA) and rejected case was every suspect case without laboratory confirmation (PCR or ELISA) of pertussis.

1.3.Statistical Analysis

Data on pertussis incidence in Vojvodina during 1948-2012 period with DTwP3 and DTwP revaccination coverage dose vaccine were obtained from the Institute of Public Health of Vojvodina (4). Incidence rates were calculated using the annual number of registered cases as a numerator and the number of inhabitants in Vojvodina according to census as a denominator and multiplied by 100,000 population.

According proposed the algorithm, we included all suspected cases in the Sentinel and Hospital Surveillance System in our analysis. After classification, we analysed the age specific incidence of pertussis in Novi Sad, which can be representative for the whole

territory of Vojvodina. We used an annual number of registered cases of pertussis through two surveillance systems as a numerator. Population under sentinel surveillance (Health Centre of the city of Novi Sad) and population in the city of Novi Sad, Vojvodina, per the census, were used as a denominator for calculation of the age-specific incidence rates of pertussis, respectively. Incidence rates were calculated and multiplied by 100,000 population. For calculating of age-specific incidence, we used the following age groups: 0-3 months, 4-12 months, 13-24 months, 24 months-6 years, 7-9 years, 10-14 years, 15-19 years, 20-29 years, 30-39 years, 40-49 years, 50-59 years and ≥ 60 years.
The distribution of vaccination status, sex category, type of laboratory testing and certain symptoms of case definitions were compared by Fisher's exact test. We used Wilcoxon rank sum test for determining differences in days of cough duration in patients with pertussis confirmation in the sentinel and hospital surveillance and between two surveillance systems. A 2-tailed P value <0.05 was considered statistically significant. Data analysis was performed using the SPSS version 22 software.

Results

Figure 2 summarises general trend of pertussis incidence in Vojvodina during 1948-2014 period with coverage of DTwP3 vaccine (primary series) and DTwP revaccine (booster dose), according to data from the Institute of Public Health of Vojvodina, Novi Sad.
Immunization coverage with primary series and revaccination against pertussis has been high. Coverage of ≥95% with DTwP3 vaccine was continuously registered since 1990 to 2014, while coverage of revaccine against pertussis of ≥95% was achieved in the period from 1974 to 2014. The highest annual incidence rate of pertussis was registered in the 1959 (242.1/100,000 population).
During the observed period (season 2013/14), the estimated incidences of all reported pertussis cases in Novi Sad trough sentinel and hospital surveillance of pertussis were 207.0/100,000 versus 16.2/100,000 inhabitants, respectively. Confirmed cases of pertussis were registered in patients almost of all age groups. However, trough sentinel surveillance, respondents aged between 20 to 39 years were not registered, while in the hospital surveillance pertussis did not recognize among children aged 13-24 months. The highest age-specific incidence rate of pertussis in the sentinel surveillance was registered among persons aged 10-14 years (1618.1/100,000), while in the hospital surveillance the highest hospitalization rate of pertussis recorded in children aged 7-9 years (137.1/100,000). In infants, younger than 3 months, the hospitalization rate was 97.0/100,000. The least values of incidence of pertussis, in the both surveillance systems, were registered in the patients older than 20 years of age (Figure 3)
During one year (season 2013/14), a total of 103 laboratory confirmed cases of pertussis were reported. Of these, 47 (45.6%) cases of pertussis were registered in the sentinel, while in the hospital surveillance was evidence 56 (54.4%) cases. The prevalence's of laboratory confirmation of pertussis in the sentinel and hospital surveillance were 22.2% (47/212) versus 52.3% (56/107), respectively. The proportions of PCR positive cases among tested participants in the sentinel and hospital surveillance of pertussis were 24% (18/75) versus 34.1% (14/41), respectively. The prevalence's of ELISA IgG test among outpatient and hospitalized cases of pertussis were 21.2% (29/137) versus 63.6 (42/66), respectively (Table 1).
For 87 (84.5%) participants aged younger than 18 years, vaccination status was known and participation of included outpatients and hospitalized pertussis cases were nearly equal (43 versus 44, respectively). There were 16 patients aged 18 years and older with unknown vaccination status. Compared through two surveillance systems among participants <18 years of age, there were six cases of pertussis those previously unvaccinated, and 16 patients who

received one, two or three doses of vaccine against pertussis. The majority of pertussis cases before laboratory confirmation were immunized with four doses of pertussis vaccine (65 of 87, 74.7%) (Table 2).

The results for participants in the youngest age group (0-3 months) showed together for two surveillance systems. A total of five confirmed cases were registered in this age group, four patients were registered trough hospital and only one trough sentinel surveillance of pertussis. Population under sentinel surveillance of pertussis covered only 362 patients aged 0-3 months during one year. For infants with laboratory confirmation of pertussis, the median duration of cough was 16 days (range 10-30 days), and all laboratory confirmed cases were male. Prevalences of positive results by PCR or serology were almost equal (30.8% versus 33.3%, respectively). The most common symptoms among laboratory confirmed cases were apnoea and pneumonia (60%). Prevalence of confirmed cases among patients with post-tussive emesis was only 14.3% (1/7), whereas every patient with apnoea or seizure had a laboratory confirmation of pertussis. Compared to the patients without laboratory confirmation of pertussis, laboratory confirmed cases were more likely to have apnoea ($p = 0.0179$). Differences between others symptoms from the proposed case definition were not statistically significant (Table 3).

A total of 34 pertussis cases were registered in patients aged 4 months-9 years. In the sentinel surveillance was registered 15, while in the hospital surveillance were registered 19 laboratory confirmed cases. The median duration of the patients' cough aged 4 months-9 years with laboratory confirmation of pertussis in the sentinel surveillance was 20 days (range 3-45 days), but in the hospital surveillance was 30 days (range 6-90 days), and the difference has been statistically significant ($p = 0.0443$). In this age, except seizure, all other proposed symptoms were registered. The most common symptom among confirmed cases of pertussis in the sentinel and hospital surveillance of pertussis was whoop (73.3% versus 63.2%, respectively).

No differences in gender, PCR or serology testing and almost all proposed clinical symptoms, between participants aged 4 months-9 years with positive confirmation of pertussis in two surveillance systems. However, apnoea was slightly significantly higher among hospitalized patients than among patients those registered trough sentinel surveillance of pertussis (42.1% versus 6.7%, $p = 0.0408$).

Observed the clinical features in the sentinel surveillance, we found that combinations of a paroxysmal cough with no or minimal fever along with whoop or post-tussive emesis or close exposure with person with a prolonged a febrile cough illness were statistically more frequent registered among participants with than among respondents without laboratory confirmation of pertussis ($p = 0.0177$, $p = 0.0095$, $p = 0.0128$, respectively). The addition of one or more symptoms trough sentinel surveillance showed that six different combinations from the proposed case definition were statistically significant predictors of pertussis among patients aged 4 months-9 year.

Also, observed the clinical features in the hospital surveillance, a paroxysmal cough with no or minimal fever combined with apnoea or combination a paroxysmal cough with no or minimal fever along with whoop and apnoea were significant predictors of pertussis in hospitalized patients aged 4 months-9 year (Table 4).

A total of 64 pertussis cases were registered in patients aged 10 years and older. In the sentinel surveillance were registered 31, and in the hospital surveillance were registered 33 laboratory confirmed cases. The most common symptoms among confirmed cases of pertussis in the sentinel and hospital surveillance of pertussis were whoop and worsening of symptoms at night (71.0% versus 84.8%, respectively). No differences in gender, PCR or serology testing, and median duration of the patients' cough between participants aged 10 year and older with positive confirmation of pertussis in two surveillance systems. Among

laboratory confirmed cases, post-tussive emesis was more frequently registered in confirmed cases of pertussis in the sentinel than in the hospital surveillance of pertussis (61.3% versus 27.3%, p = 0.0111), but worsening of symptoms at night was a slightly better predictor for pertussis positive results among hospitalized patients (84.8% versus 61.3%, p = 0.0383).

Observed the clinical features in the sentinel surveillance, we found that a non-productive, paroxysmal cough of ≥2 weeks duration without fever along with whoop or apnoea or post-tussive emesis were significantly more registered among laboratory confirmed cases than in respondents without laboratory confirmation of pertussis (p < 0.0001, p = 0.0159, p = 0.0001, respectively). The addition of one or more symptoms trough sentinel surveillance showed that nine different combinations from the proposed case definition were statistically significant predictors of pertussis in patients aged 10 years and older. Surprisingly, in the hospital surveillance of pertussis, no significant differences were found regarding patients with and without laboratory confirmation of pertussis (Table 5).

2. Discussion

In the prevaccine era, pertussis was considered as a childhood disease. In the USA, more of 95% of registered pertussis cases were under 10 years of age (6). However, after widely introducing of pertussis immunization program, age distribution of disease has shifted towards infants, adolescents and adults (5, 7). Today, pertussis is presenting as one of the most common vaccine preventable disease with epidemic and endemic characteristics worldwide (7). In the USA, since 1982, pertussis became serious epidemiological problem, again. For example, in the period from 1982 to 2011 incidence rates of pertussis cases in certain years exceed the values of rates during the prevaccine era and main reason for this was an increased awareness about pertussis (8).

Observed the data in the European country, from 2001 to 2005, the highest average incidence rates of pertussis were registered in the Estonia (23.3/100,000) and Poland (5.3/100,000), but the lowest were in the Czech Republic (3.4/100,000), Lithuania (1.4/100,000) and Romania (0.7/100,000) (9). In the South America (Argentina), the average incidence rate of pertussis was 5.7/100,000 in 2005 and 4.4/100,000 in 2006, respectively (10).

In Vojvodina, before introducing immunization, pertussis was a significant epidemiological problem. Unfortunately, during this period, pertussis was registered only according a typical clinical manifestation, without laboratory confirmation of disease. Similar with the situation in other regions across the world (5, 6, 11), pertussis in our territory was commonly detected among children. After introducing of immunization (1960) pertussis incidence decreased. In the 1991, first time after the introduction of DTwP vaccine, the annual incidence rate was below of 1/100,000, and ten years later, pertussis was not registered in Vojvodina during 2001 and 2002 years. In addition, after wide application of vaccine against pertussis in our territory, disease reported only sporadically among patients < 20 years of age, but most commonly among infants, those unvaccinated or incompletely immunized, and in the school children, because of waning of vaccine-induced immunity (3). During eleven years (from 2001 to 2011), a total of 37 cases of pertussis cases were reported in Vojvodina, but only during 2012 a total of 20 pertussis cases were recognized. The evident increase number of pertussis cases in 2012 may explains because of implementation of improving sentinel and hospital pertussis surveillance in Novi Sad, Vojvodina (4). From 1995 to 2004, among persons with pertussis for whom age was registered, three quarters of all cases were children < 2 years of age, and 82% patients previously were not immunized against pertussis (3).

Before introducing of immunization against pertussis, there were 125 cases with fatal outcome. In the immunization period, the number dropped to 13 deaths, and the last two cases with fatal outcome were reported in the 1970 and 2015 (3, 4). However, because the surveillance of pertussis was mainly passive, we believe that more deaths due to unrecognized pertussis cases were not detected.

In contrast to previously epidemiological situation, after implementation of active pertussis surveillance trough the sentinel and hospital surveillance (season 2013/14), we determined that pertussis is not only a disease of young children, but also pertussis recognized in almost all age groups and pertussis incidence rates exceeds all previously notificated rates in the vaccine era.

In our investigation, we found that average annual incidence rates of pertussis per 100,000 inhabitants in the sentinel and hospital surveillance were 207/100,000 versus 16/100,000, respectively. Similarly, the relationship between two surveillance systems was found in the other published reports (12, 13). In comparison with the period before implementation of active pertussis surveillance, the high values of pertussis incidence trough two implemented surveillance systems can be explained by the facts that first time in our country we implemented the new clinical case definition of pertussis with increased awareness among all included physicians, and with timely and adequate laboratory support. Considering that we used a single serologic test for laboratory confirmation of pertussis, we can believe that some patients, especially those with a persistent cough, were unrecognized.

As is well known, pertussis may occur at any age (14), but the age distribution of pertussis depends on the several factors (6). Thanks to use of clinical case definition of pertussis, we determined that the average ages of outpatients and hospitalized patients were 14.5 versus 16.4 years old, respectively. Observed of age-specific incidence rate, we found that pertussis was more frequently registered among patients in 7-9 (hospital surveillance) and 10-14 (sentinel surveillance) year olds. Also, the high age specific incidence rate was registered among hospitalized patients aged 0-3 months (97/100,000). However, the lowest incidence rates of pertussis were registered among the oldest patients (≥60 years old). The explanation for this is in the fact that clinical characteristics of pertussis in older ages usually indistinguishable, and because patients of these age groups previously vaccinated or having had prior contact with *B. pertussis* (14). Similar disease distribution and incidence rates of pertussis previously were observed in the United Kingdom and USA (12, 13).

Similar to the results of other authors (15), our analysis indicates that patients with 4 doses of pertussis vaccine were less frequently registered in the hospital than in the sentinel surveillance. Likewise, there were mostly age appropriately vaccinated pertussis cases in the two surveillance systems.

According proposed case definitions for two different age groups (0-3 months and 4 months-9 years), we followed pneumonia and seizure as complications of pertussis among hospitalized pertussis cases and outpatients. Among patients in the youngest age group (0-3 months), pneumonia and seizure were registered among three versus one patient, respectively. In the patients aged 4 months-9 years, only one hospitalized pertussis case was registered with pneumonia, while seizure was not detected. This phenomenon can be interpreted by the fact that many patients aged ≤ 18 year previously appropriate immunized against pertussis. In addition, in our study, only two of 47 patients in the sentinel surveillance and four of 56 hospitalized patients before pertussis laboratory confirmation were unvaccinated.

As is well known, pertussis expression is very heterogeneous. Likewise, the proposed clinical case definition of pertussis given by the World Health Organization (WHO) (16) the US Centers for Disease Control Prevention (CDC) (17, 18) or the European Centre for Disease Prevention and Control (ECDC) (19) did not universally applied and they mostly used for testing of vaccine efficacy. But, the two the most tested symptoms in the patients with suspicion of pertussis trough different research are whoop and posttussive emesis. The explanation for this is in the fact that these symptoms are a mandatory in the all proposed clinical case definition of WHO, CDC or ECDC (16-19), which widely used in countries where pertussis surveillance exists. Approximately similar to the results of other authors (20),

in our research, prevalence of whoop among pertussis cases was 40%. Post-tussive emesis in this age was detected among 20% of laboratory confirmed cases. The same prevalence of post-tussive emesis was registered in Tunisian hospitalized infants aged <1 year, and among patients aged 0-3 months in South Korea (21, 22). A Tunisian study (21), where the WHO clinical case definition of pertussis was used (a cough illness lasting longer than two weeks with paroxysms of coughing, inspiratory whoop, and/or post-tussive vomiting), and a respiratory illness with apnoea for infants aged <3 months, a confirmed positive laboratory diagnosis was obtained for a total of 20% patients. Unlike the WHO criteria, we included all patients with cough any duration and coryza and prevalence of pertussis among all tested patients aged 0-3 months in our investigation was 31%.

In the age group 4monts-9 years old, the prevalences of whoop in the sentinel and hospital surveillance were 73.3% versus 63.2%, respectively, whereas post-tussive emesis in two surveillance systems was with nearly equal prevalence among confirmed cases (60.0% versus 63.2%). In the pertussis cases aged ≥ 10 years, the prevalences of whoop in the sentinel and hospital surveillance were 71.0% versus 66.7%, respectively. However, post-tussive emesis had a significantly higher prevalence among laboratory confirmed cases in the sentinel surveillance than among hospitalized patients (61.3% versus 27.3%).

Results of investigation in Tehran (1), among outpatients with an average age of 11 year, where the WHO clinical case definition of pertussis was used, shows that the prevalences of whoop and post-tussive emesis among laboratory confirmed cases were 71.4% versus 61.9%, which is similar to our results. Because the cough of ≥ 14 days duration was a prerequisite symptom in this research, prevalence of pertussis PCR laboratory confirmed cases among all tested patients was only 6.4% (21/328). An out-hospital study in England (23), where inclusion criteria was only a cough of ≥ 14 days duration and where used IgG serology confirmation of pertussis, prevalence of pertussis in the patients average aged about 10 years was 37.2% (64/172). Prevalences of whoop and vomiting were 50.0% versus 70.3%, respectively.

In our investigation, prevalences of pertussis cases among all tested patients aged 4monts-9 years in the sentinel and hospital surveillance were 20.5% (15/73) versus 37.3% (19/51), respectively, while the prevalences of confirmed cases in the patients aged ≥ 10 years were even higher (23%; 31/135 versus 75%; 33/44).

Observed 0-3 month's age group, we determined that apnoea was good predictor of laboratory confirmation of pertussis. Regarding predictors of pertussis positive laboratory test in the age groups 4months-9 years and ≥10 years old, it is obvious that more of different symptoms were revealed in the outpatients than in the hospitalized cases. A possibly explanation for this is the fact that sentinel physicians, as the very important factor for diagnosis of pertussis, were educated before starting of investigation with increasing awareness for recognition of pertussis. Although all hospitalized patients fulfilled the inclusion criteria, because a constantly inflow of a large number of patients with pertussis similarly disease (asthma, bronchitis, allergy cough, Gastroesophageal Reflux Disease) the good predictors of pertussis positive results in the age group 4months-9 years were identified only for two combinations: paroxysmal cough with no or minimal fever combined with apnoea and combination paroxysmal cough with no or minimal fever along with apnoea and whoop. In other symptoms among hospitalized cases, prevalence did not significantly different among confirmed cases compared to patients with negative laboratory results.

Observed by all three age groups, we determined that patients aged 0-3 months, hospitalized patients aged 4months-9 years and outpatients aged ≥10 years with apnoea were more likely to give a laboratory confirmation of pertussis than patients without this symptom. Good predictive value for pertussis had whoop among outpatients aged 4months -9 years and aged ≥10 years. Outpatients aged 4months -9 years and ≥10 years with laboratory confirmation of

pertussis had more likely post-tussive emesis than patients in the same age groups without laboratory confirmation of diseases.

In addition, our results show that some symptoms in the two age groups (4months-9 years and ≥10 years) were more frequent in hospitalized than in outpatient cases. Hospitalized patients aged 4month-9 years were more commonly had apnoea than outpatients, and among patients aged ≥10 years, worsening of symptoms at night was more likely detected among hospitalized than in the patients in the Health Centre of Novi Sad. Only one symptom (post-tussive emesis) was more frequently registered among patients aged ≥10 years in the sentinel than among hospitalized pertussis cases. A Spanish study found that inspiratory whoop, apnoea and cyanosis were more frequent in hospitalized than in outpatients (15). Our results support similarity in terms of frequency of apnoea trough two systems, but according proposed case definition, cyanosis was followed only among patients aged 0-3 months, where because the small number of participants we did not compare frequencies in inpatients and outpatients.

In conclusion, a large number of registered cases of pertussis can be considered as a result of implementing the clinical case definition of pertussis and in particularly because the proposed case definitions predicted including patients aged ≤ 10 years those coughing less than 14 days. Thanks to that, in our research, the high incidence rates of pertussis were registered exactly in this population and the highest age-specific incidence rate of pertussis was registered among hospitalized patients aged 7-9 years. Likewise, our investigation imposed by the fact that we should be considered of introducing at least one further booster dose at school entrance in the Serbian immunization programme. To more improve understanding increasing incidence of pertussis in adolescents and adults, it is necessary a seroepidemiological study conducted. It is encouraging that several proposed symptoms had a good predictor's value, especially in the sentinel surveillance, where patients with suspicion of pertussis usually earlier detected than in the hospital units. This may contribute to early detection of pertussis cases and after immediately introduction of chemoprophylaxis can considerably influence to interruption of transmission disease among close contacts.

3. References

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SUPPLEMENT

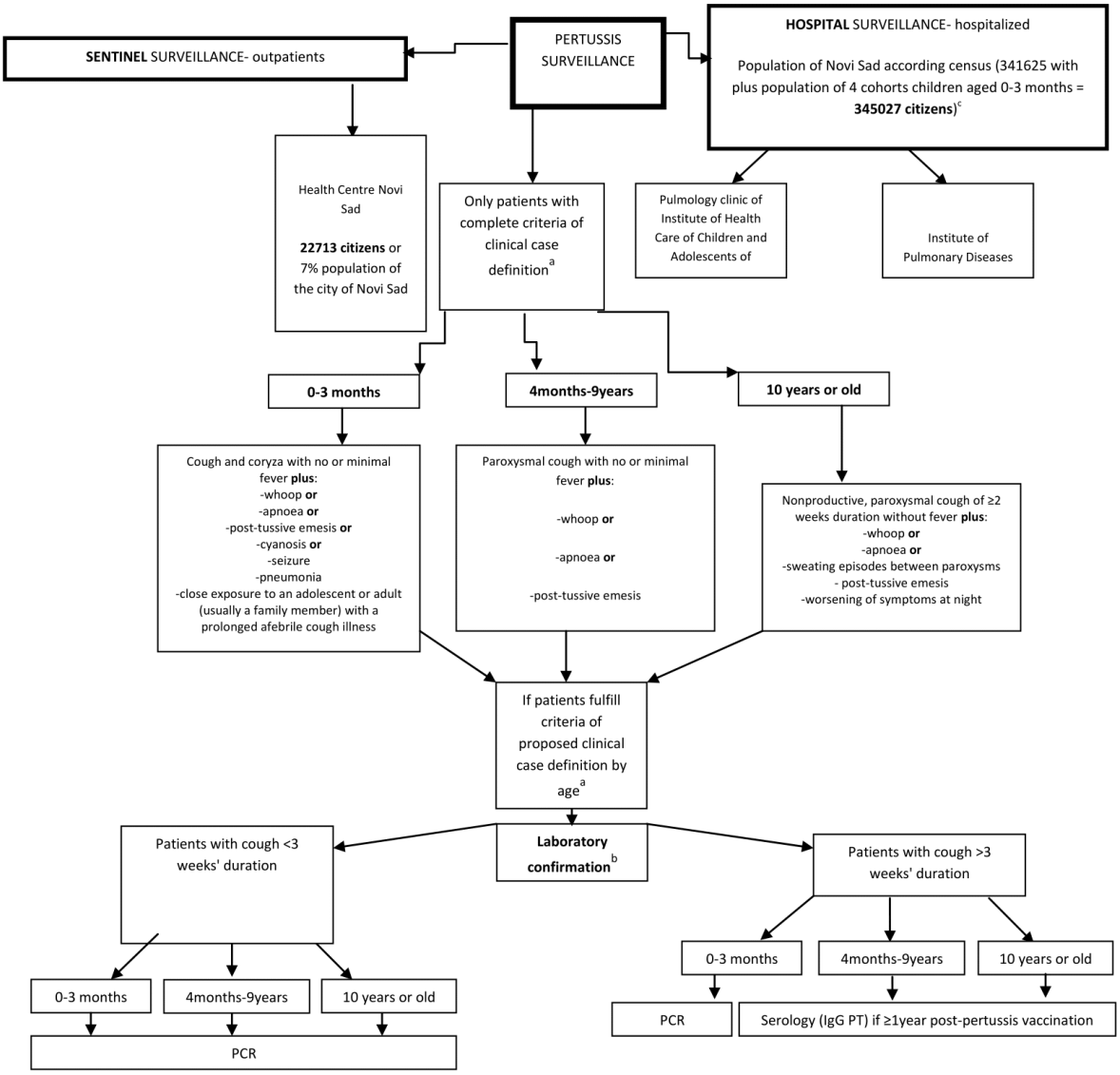
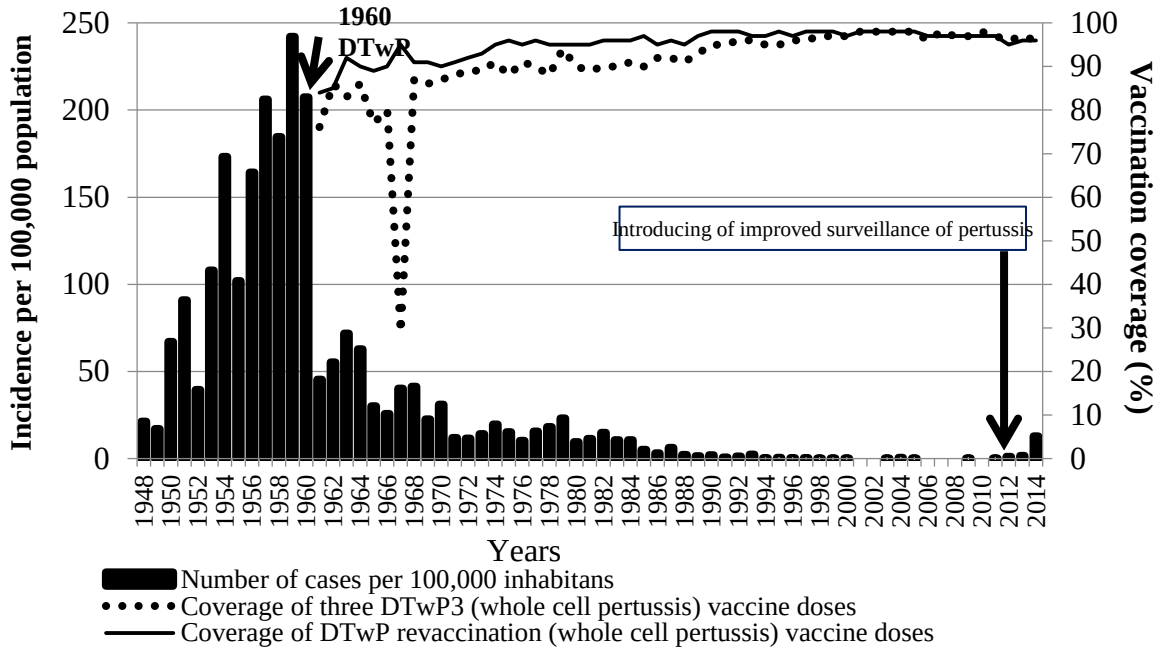


Figure 1. Algorithm for the surveillance and laboratory diagnosis of pertussis. [a,b] Clinical case definition and procedures for laboratory confirmation in accordance with the recommendations of the Global Pertussis Initiative (GPI)

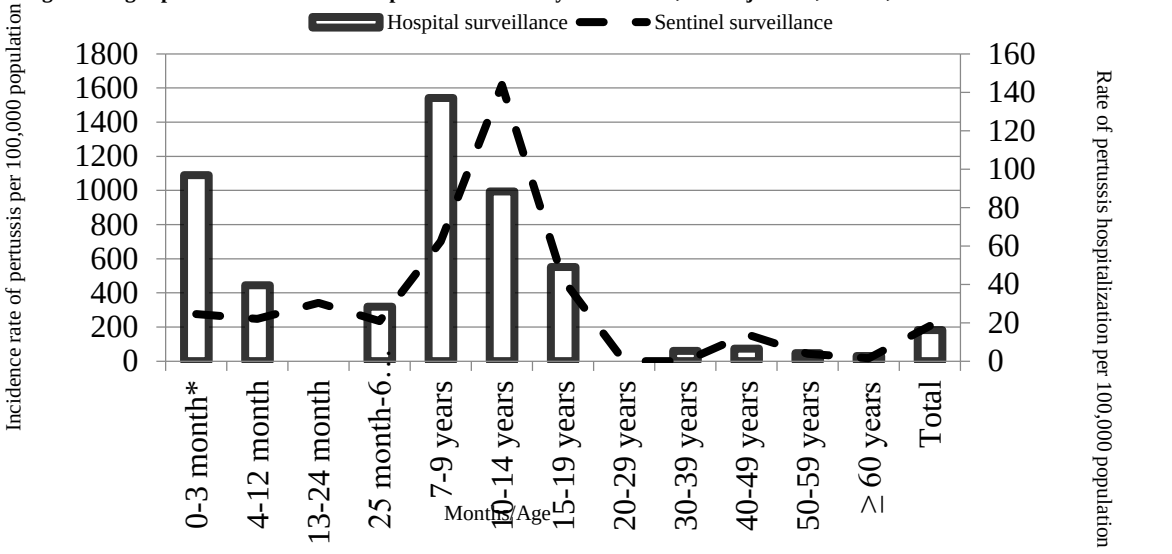
Cherry at all, Clinical Definitions of Pertussis: Summary of a Global Pertussis Initiative Roundtable Meeting, February 2011.

Figure 2. Pertussis incidence and pertussis immunisation coverage, AP Vojvodina, Serbia, 1948-2014.



Source: Institute of public Health of Vojvodina, Novi Sad

Figure 3. Age-specific incidence rates of pertussis in the city of Novi Sad, AP Vojvodina, Serbia, October 2013 - October 2014.



*Population in the sentinel and hospital surveillance presents as 4 kohorts of children age 0-3 month trough one year (52 weeks)

Table 1. The type of laboratory confirmation of pertussis cases in the city of Novi Sad, October 2013- October 2014

Outpatients tested/confirmed (%)		Subtotal (outpatients) tested/confirmed (%)	Hospitalized tested/confirmed (%)		Subtotal (hospitalized) tested/confirmed (%)	Total tested/confirmed (%)
PCR	Serology		PCR	Serology		
75/18 (24.0)	137/29 (21.2)	212/47 (22.2)	41/14 (34.1)	66/42 (63.6)	107/56 (52.3)	319/103 (32.3)

PCR: polymerase chain reaction; Serology: anti-PT IgG antibodies titers with cut-off values ≥100 U/mL for all ages or anti-PT IgA were as follows: 2 IU/mL, 0-4 years old; 6 IU/mL, 5-10 years old; 12 IU/mL, older than 11 years of age

Table 2. Vaccination status of pertussis cases aged ≤18 years in the city of Novi Sad, October 2013- October 2014

Cases	Outpatients n=43	Hospitalized n=44	Total n=87
Unvaccinated	2 (33.3)	4 (66.7)	6
I dose	1 (25.0)	3 (75.1)	4
II dose	2 (33.3)	4 (66.7)	6
III dose	2 (33.3)	4 (66.7)	6
IV dose	36 (55.4)	29 (44.6)	65

Table 3. Characteristics of patients aged 0-3 months with suspected pertussis infection in the sentinel and hospital surveillance in the city of Novi Sad, October 2013- October 2014

Characteristic	Positive N=5 (%)	Negative N=11 (%)	Total N=16 (%)	Prevalence of confirmed cases	*P* Value[a]
Duration of cough in days, median (range)	16.0 (10-30)	7.0 (2-30)	12.0 (2-30)	NA	ND
Male	5 (100.0%)	3 (27.3%)	8 (50.0%)	62.5%	0.0257
PCR	4 (80.0)	9 (81.8)	13 (81.3)	30.8%	> 0.9999
Serology[b]	1 (20.0)	2 (18.2)	3 (18.7)	33.3%	
Cough and coryza with no or minimal fever **plus:**					
Whoop	2 (40.0%)	5 (45.5%)	7 (43.8 %)	28.6%	> 0.9999
Apnoea	3 (60.0%)	0 (-)	3 (18.8%)	100.0%	**0.0179**
Post-tussive emesis	1 (20.0%)	6 (54.5%)	7 (43.8%)	14.3%	0.3077
Cyanosis	1 (20.0%)	4 (36.4%)	5 (31.3%)	20.0%	0.6223
Seizure	1 (20.0%)	0 (-)	1 (6.3%)	100.0%	0.3125
Pneumonia	3 (60.0%)	2 (18.2%)	5 (31.3%)	60.0%	0.2446
Close exposure with person with a prolonged afebrile cough illness	1 (20.0%)	1 (9.1%)	2 (12.5%)	50.0%	0.5417
Whoop + apnoea	1 (20.0%)	0 (-)	1 (6.3%)	100.0%	0.3125
Whoop + post-tussive emesis	0 (-)	2 (18.2%)	2 (12.5%)	NA	> 0.9999
Whoop + cyanosis	0 (-)	2 (18.2%)	2 (12.5%)	NA	> 0.9999
Whoop + seizure	0 (-)	0 (-)	0 (-)	NA	ND
Whoop + pneumonia	0 (-)	0 (-)	0 (-)	NA	ND
Whoop + close exposure to an adolescent or adult (usually a family member) with a prolonged afebrile cough illness	0 (-)	0 (-)	0 (-)	NA	ND
Whoop + apnoea + post-tussive emesis + cyanosis + seizure + pneumonia + close exposure to an adolescent or adult (usually a family member) with a prolonged afebrile cough illness	0 (-)	0 (-)	0 (-)	NA	ND

NA- not applicable; ND: not determined; PCR: polymerase chain reaction; Statistically significant p values are shown in bold.

[a] Two-tailed Fisher's exact test.

[b] Tested with immunoglobulin G pertussis toxin test only if ≥1 year post-pertussis vaccination

Table 4. Characteristics of patients aged 4m-9 years with suspected pertussis infection in the sentinel and hospital surveillance in the city of Novi Sad, October 2013- October 2014

	Sentinel surveillance					Hospital surveillance					
Characteristic	Positive N=15 (%)	Negative N=58 (%)	Total N=73 (%)	Prevalence of confirmed cases (%)	*P* Value [a,b]	Positive N=19 (%)	Negative N=32 (%)	Total N=51 (%)	Prevalence of confirmed cases (%)	*P* Value [a,b]	*P* Value [a,c]
Duration of cough in days, median (range)	20.0 (3-45)	24.5 (4-100)	23.0 (3-100)	NA	0.0663 [d]	30.0 (6-90)	21.0 (2-90)	22.0 (2-90)	NA	0.2054[d]	**0.0443**[d]
Male	4 (26.7%)	25 (43.1%)	29 (39.7%)	13.8%	0.3756	9 (47.4%)	15 (46.9%)	24 (47.1%)	37.5%	> 0.9999	0.2955
Female	11 (73.3%)	33 (56.9%)	44 (60.3%)	25.0%		10 (52.6%)	17 (53.1%)	27 (52.9%)	37.0%		
PCR	7 (46.7%)	21 (36.2%)	28 (38.4%)	25.0%	0.5548	3 (15.8%)	17 (53.1%)	20 (39.2%)	15.0%	0.2598	0.1510
Serology[e]	8 (53.3%)	37 (63.8%)	45 (61.6%)	17.8%		16 (84.2%)	15 (46.9%)	31 (60.8%)	51.6%		
Paroxysmal cough with no or minimal fever **plus:**											
Whoop	11 (73.3%)	21 (36.2%)	32 (43.8%)	34.4%	**0.0177**	12 (63.2%)	11 (34.4%)	23 (45.1%)	52.2%	0.0797	0.7152
Apnoea	1 (6.7%)	3 (5.2%)	4 (5.5%)	25.0%	> 0.9999	8 (42.1%)	1 (3.1%)	9 (17.6%)	88.9%	**0.0008**	**0.0408**
Post-tussive emesis	9 (60.0%)	13 (22.4%)	22 (30.1%)	40.9%	**0.0095**	12 (63.2%)	18 (56.3%)	30 (58.8%)	40.0%	0.7706	> 0.9999
Worsening of symptoms at night	10 (66.7%)	26 (44.8%)	36 (49.3%)	27.8%	0.1567	11 (57.9%)	11 (34.4%)	22 (43.1%)	50.0%	0.1453	0.7282
Pneumonia	0 (-)	5 (8.6%)	5 (6.8%)	NA	0.5763	1 (5.3%)	2 (6.3%)	3 (5.9%)	33.3%	> 0.9999	> 0.9999
Seizure	0 (-)	0 (-)	0 (-)	NA	ND	0 (-)	0 (-)	0 (-)	NA	ND	ND
Close exposure with person with a prolonged afebrile cough illness	6 (40.0%)	6 (10.3%)	12 (16.4%)	50.0%	**0.0128**	4 (21.1%)	4 (12.5%)	8 (15.7%)	50.0%	0.4502	0.2764
Whoop + apnoea	1 (6.7%)	3 (5.2%)	4 (5.5%)	25.0%	> 0.9999	6 (31.6%)	1 (3.1%)	7 (13.7%)	85.7%	**0.0079**	0.1039
Whoop + post-tussive emesis	7 (46.7%)	4 (6.9%)	11 (15.1%)	63.6%	**0.0016**	7 (36.8%)	6 (18.8%)	13 (25.5%)	53.8%	0.2878	0.7282

Whoop + worsening of symptoms at night	6 (40.0%)	10 (17.2%)	16 (21.9%)	37.5%	0.0804	6 (31.6%)	5 (15.6%)	11 (21.6%)	54.5%	0.4055	0.7241
Whoop + close exposure to an adolescent or adult (usually a family member) with a prolonged afebrile cough illness	5 (33.3%)	2 (3.4%)	7 (9.6%)	71.4%	**0.0032**	2 (10.5%)	2 (6.3%)	4 (7.8%)	50.0%	0.6229	0.1994
Post-tussive emesis + worsening of symptoms at night	8 (53.3%)	6 (10.3%)	14 (19.2%)	57.1%	**0.0008**	7 (36.8%)	7 (21.9%)	14 (27.5%)	50.0%	0.3335	0.4888
Post-tussive emesis + close exposure to an adolescent or adult (usually a family member) with a prolonged afebrile cough illness	3 (20.0%)	0 (-)	3 (4.1%)	100.0%	**0.0073**	4 (21.1%)	3 (9.4%)	7 (13.7%)	57.1%	0.4016	> 0.9999
Worsening of symptoms at night + close exposure to an adolescent or adult (usually a family member) with a prolonged afebrile cough illness	3 (20.0%)	2 (3.4%)	5 (6.8%)	60.0%	**0.0555**	3 (15.8%)	1 (3.1%)	4 (7.8%)	75.0%	0.1396	> 0.9999
Whoop + post-tussive emesis + worsening of symptoms at night	6 (40.0%)	2 (3.4%)	8 (11.0%)	75.0%	**0.0006**	4 (21.1%)	4 (12.5%)	8 (15.7%)	50.0%	0.4502	0.2764
Whoop + post-tussive emesis + worsening of symptoms at night + close exposure to an adolescent or adult (usually a family member) with a prolonged afebrile cough illness	2 (13.3%)	1 (1.7%)	3 (4.1%)	66.7%	0.1052	2 (10.5%)	0 (-)	2 (3.9%)	100.0%	0.1341	> 0.9999

NA-not applicable; NS-not significant; ND: not determined; PCR: polymerase chain reaction. Statistically significant p values are shown in bold.

[a] Two-tailed Fisher's exact test.

[b] Differences between number of positive and number of negative patients through certain surveillance systems.

[c] Differences between cough duration or frequency of certain symptoms among positive results of pertussis in the sentinel and certain symptoms among positive results in the hospital surveillance of pertussis.

[d] Wilcoxon rank sum test

[e] Tested with immunoglobulin G pertussis toxin test only if ≥1 year post-pertussis vaccination.

Table 5. Characteristics of patients aged 10 years and older with suspected pertussis infection in the sentinel and hospital surveillance in the city of Novi Sad, October 2013- October 2014

	Sentinel surveillance					Hospital surveillance					
Characteristic	Positive N=31 (%)	Negative N=104 (%)	Total N=135 (%)	Prevalence of confirmed cases (%)	*P* Value [a,b]	Positive N=33 (%)	Negative N=11 (%)	Total N=44 (%)	Prevalence of confirmed cases (%)	*P* Value [a,b]	*P* Value [a,c]
Duration of cough in days, median (range)	22.0 (14-60)	25.0 (14-200)	25.0 (14-200)	NA	0.6948[d]	30.0 (7-100)	30.0 (6-120)	30.0 (6-120)	NA	NA	0.3268[d]
Male	16 (51.6%)	35 (33.7%)	51 (37.8%)	31.4%	0.0914	15 (45.5%)	4 (36.4%)	19 (43.2%)	78.9%	0.7315	0.8027
Female	15 (48.4%)	69 (66.3%)	84 (62.2%)	17.9%		18 (54.5%)	7 (63.6%)	25 (56.8%)	72.0%		
PCR	10 (32.3%)	33 (31.7%)	43 (31.9%)	23.3%	> 0.9999	8 (24.2%)	4 (36.4%)	12 (27.3%)	66.7%	0.4569	0.5814
Serology[e]	21 (67.7%)	71 (68.3%)	92 (68.1%)	22.8%		25 (75.8%)	7 (63.6%)	32 (72.7%)	78.1%		
Nonproductive, paroxysmal cough of ≥2 weeks duration without fever **plus**:											
Whoop	22 (71.0%)	27 (25.9%)	49 (36.3%)	44.9%	**< 0.0001**	22 (66.7%)	5 (45.5%)	27 (61.4%)	81.5%	0.2887	0.7908
Apnoea	5 (16.1%)	3 (2.9%)	8 (5.9%)	62.5%	**0.0159**	9 (27.3%)	0 (-)	9 (20.5%)	100.0%	0.0849	0.3691
Sweating episodes between paroxysms	11 (35.5%)	50 (48.1%)	61 (45.2%)	18.0%	0.3040	13 (39.4 %)	5 (45.5%)	18 (40.9%)	72.2%	0.7375	0.8002
Post-tussive emesis	19 (61.3%)	19 (18.3%)	38 (28.1%)	50.0%	**< 0.0001**	9 (27.3 %)	4 (36.4%)	13 (29.5%)	69.2%	0.7058	**0.0111**
Worsening of symptoms at night	19 (61.3%)	51 (49.0%)	70 (51.9%)	27.1%	0.3062	28 (84.8%)	7 (63.6%)	35 (79.5%)	80.0%	0.1954	**0.0383**
Whoop + apnoea	4 (12.9%)	1 (1.0%)	5 (3.7%)	80.0%	**0.0099**	7 (21.2%)	0 (-)	7 (15.9%)	100.0%	0.1653	0.5119
Whoop + sweating episodes between paroxysms	8 (25.8%)	13 (12.5%)	21 (15.6%)	38.1%	0.0911	7 (21.2%)	2 (18.2%)	9 (20.5%)	77.8%	> 0.9999	0.7711
Whoop + worsening of symptoms at night	13 (41.9%)	12 (11.5%)	25 (18.5%)	52.0%	**0.0004**	19 (57.6%)	3 (27.3%)	22 (50.0%)	86.4%	0.1623	0.3171
Whoop + post-tussive emesis	12 (38.7%)	3 (2.9%)	15 (11.1%)	80.0%	**< 0.0001**	6 (18.2%)	2 (18.2%)	8 (18.2%)	75.0%	> 0.9999	0.0962
Sweating episodes between paroxysms + post-tussive emesis	7 (22.6%)	7 (6.7%)	14 (10.4%)	50.0%	**0.0183**	3 (9.1%)	1 (9.1%)	4 (9.1%)	75.0%	> 0.9999	0.1780
Sweating episodes between paroxysms + worsening of symptoms at night	5 (16.1%)	20 (19.2%)	25 (18.5%)	20.0%	0.7974	12 (36.4%)	2 (18.2%)	14 (31.8%)	85.7%	0.4565	0.0914
Post-tussive emesis + worsening of symptoms at night	10 (32.3%)	10 (9.6%)	20 (14.8%)	50.0%	**0.0038**	8 (24.2%)	3 (27.3%)	11 (25%)	72.7%	> 0.9999	0.5814

Apnoea + post-tussive emesis	5 (16.1%)	1 (1.0%)	6 (4.4%)	83.3%	**0.0025**	2 (6.1%)	0 (-)	2 (4.5%)	100.0%	> 0.9999	0.2499
Apnoea + sweating episodes between paroxysms	1 (3.2%)	3 (2.9%)	4 (3.0%)	25.0%	> 0.9999	1 (3.0%)	0 (-)	1 (2.3%)	100.0%	> 0.9999	> 0.9999
Apnoea + worsening of symptoms at night	3 (9.7%)	3 (2.9%)	6 (4.4%)	50.0%	0.1339	6 (18.2%)	0 (-)	6 (13.6%)	100.0%	0.3114	0.4764
Whoop + sweating episodes between paroxysms + worsening of symptoms at night	3 (9.7%)	5 (4.8%)	8 (5.9%)	37.5%	0.3842	7 (21.2%)	1 (9.1%)	8 (18.2%)	87.5%	0.6563	0.3048
Whoop + sweating episodes between paroxysms + post-tussive emesis	5 (16.1%)	1 (1.0%)	6 (4.4%)	83.3%	**0.0025**	2 (6.1%)	1 (9.1%)	3 (6.8%)	66.7%	> 0.9999	0.2499
Whoop + worsening of symptoms at night + post-tussive emesis	6 (19.4%)	2 (1.9%)	8 (5.9%)	75.0%	**0.0019**	6 (18.2%)	1 (9.1%)	7 (15.9%)	85.7%	0.6594	> 0.9999
Apnoea + sweating episodes between paroxysms + post-tussive emesis	1 (3.2%)	1 (1.0%)	2 (1.5%)	50.0%	0.4079	0 (-)	0 (-)	0 (-)	ND	NA	ND
Apnoea + sweating episodes between paroxysms + worsening of symptoms at night	0 (-)	2 (1.9%)	2 (1.5%)	ND	> 0.9999	1 (3.0%)	0 (-)	1 (2.3%)	100.0%	> 0.9999	ND
Apnoea + worsening of symptoms at night + post-tussive emesis	3 (9.7%)	0 (-)	3 (2.2%)	100.0%	**0.0112**	1 (3.0%)	0 (-)	1 (2.3%)	100.0%	> 0.9999	0.3474
Sweating episodes between paroxysms + post-tussive emesis + worsening of symptoms at night	2 (6.5%)	3 (2.9%)	5 (3.7%)	40.0%	0.3236	4 (12.1%)	0 (-)	4 (9.1%)	100.0%	0.5581	0.6729
Whoop + sweating episodes between paroxysms + post-tussive emesis + worsening of symptoms at night	2 (6.5%)	0 (-)	2 (1.5%)	100.0%	0.0514	2 (6.1%)	0 (-)	2 (4.5%)	100.0%	> 0.9999	> 0.9999
Whoop + apnea + sweating episodes between paroxysms + post-tussive emesis + worsening of symptoms at night	0 (-)	0 (-)	0 (-)	ND	NA	0 (-)	0 (-)	0 (-)	ND	NA	NA

NA-not applicable; NS-not significant; ND: not determined; PCR: polymerase chain reaction. Statistically significant p values are shown in bold.

[a] Two-tailed Fisher's exact test.

[b] Differences between number of positive and number of negative patients through certain surveillance systems.

[c] Differences between cough duration or frequency of certain symptoms among positive results of pertussis in the sentinel and certain symptoms among positive results in the hospital surveillance of pertussis.

[d] Wilcoxon rank sum test

[e] Tested with immunoglobulin G pertussis toxin test only if ≥1 year post-pertussis vaccination.

3. PREVENTION AND CONTROL THE SPREAD OF MULTIDRAG-RESISTANT PATHOGENS IN HOSPITAL

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Objectives:
Healthcare-associated infections (HAIs)–infections patients can get while receiving medical treatment in a healthcare facility–are a major, yet often preventable, threat to patient safety. Together with health care and public health partners, CDC is working to bring increased attention to HAIs and prevention (1). The period from 1950 to 1960 was truly the golden age of antibiotic discovery, as one-half of the drugs commonly used today were discovered in this period. Unfortunately, the increasing use of antibiotics for human and nontherapeutic animal use (growth promotion) led all too soon to the development of resistant bacterial pathogens (2).
World Economic Forum (WEF) concluded that "arguably the greatest risk to human health comes in the form of antibiotic-resistant bacteria. We live in a bacterial world where we will never be able to stay ahead of the mutation curve. A test of our resilience is how far behind the curve we allow ourselves to fall (3,4).
Antibiotic resistance has occurred in our lifetimes. Within two to three years after the introduction of a new antibiotic treatment, resistance usually develops (although there have been a few notable exceptions – penicillin resistance in streptococci, for example). This is nowhere more apparent than in the steady evolution of beta-lactamases (enzymes that detoxify the beta-lactam antibiotics) by point mutation under the selective pressure of successive introductions of new beta-lactamase-resistant penicillins, cephalosporins, carbapenems and monobactams (5).
Infections caused by bacterial organisms resistant to most available antibiotics, called multi-drug resistant organisms (MDRO). The following document aims to provide information and guidance on how to control the spread of these bacteria inside and outside the hospital both on a local and on a national level. Transmission of MDROs tends to occur most frequently in acute care facilities, although all healthcare facilities may be affected (6,7,8).
HAIs are a major problem in hospitals around the world. A particular problem is the resistance of HAIs to antimicrobial agents, and the occurrence of MDRO ofHAIs causing problems in daily work of clinicians and narrower choice of antibiotics that can be used in the treatment of these infections (7,8).

Method:
1.Centers for Disease Control and Prevention, Management of Multidrug-Resistant Organisms In Healthcare Settings, www.cdc.gov/getsmart/healthcare. 2. Centers for Disease Control and Prevention, Management of Multidrug-Resistant Organisms In Healthcare Settings, www.cdc.gov/getsmart/healthcare.Page last updated: October 18, 2016.

Results:
The various types of interventions used to control MDROs may be grouped into several categories. These include judicious use of antimicrobials, surveillance (routine and enhanced), standard and contact precautions, education and decolonization. Surveillance is a important component of any MDRO control program, allowing detection of newly emerging pathogens, monitoring epidemiologic trends, and measuring the effectiveness of interventions. Multiple MDRO surveillance strategies have been employed, ranging from

surveillance of clinical microbiology laboratory results obtained as part of routine clinical practis.

Discusion:

Today we can list a number of organisms in hospitals and the community that thwart treatment because they are resistant to not one, but to many different antibiotics.The physicians attending medical school 20–30 years ago probably did not even discuss these organisms as important pathogens, though today they cause prominent, even potentially lethal, problems in hospitals worldwide (9).

An important distinction in the epidemiology of MDRO is made between infection and colonization. Infection is characterized by serious illness when MDRO contaminate wounds, the bloodstream, or other tissues. In contrast, colonization with MDRO may occur in the gut, nasal cavities, or other body surfaces(10).

Colonization through human-to-human transmission of MDRO may be just as important to the increasing frequency of resistant infections. Each carrier in the unit increases the risk of infection for other patients, long-term increases in the risk of infection may reflect the increasing number colonized on admission. Because colonization is generally harmless, the importance of transmission and carriage among healthy people has been largely neglected (11).

The global dissemination of antibiotic-resistant bacteria has received much attention, particularly over the last 100 years, following reports of the international spread of multi-resistant Streptococcus, meticillin-resistant Staphylococcus aureus (MRSA) (12,13), and resistant Enterobacteriaceae, particularly strains resistant to cephalosporins due to the production of CTX-M type extended-spectrum b-lactamases and strains producing carbapenemases (14).

Acinetobacterbaumannii is a serious and emerging nosocomial pathogen, also. Initially regarded as of little clinical significance, it is now being isolated more frequently, particularly in intensive care settings where it is a cause of serious infections such as ventilator-associated pneumonia, bloodstream infection, urinary tract infection, meningitis and wound infection (15).

The increase and spread of MDRO Gram-negative bacteria, including *Enterobacteriaceae*, *Pseudomonas* and *Acinetobacter* species, have become major concerns worldwide. Although the frequent misuse of antibiotic drugs has greatly contributed to worldwide antibiotic resistance by causing a large dispersal of resistance determinants, recent studies demonstrate that these resistance determinants could have emerged from ancient or environmental sources. Moreover, during the last 10 years, we have been witnessing the emergence and development of technologies for high-throughput sequencing, coinciding with an exponential increase in the number of bacterial genomes sequenced. These sequencing technologies allow a complete study of MDR bacterial genomes and are the best way to investigate the genetic determinants of antimicrobial resistance (16).

Prevention and control of MDRO transmission include: improvements in hand hygiene, use of contact precautions until patients are culture negative for a target MDRO, active surveillance cultures (ASC), education, enhanced environmental cleaning, and improvements in communication about patients with MDROs within and between health care facilities. The various types of interventions used to control or eradicate MDROs may be grouped into 7 categories. These include administrative support, judicious use of antimicrobials, surveillance (routine and enhanced), standard and contact precautions, environmental measures, education, and decolonization (17).

Hospital infection control is expensive, and the costs are shouldered entirely by hospitals. Hospitals may reduce the prevalence of MDRO rapidly through improved hospital infection control to a certain point, but larger, long-term reductions in prevalence may require a

reduction in the carriage rate in the catchment population. Such changes may require decades (18). The benefits of effective infection control and the costs of poor infection control extend beyond a single hospital. A successful public health response to the antibiotic resistance epidemic must recognize that colonization with MDO is a sort of pollution. Policies to control resistance should be coordinated (18,19).

Conclusion:Preventing infections will reduce the burden of MDROs in healthcare settings. Prevention of antimicrobial resistance depends on appropriate clinical practices that should be incorporated into all routine patient care.

Keywords: MDRO, prevention, epidemiology

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ORAL PRESENTATIONS

1. RESULTS OF IMPLEMENTACION IMMUNIZATION PROGRAM IN SERBIAN AREAS OF KOSOVO AND METOHIJA

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Objectives: The aim of this paper is to present and analyze the results of the implementation of mandatory immunization programs in the Serbian areas of Kosovo and Metohija in 2016, and point out the problems and challenges of obligatory immunization in this area.
Material and Methods: A descriptive epidemiological method was used, and the analysis was made on the basis of the annual report of the Public Health Institute Kosovska Mitrovica on the conducted immunization.
Results: Preventive disease vaccines still account for about 3 million lives per year, accounting for around 5% of the total number of deaths globally. The WHO is launching the Extended Immunization Program (EPI) in 1974 with the goal of all children in the world being vaccinated against frequent and deadly diseases. The coverage of mandatoty vaccines in Serbian areas in Kosovo and Metohia is the highest in the BCG vaccine, 98.6% and the smallest coverage is MMR vaccine (82.1%), the largest coverage is in Kosovska Mitrovica (75.84%), and the lowest coverage is in Zubin Potok (55.5%). The coverage of polio and DTP vaccine is 91.2%. The program of immunization in Serbia has goals that every child is vaccinated with all the mandatory vaccines, in order to achieve a high degree of collective immunity and prevent the illness and epidemic reporting of diseases that can be prevented by vaccines.
Conclusion: In order to have a high coverage of the immunized population in the future, we need to ensure timely availability and unhindered procurement of vaccines.Very important is to provide continuous implementation of immunization and achievement of the necessary collective immunity in the Serbian communities of Kosovo and Metohija, as well as constant education of both medical staff and the population.

Keywords: Immunization program, vaccination,Serbian areas, Kosovo and Metohija

2. REGISTERED VECTOR-BORNE DISEASES IN MONTENEGRO 2006-2015

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Introduction: Vector-borne diseases tightly connected with environmentrepresent example of the negative climate change impact on public health. Following diseases from this group are registered in Montenegro: Lyme disease, Leishmaniosis, malaria and West Nile virus disease.
Aim:Exploring epidemiological characteristics of the vector-borne diseases in Montenegro for the referring period.
Materials and Method: Descriptive epidemiological method was used for this study. Data sources were communicable diseases' notification records, epidemiological questionnaires and microbiology laboratory results.
Results: Lyme disease is the most commonly registered disease in this group making 60% of all cases (64 cases-1,03/100.000). Incidence was from 0,3/100.000 (2 cases 2010) to 0,5/100.000 (13 cases 2008).The largest number of the cases was among 20-59 age (61%). The highest incidence rate was registered in Herceg Novi (3,56/100 000).Leishmaniosisis the second most commonly registered disease from this group(27,4%of all cases). Incidence rate was between 0,1/100.000 (2007 and 2010 – 1 registered case) to 0,8/100.000 (2015 - 5 cases). The highest incidence rate was registered inPlužine (3,09/100.000).In the referring period 8 cases of imported malaria were registered– 0,13/100 000in Montenegro (7,5%of all cases), while number of West Nile virus disease registered cases was 5 - 0,08/100.000.The largest number of vector-borne disease cases was registered in summer.
Conclusion: Vector-borne diseases in Montenegro occur as endemic and sporadic. All registered malaria cases were imported. In order to prevent and control vector-borne diseases basic measures continue to be: vectors control, detection and treatment of cases and the treatment and control of animal reservoirs. It is necessary to improve intersectoral cooperation and education on all levels.

Keywords: Vector-borne diseases, Incidence, Montenegro

3. EPIDEMIOLOGICAL CHARACTERISTICS OF LEPTOSPIROSIS IN TUZLA CANTON BETWEEN YEAR 2010 AND 2015

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Introduction: Leptospirosis is acute septicemic infectious diseases of humans and animals caused by the microorganisms of the genus Leptospira. The disease occurs all over the world, especially in the river valleys. L.ichterohaemorrhagica, L.pomona, L.pyrogenes, L.grippotyphosa, L.sejroe are particularly important in our area. Reservoirs and sources of infection are rodents and domestic animals. Human infection is caused by direct or indirect contact with domestic or wildlife, especially rodents. The disease has a seasonal character with the highest number of patients in the summer or during floods. The disease usually has a benign course and rarely manifests itself as a more severe disease with damage to the liver, kidneys and brain envelopes with possible lethal outcome.

Material and Methods: Authors aimed to show the epidemiological characteristics of leptospirosis patients in Tuzla canton in period between 2010-2015 through retrospective death and illness from infectious disease reportdata analysis.

Results: During the analyzed period, there were 135 persons suffering from leptospirosis registered in all of 13 municipalities of Tuzla Canton. The biggest number of persons suffering from leptospirosis is registered during the year 2014 (66/135, 48.9%) when the Tuzla Canton area was affected by elemental flood disasterson two occasions (May, August),especially in the Spreca and Tinja river basin. Thelowest number of persons suffering from leptospirosis is registered during the year 2013 (2/135, 1.5%).The largest number of patients is registeredin the municipalities of Srebrenik (30/135: 22.2%), Zivinice (24/135, 17.8%), Tuzla (17/135: 12.6%) and Gracanica (16/135, 11.8%). During the year 2014 two deaths and fatalities were recorded (1.48 %). The illness occurred throughout the year with a marked increase in the number of patients in the fall months (IX, X) when 34.8% of cases were recorded and with the least number of patients during the spring (III, IV) - 2.9%. Men (72.5%) and persons over 25 years old (97%) are the population most affected, while cases of illness are not recorded in children under 14 years of age.

Conclusion: After an elemental disaster in the Tuzla Canton area the number of people suffering from leptospirosis was increased comparing to the number of patients in previous years, especially during the fall months. The most affected population ismen workers living near big rivers.

Keywords: leptospirosis, flood, Tuzla Canton.

4. WEST NILE VIRUS INFECTION IN POPULATION OF BELGRADE, 2012-2016

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Objective: The study analyzes the epidemiological features of West Nile virus (WNV) infection in population of Belgrade for the period 2012-2016.
Method: The incidence of WNV infection were analyzed in this descriptive study. In analyzing the data, the crude and age-specific and standardized incidence rates were used.The standardization is carried out by the direct method, using the world population as a standard.
Results: In total, 346 cases of WNVinfection (256-neuroinvasive infection, 90-fever) where identified, of thom 32 (9.2%) died. The highest average age-specific incidence rates in the age group ≤70 years were registered (19.8/100,000 men and 9.7/100,000 women). The average standardized incidence rate was 2.1 per 100,000 inhabitants (2.3/100,000 men and 1.9/100,000 women).The average standardized incidence rates for rural municipalities (3.6/100,000 population) was higher than for urban (1.9/100,000 population). Peak occurrence of WNV infection in the reporting period was in August (56.6%). The average case fatality rate was 8.7%.
Conclusion: WNV infection in Belgrade can have serious consequences for public health. There is a possibility of underreporting because the milder forms of the disease are not laboratory research and may remain unrecognized. Prevention of WNV infection requires a multidisciplinary approach, continuous engagement and cooperation of veterinary and health services.

Keywords: West Nile virus infection, incidence rate, case fatality rate, Belgrade

5. SHOULD WE BLAME „ADVANCE IN TECHNOLOGY“ FOR INCREASED NUMBER OF NEW HIV INFECTED GAY MALES IN SERBIA?

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Since the introduction of the Internet (as we know it today), gay males met each other using chat rooms, similar to „Serbiancafe“, „Gayromeo“etc. That ment that every meeting required some kind of logistics, eg. had to be scheduled from home. Starting 2009, new application Grindr (https://en.wikipedia.org/wiki/Grindr), become most popular connecting platform. Last several years, smart phones developed into “must have” for (almost) every gay male and application on their phones simplified logistics of scheduling encounters and even made it more fun.

Objective is to show that even though those apps are advertised as general networking platforms, they actually are explicit sexual networking tools carrying extremely high risk.

Methods and results: In the period January - December of 2016, individual interviews of 477 gay males who were tested on HIV in the VCCT Center of Institute for Student’s Health of Belgrade, revealed that in the last year 74% of them met their sexual partners using Grindr. Out of 477 tested gay males, 29 were HIV positive (6,085), and out of those 29 newlyinfected, 93% or 27 individuals, met their sexual partners over the Grinder. Results of conversations in focus groups showed that Grinder app not only locate and show actual distance of the potential partner, but also arouse extreme curiosity, allowing easy ad hock encounters, multiple encounters in the same day, “threesome”, etc.

Conclusion: Any future intervention in public health against spread of HIV infections, should have answer to this kind of “Technological advance”.

Keywords: mobile application Grindr, newlyinfected gay males in Serbia

6. EPIDEMIOLOGICAL, CLINICAL AND PATHOHISTOLOGICAL CHARACTERISTICS OF PATIENTS WITH CHRONIC HEPATITIS B

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Introduction: **Hepatitis B virus** can cause the occurrence of both acute and chronic forms of hepatitis B (CHB). Primary infection may result in the development of persistent infection in 10% of patients. Chronic hepatitis B (CHB), liver cirrhosis, or hepatocellular carcinoma are responsible for about one million deaths worldwide each year.
Aim of the paper: To examine the relationship of epidemiological and clinical characteristics of CHB with histopathological finding of the liver.
Material and methods: The study enrolled 71consecutive patients treated at the Infectious Disease Clinic, Clinical Center Niš, in the period from May 2014 to May 2016. The diagnosis of CHB was established according to serological and biochemical tests and liver biopsy. Data sources included the surveys and histories of patients' diseases. The method of descriptive epidemiology was applied. Student's *t* test, X^2 test and Fisher's test ($p< 0.05$) were used in data analysis.
Results: During the observation period 71 consecutive patients were registered (58 male patients and 11 female patients), mean age of 38.75 ± 14.83 years (the youngest patient was 10 years old and the oldest patient was 68 years old). Males were older than females for 5.85 years. The greatest number of patients was from urban areas (59 subjects – 83.09%), aged between 31 and 50 years. The prevalence of HBeAg positive CHB was significantly higher in all age groups (64 patients – 90.14 %), while the prevalence of HBeAg negative CHB was lower (5 patients – 7.04 %, over 50 years of age). Anamnestic data did not reveal the routes of transmission in about half of all cases from the cirrhotic group, whereas anamnestically established transfusions and dental interventions/surgeries as routes of transmission were accounted for 20 % and 45 % respectively (Fisher's test, $p<0.05$). In other groups with different degrees of fibrosis, the most common routes of transmission were dental intervention and dental surgeries, unknown route and sexual contact (28.6: 25:16.7 %; Fisher's test, $p<0.05$),while the other modes of transmission included professional risk, tattooing, and household contact (9.1:8.2:14.1 %; Fisher's test, $p<0.05$). In the group without fibrosis, the mode of transmission was mostly unknown (43.1%), while established modes included dental intervention and surgeries, accidental prick, sexual contact, household contact, and hemodialysis (23.5:12.5:8.3:8.3:4.5 %; Fisher's test, $p<0.05$).
Clinical symptoms and signs present in more than half of the cases in the groups with fibrosis included exhaustion and pain under the right rib arch, hepatomegaly was registered in one third of cases in the group without fibrosis, while splenomegaly was present only in groups with advanced fibrosis and cirrhosis.
Conclusion: The study suggests that dental interventions and surgeries could be the most common anamnestically established modes of transmission in CHB, as well as a significant route of transmission in the process of liver fibrosis. Due to CHB course and its severe complications, special attention should be paid to immunization and eradication of HBV infection.

Keywords: Chronic hepatitis B, epidemiological, clinical and pathohistological characteristics of the liver, immunization

POSTER PRESENTATIONS

1. INTEGRATED HEALTH INFORMATION SYSTEM IN THE FUNCTION OF IMPROVING THE QUALITY OF THE NOTIFICATION SYSTEM FOR INFECTIOUS DISEASES

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Objectives: The purpose of this analysis was to examine the basic characteristics of reporting diseases from infectious diseases, and the impact of daily active monitoring of infectious disease reporting, using the EHR. The timeliness and efficiency of reporting are monitored, on the population of Belgrade, in the period from 2012 to 2016. In the paper we recommend the most optimal way of organization with increasing the efficiency of reporting infectious diseases.
Materials and methods: In this study a descriptive epidemiological method was used. The area covered by the research is the city of Belgrade in period from 2012 to 2016. Data on the number of infectious diseases reported by municipalities were collected from the published material of the City Bureau of Statistics. For the analysis of the disease, rates of illness were used on estimated numbers of inhabitants in Belgrade by age and sex, according to the 2002 census methodology
Results: In the observed period, the Primary health care center "Voždovac" reported each year with individual reports of diseases from infectious diseases, several times more illness, compared to the number of applications from other territory of the city of Belgrade.
The rate of illness from infectious diseases for Vozdovac is significantly higher than for other municipalities of similar or higher number of inhabitants.
Conclusion: Using the EHR and LAN intranet network in active surveillance of infectious disease reporting, information is obtained much faster, more precisely and most importantly in time
Recommendation: An integrated health information system provides an opportunity to improve the quality of the reporting system for communicable diseases.

Keywords: Integrated health information system, registration of infectious diseases

2. ESTIMATION OF NEED FOR SPECIALISTS IN THE FIELD OF EPIDEMIOLOGY FOR PUBLIC HEALTH SYSTEMS OF REPUBLIC OF SERBIA

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Objectives: To analyze degree of implementation of propositions from Rule Book and derive minimum number of epidemiologists that should be engaged in the Center for Diseases Control, as well as to estimate number of epidemiologists in next five years.
Materials and methods: For the purpose of this analysis two types of information are used: information about population and information about specialists in the field of epidemiology. Information about population is taken from National Bureau of Statistics of Republic of Serbia. Information about specialists in the field of epidemiology is taken from the Center for Statistics of Public Health Institute.
Analysis uses methods of descriptive research.
Results: On the basis of propositions given in the Rule Book minimum number of epidemiologists engaged in Public Health System of Republic of Serbia should be 160.
Currently, in the year 2017, number of engaged epidemiologists in Public Health System is 119. Having in mind current number of students in the field of epidemiology and number of currently engaged epidemiologists that will be retired after 2020, it can be shown that the number of epidemiologists engaged in Public Health System of Republic of Serbia will be around 93.
Conclusion: As a conclusion of aforementioned analysis it can be said that the number of epidemiologists that are engaged in Public Health facilities responsible for monitoring, prevention and control of infectious diseases is lower than it is proposed by the Rule Book, and the estimated number of epidemiologists in the year 2020 will by nearly twice as low than the one proposed by the Rule Book.

Keywords: Human resource management, epidemiologists

3. IMPORTANCE OF THE HEPATITIS C VIRUS INFECTION IN THE EPIDEMIOLOGY OF THE HEPATOCELLULAR CARCINOMA

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Introduction: Hepatocelular carcinoma (HCC) is one of the most common tumors in the world, with estimated 750 000 deaths annually. It most commonly occurs in China, sub-Saharan Africa and South-East Asia, accounting for 80% of all liver tumors. Men have 3 times more chances for HCC comparing to women. HCC etiology can be infectious (hepatitis B virus, C, etc.) and non-infectious (various toxic substances, etc.). Hepatitis C (HCV) infection is a serious global health problem, and 75 to 85% of the patients suffer chronic disease, 27% cirrhosis and 25% develop HCC. People with HCV infection have 20 times more chance of developing HCC than without it, with an incidence of 1-3%.
Methods and Patients: 86 patients with chronic HCV infection from 2011 - 2014 were tested at the Clinic for Infectious Diseases in Nis. Diagnosis was established by epidemiological, clinical, laboratory and PH analysis.
Results: The pattern of forming of the HCV infection has been shown in two patients. There were 52 (60.5%) male and 34 (39.5%) female patients. Seventy (81.4%) were treated with the antiviral therapy. The age of the patients ranged from 14 to 74 years. Professional orientations of the patients differed. Genotyping presented the dominance of the genotype 1, forty nine (56.9%) followed by genotype 3 with 23 (26.7%), genotype 2 with 8 (9.3%) and combined genotypes in 6 patients (6.9%). During the three-year period, 3 (3.48%) of HCC patients, two male and one female were registered. The age of the patients ranged from age 52 to 78 years. In two patients, HCC was proven during the first hospitalization, and in the third one after the outbreak of antiviral therapy. HCC patients had genotype 1 in 2 cases and one patients had genotype 3.
Conclusion: HCC was registered with 3 (3.48%) patients. In two patients HCC was registered at the terminal stage of the disease and they had genotype 1.

Keywords: hepatocellular carcinoma, Viral C hepatitis, genotyping, liver cirrhosis

4. BLOOD STREAM INFECTIONS CAUSED BY ACINETOBACTER SPP. IN THE HEALTCARE SETTINGS OF VOJVODINA PROVINCE IN THE PERIOD FROM 2013 TO 2015

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Objectives: To determine antibiotic resistance patterns and characteristics of patients aged 18 years and older with bloodstream infections (BSI) caused by Acinetobacter spp. in the healthcare settings in Vojvodina from 2013 to 2015.
Materials and methods: A descriptive epidemiological study was used. The rates of antimicrobial resistance ofprimoisolates(only the first isolate from blood were included) of Acinetobacter spp. were analyzed using standard biochemical methods and the Vitek 2 automated system. Multidrug resistance was defined as resistance to ≥3 classes of antimicrobial agents. Demographical and clinical characteristics of patients with BSI caused by Acinetobacter spp. were collected by special designed epidemiological questionnaire.
Results: During the observed period, overall 204 patients developed BSI caused by Acinetobacter spp.In 196 patients (96,1%), the infection was caused by multi-drug resistant (MDR) strains of Acinetobacter.The majority (71.1%) of infections were acquired in the intensive care units (ICU).The mean age of the patients was 57.3 ± 15.7 years. The majority of patients were males (64.2%), with a history of previous hospitalization (71.1%), and comorbidities(67.6%). The average value of Charlson comorbidity index was 3.08 ± 2.01.The previous use of invasive procedures were registered in 202 (99%) patients, while the previous administration of antibiotics were observed in 188 (92.2%) patients. The lethal outcome occurred in 112 (54.9%) patients.
Conclusion: Increased use of invasive procedures and high antibiotic consumption contribute to high percentage of MDR of Acinetobacter spp. in ours hospitals. Prudent use of antimicrobial agents and comprehensive infection control practicesare the cornerstones of effective prevention and control efforts aimed at reducing the selection and transmission of this resistant bacteria.

Keywords: Acinetobacter spp.; Bacteremia; Drug Resistance;Intensive Care Units

5. MMR VACCINATION IMPLEMENTATION RESULTS IN THE NORTH DISTRICT OF BAČKA FOR THE PERIOD 2007-2017

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Introduction: The European Region of the WHO is currently in the process of eliminating morbilli and rubella, also known as Congenital rubella syndrome – CRS. In order to eliminate the above mentioned diseases, as well as to control parotitis, it is necessary to achieve high vaccination coverage against morbilli, parotitis and rubella (MMR vaccination), higher than 95%, which will provide good collective immunity.
Objective: Results analysis of the implementation of the immunization program in North Bačka district based on the incidence movement and achieved vaccination coverage against morbilli, parotitis and rubella in the period from 2007 to 2016.
Material and methods: As a source of data reports of contagious diseases were used, reports of contagious diseases epidemics and registered morbilli, parotitis and rubella incidence in the period from 2007 to 2016. Immunization coverage was analyzed based on the annual reports on the implementation of immunization.
Results: In 2007, 4 morbilli cases were registered (Inc.2.2/100000), and in 2015 morbilli epidemic that counted 8 patients (Inc.4.4/100000). In 2007, 2 persons suffered from parotitis (Inc.1.1/100000), in 2012 parotitis epidemic was registered with 128 patients (Inc.71.1/100000), and in 2014 there was one parotitis patient (Inc.0.6/100000). In the analyzed period cases of rubella disease were not registered. MMR vaccination coverage for both vaccination and revaccination ranged from the lowest 93.27% (93.35) in 2015, to the highest, max. 100%, recorded in 2007.
Conclusion: Due to the occasional problems with MMR vaccine supply, as well as shattered public confidence in vaccination caused by certain anti-vaccination movements, a vaccination coverage decrease was noted under protective line of 95%, which resulted in the emergence of the mentioned diseases in the epidemic form.

Keywords: Vaccination, MMR vaccine, incidence, epidemic

6. SOME MENTAL HEALTH SCORE VARIABLES IN CHRONIC HEPATITIS C PATIENTS

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The aim of this paper is to determine the differences in the mental health of chronic hepatitis C (HHC) patients compared to the period before the diagnosis of the disease.
Material and methods: The research was conducted as a cross sectional study, at the Clinic for Infectious Diseases, Clinical Center Nis. Using structured questionnaires, socio-demographic characteristics and some behavioral characteristics were examined. An SF 36 questionnaire was used to examine the mental component of quality of life. Statistical analysis of the obtained results was done on the computer in the SPSS program package, version 16.0. **Results**: 154 patients (95 male and 59 female) completed the questionnaire completely. There was a statistically significant difference in the assessment of the quality of mental health. All the examined parameters showed a high significance: feeling nervous (Z = 6,074, p <0,001), indisposition (Z = 5,229, p <0,001), feeling relaxed and calm (Z = 6,113, p <0,001), feeling depressed (Z = 5.494, p <0.001), feeling of happiness (Z = 6.251, p <0.001). The highest percentage of changes in the duration of the feeling `after diagnosis` of 22.73% was recorded in people who had never been unsettled before and for those who were happy most of the time - 19.48%. Univariant regression analysis showed that older HHC diagnosed patients had higher scores (Beta = 0.168, p = 0.03) and that users of psychoactive substances (PAS) had lower scores (Beta = -2.262, p = 0.001). Multivariate regression analysis found that none of the examined variables had a statistically significant effect of the patients after HHC diagnosis. **Conclusion**: The study found that there was a decline in the quality of life in the field of mental health. Older age is a protective variable but consuming PAS is risk factor for mental health in the patients before the HHC diagnosis. None of the investigated variables were found as risk faktor, for mental health, after the HHC diagnosis. There is a need to improve preventive measures and promote healthy lifestyles among younger population.

Keywords: mental health, chronic hepatitis C, sociodemographic characteristics

SESSION: THEORETICAL AND PRACTICAL PROBLEMS OF NON-COMMUNICABLE DISEASE EPIDEMIOLOGY

INVITED LECTURE

RISK FACTORS FOR BREAST CANCER IN YOUNG WOMEN

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Abstract

Breast cancer is the most common type of cancer among women. The incidence is low at young age, but, the clinical and pathological profile of breast cancer in young women is significantly different than in older patients, with a predominance of unfavorable prognostic parameters; young women had lower 5-year overall survival and more common family history of breast cancer compared to older ones. The incidence of breast cancer in women under 35 years is between 2.7-12.5%, while in those below 40 years is between 4.5-42.5%. Although uncommon, breast cancer in young women is worthy a special attention due to the unique and complex issues that are raised.

Keywords: breast cancer, risk factors, young women

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ORAL PRESENTATIONS

1. TRENDS IN INCIDENCE AND MORTALITY RATES OF BLADDER CANCER IN CENTRAL SERBIA IN THE PERIOD FROM 1999 TO 2014

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Objectives: To analyze trends in incidence (IR) and mortality rates (MR) of bladder cancer (BC) in Central Serbia (CS), during the period 1999-2014.
Methods: Data for the period 1999-2014 were taken from The Public Health Institute of Serbia. Jointpoint regression analysis was used to estimate annual percent changes (APCs) and average annual percent changes (AAPCs) in IR and MR.
Results: In CS, BC was the 4th most commonly diagnosed cancer among males, and 8th among women. The average standardized IR (SIR) in men was 3.5 times higher than in women. There was a significant increase in SIR for BC in men (AAPC +2.1%, 1991-2014) and a non-significant increase of SIR in women (AAPC + 1.2%, 1999-2014). The average SMR in men was 4.1 times higher than in women. There was a non-significant increase in SMR for BC in men (AAPC +0.6%, 1999-2014). In men aged 75+, there was a significant average annual growth of age-specific MR by 1.8%. There was a significant decrease in SMR (APC-12.9%, 1999-2002) in females, followed by a significant increase (APC +2.6%, 2002-2014).
Conclusion: Growing trend in incidence and mortality of BC demands analytical studies in order to identify potential risk factors for this malignant cancer and to implement preventive measures.

Keywords: Bladder cancer, trend, incidence, mortality, joinpoint regression

2. INCIDENCE OF NON-MELANOMA SKIN CANCER IN THE POPULATION OF THE NIŠAVA DISTRICT

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Introduction. Non-melanoma skin cancer (NMSC) is the most common type of skin cancer in white population. It represents 65 to 80% of all skin cancers and it is associated with high morbidity and costs, low mortality and decreased quality of life. The objective of the paper was to determine incidence trend of NMSC in the Nišava District. **Method.** Data were retrospective analysed from 2005 to 2014. Data about incidence of NMSC were extracted from the Serbian Cancer Registry for the population of the Nišava District. Data about population originated from Censuses 2002 and 2011. Crude incidence rates were calculated per 100.000 inhabitans. Direct method of standardization was performed with the World population as a standard. Trend lines were estimated using linear regression. **Results.** The total number of new 1756 NMSC cases was registered (1136 in males and 620 in females). Male to female ratio of incidence was 1.8 vs 1. A significantly increasing incidence trend of NMSC both in males ($y=-2{,}926x+43{,}71$, $R^2=0{,}435$) and in females ($y=-2{,}303x+34{,}24$, $R^2 = 0{,}424$) was determined. Incidence rates were increased with age. NMSC were registered in all ages predominantly in the older age groups. The number of new cases was rapidly increasing after the 50 years of age. The highest incidence rates were in the municipalities Gadžin Han and Niš and the lowest in Svrljig and Ražanj. **Conclusion.** Presented findings showed the significantly increasing incidence trend of NMSC in population of the Nišava District. In order to prevent NMSC it is necessary to promote education campaigns to limit uncontrolled sun exposure. Measures of primary prevention and early detection of NMSC are needed.

Keywords: trend, incidence, non-melanoma skin cancer

3. PSYCHOSIS RISK SYNDROME

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In the literature, in addition to the term Psychosis Risk Syndrome (PRS) for PRS, the name of putative prodrome, Ultra High Risk Syndrome (UHRS) and Clinical High Risk Syndrome (CHRS*), At Risisk Mental State (ATRS)* is used. PRS was created by examining the prodromal phase of schizophrenia, but unlike penetration, which is a retrospective term and represents a stage in the development of the disease, PRS is associated with the prospective determination of the risk of psychosis.PRS is currently only applied at the level of research setup. Attenuated Psychosis Syndrome (APS) as part of PRS officially entered the DSM V classification in Adnex for further research, Section III in the framework of schizophrenia. The aforementioned concepts represent a combination of the dimensional and categorical model of disease determination. The PRS concept is essential for early intervention in psychosis and interventions in the PRS represent the level of secondary disease prevention. Identification of the PRS allows early diagnosis of the first episode of Psychosys (FEP) and therefore reduces the duration of untreated psychosis (DUP).Interventions in PRS are targeted at the Help Seeking Population, which suffers from non-specific disorders related to anxiety, depression, suicidality, aggression and the use of psychoactive substances. The work will be exposed to the PRS phases, the specific symptoms related to the same, measuring instruments of the same, will be especially exposed to APS in DSM V, the predictive validity of PRS, additional research that serves to increase the validity of PRS: genetic research, environmental impact, neuropsychological testing and therapy PRS.

Keywords: risk syndrome, psychosis

POSTER PRESENTATIONS

1. PUBLIC HEALTH APPROACH FOR IMPACT OF ORAL HEALTH ON QUALITY OF LIFE AMONG ADULT POPULATION ON THE TERRITORY OF CITY OF SKOPJE

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Oral health represents inseparable part of general health and wellbeing of the individual. Good oral health means repaired dentition and the absence of any kind of pain in that area. The problems might be in the area of functional and social inability, physical pain, physical bad condition, psychological problems. There is the need of implementing preventing programs for promoting better oral health among adult population.
Objectives: The aim of the article is to show the state of the mouth and teeth in the adult population from 19 to 50 years old, on the territory of Skopje and its impact on the quality of everyday life. There is need to be seen weather the habits, behavior, personal attitude, usual dental control of the mouth and teeth, impact the oral health and the quality of life.
Materials and methods: The survey was conducted in several representative dental offices in the territory of Skopje, where randomly 364 respondents were included in the study. They filled out the questionnaire (OHIP) and were reviewed by a dentist who noted the current state of teeth. They were divided into two groups, A and B, according to weather they visited the dentist in the last year, or not. Then the statistical processing of data in SPSS program was done.
Results: The results showed statistical significance of the difference between some variables, according to the responding to group A or group B. It showed that some socio-demographic characteristics are important factors for treatment and care of the individuals to oral health, the fear of dental intervention is the common reason for postponing the visit to the dentist, although a need of it. Some functional and behavioral factors impact the conclusion of the respondents, that the life is less quality, due to problems with teeth.
Out of 364 respondents, 159 (43.7%) are masculine, while 205 (56.3%) are female, out of them 58% are in group A, while 42% are in group B. ($p<0.05$) (Odds Ratio=2.109). According to the degree of education, out of 190 with the high degree of education, 60.5% belong to group A, while 39.5% belong to group B, Out of 163 with second level of education, 39.3% belong to group A, while 60.7% belong to group B. Out of 11 with low level of education, 27.3% belong to group A, while 72.7% belong to group B. ($p<0.05$)
Out of 118 respondents who have fear of dental intervention, 15.3% belong to group A, while 84.7% belong to group B. ($p<0.05$) (Odds Ratio=0.09). Out of 139 respondents who have difficulties with oral hygiene, 31.7% belong to group A, while 68.3% belong to group B. ($p<0.05$) (Odds Ratio=0.292). Out of 81 respondents that have general bad health due to dental problems, 25.9% belong to group A, while 74.1% belong to group B. ($p<0.05$) (Odds Ratio=0.265). Out of 151 respondents with the conclusion that life is less quality, due to problems with teeth, 35.1% belong to group A, while 64.9% belong to group B. ($p<0.05$) (Odds Ratio= 0.352). Mean value of teeth with caries in group A was 1.41, in group B, 3.41.
Mean value of filled teeth in group A was 8.4, in group B, 6.53. Mean value of extracted teeth in group A was 2.52, in group B was 6.52.
Conclusion This study show that the risk factors (gender, level of education, postponing the visit to dentist, problems with oral hygiene, problems with general health due to dental problems, less qualitative life due to problems with teeth) and the dental status noted by the dentist, have the positive correlation with the group A, or B.

Keywords: quality of life, oral health, risk factors

2. DISTRIBUTION OF SOME TYPES OF MALIGNANT NEOPLASMAS IN THE REGION OF EAST MACEDONIA – KOCHANI MUNICIPALITY

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The **objective** of this study was to determine the distribution and morbidity rate of malignant neoplasm's in patients in the region of Kochani municipality.**Method:**The research was conducted as a descriptive epidemiologic study. A total of 3061 microscopically confirmed cases with malignant disorders in the period 2011-2015, were included. A descriptive and analytical epidemiologic method was used in data analysis.**Results**:From the total of 3061 patients, 1938(63%) were women and 1123(37%) were men.Morbidity rate (Mb) showed the highest value in Kochani (665,2/100000 population), the lowest in Vinica (209/100000).Specific Mb according to gender and municipality showed the highest rate in men in Berovo (477,3/100000), the lowest in Vinica (208,1/100000).In women, Mb rate was the highest in Kochani (962,7/100000), the lowest in Vinica (210/100000).Concerning the frequency of appearing of some types of cancer, there was a difference in both genders. Colon cancer was on the first place in men with 140 diseased, followed by skin cancer with 138 cases. In women, breast cancer was on the first place with 832 diagnosed patients. The second and the third place took genital cancers (uterine cervical cancer-244;uterine body-182 observed cases). **Conclusion:**Preventive programs for early discovering of malignant diseases are very important. Also, of great meaning is solving of the problem with in due time registration of these diseases, which exists in some of the municipalities of the East Region.

Keywords: malignant diseases, morbidity, localization of neoplasms.

3. RISK FACTORS FOR BLADDER CANCER – CORNERSTONE FOR SCREENING

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Aims and background. Bladder cancer (BC) incidence and prevalence are among top ten cancers in the world. Bladder cancer (BC) is the most expensive cancer to treat. Its incidence and mortality have not decreased in the last four decades. There is a need for a low-cost screening test for BC that would be applicable for early detection in asymptomatic persons, a test that would preferably be noninvasive and have satisfactory sensitivity and specificity.

Methods. ***Step one.*** Based on the proven risk factors for BC, we present a simple scoring system as part of the new BC screening method. ***Step two.*** Urinary metabolites of the ubiquitous BC carcinogens should be identified in urine, among persons recruited according to previous scoring system.

Results and Conclusions. Recent large studies from EU emphasized two key problems in BC screening: 1) determination of highly risky group, 2) Biomarker determination. The heterogeneous results of studies on BC etiology are largely due to a lack of research into the compounds (and their mutual interactions) present in the urinary bladder, carcinogens absorbed through the skin and/or inhaled, and the daily dynamics of exposure to exogenous risk factors.
New attempts in BC screening should be focused on urine content analyses, not only on hematuria and currently used biomarkers. We propose the scoring system for BC pre-evaluation (recruitment for screening) and the new direction for BC prevention based on the focused on urine content analyses (urinary metabolites of ubiquitous BC carcinogens).

4. MALIGNANT TUMORS AS THE CAUSE OF DEATH IN THE SERBIAN AND NON-ALBANIAN POPULATION ON THE TERRITORY OF THE AUTONOMOUS PROVINCE OF KOSOVO AND METOHIJA

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Introduction: Malignant tumors are the second most common cause of premature dying of the population worldwide, so as in our country. The aim of this paper was to describe the movement of the number of deaths and mortality rates of malignant tumors in the Serbian and non-Albanian population on the territory of the Autonomous Province (AP) of Kosovo and Metohija (KiM). **Method:** A descriptive epidemiological study was applied. Data on deaths in Serbian and non-Albanian population in the period 2004-2013. year on the territory of AP KiM and the southern part- enclaves have been retrospectively analyzed. In the AP KiM area after 1999, the population census was not carried out by the Republic of Serbia, so that the population data of the AP KiM territory were obtained from the International and Provincial Red Cross, UNMIK Administration, the Ministry of Kosovo and the Coordination Center, the Republic Health Insurance Fund (RFZO), The Public Health Institute Kosovska Mitrovica. Public Health Institute's of Kosovska Mitrovica database of diseased and deceased was the source of data. The annual and average annual mortality rates per 100,000 inhabitants were calculated and were not standardized. The line trend is calculated.
Results: 1108 people, 591 (53.34%) men and 517 (46.66%) women died of the malignant tumors. The average annual non-standardized mortality rate was 76.5 / 100.000 inhabitants. Continuous increase in annual non-standardized mortality rates was determined ($y = 5.7659x + 44.789$, $R2 = 0.9025$). The increase in malignant tumors mortality in males is statistically significant ($y = 4.745x + 33$, $R2 = 0.863$). There is a statistically significant increase in the mortality rate of malignant tumors ($y = 3.606x + 31.86$, $R2 = 0.92$) at women too. Mortality rates were higher in men than in women, and the difference was not statistically significant. The most common malignant tumors as the cause of men's death were: lung cancer (26.2%), colon cancer (10.7%) and prostate cancer (9.1%). In women, the most common malignant neoplasms as the cause of death were: breast cancer (24.6%), cervical cancer (11.4%) and lung cancer (6.8%). The number of deaths increased with age and the maximum was notices for the older then 69 years. **Conclusion:** A continuous increase in the number of deaths from malignant tumors and the rate of mortality in the observed ten-years period has been determined. There was no statistically significant difference in the death rate among malignant tumors between the sexes. Mortality trends show an upward trend in the future. Lung cancer was the first cause of a man's death and the third cause of womens dying. Most of the dead were older than 69 years. Primary and secondary prevention measures are necessary in order to reduce the presence of risk factors and improve early diagnosis and treatment.

Keywords: malignant tumors, trend, mortality

5. STROKE MORTALITY TRENDS IN SERBIA, 1991-2013

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Objectives: Stroke was one of the leading killers in the world during the past decades. The aim of this study was to examine trends in stroke mortality in Serbia.
Materials and methods: A population-based cross sectional study analyzing stroke mortality in Serbia in the period 1991-2013 was carried out based on official data. The age-standardized rates (ASRs, per 100,000) were calculated using the direct method, according to the World standard population. Joinpoint regression analysis was used to estimate annual percent change (APC) with the corresponding 95% confidence interval (CI).
Results: More than 360,000 people (approximately 160,000 men and 200,000 women) have died due to stroke in Serbia during the observed period. The average ASR was 97.0 per 100,000 men and women per year. Mortality rates from stroke in Serbian population increased initially before decreasing: APC = + 1.2% (95% CI = 0.4 to 2.1) between 1991 and 1999 and then APC = - 1.8% (95% CI = -3.1 to -0.4) from 1999 to 2006, followed by APC = - 5.6% (95% CI = -6.6 to -4.6) from 2006 to onwards. Stroke mortality trends significantly decreased in both men (APC = - 1.8%, 95% CI = -2.4 to -1.3) and women (APC = -1.9%, 95% CI = -2.6 to -1.2): according to comparability test, trends in men and women were parallel (final selected model failed to reject parallelism, $P > 0.05$). Stroke mortality rates showed significantly decreased trends in all age groups in both genders during the observed period, while significantly increased mortality trend was noticed only among women aged 35-39 years from 2010 to onwards.
Conclusion: Additional analytic epidemiological researches on risk factors for stroke among the Serbian population are needed. Further efforts to reduce mortality from stroke in Serbia are required.

Keywords: Stroke, mortality, trend, joinpoint regression analysis

6. BEVACIZUMAB AND IRINOTECAN BASED CHEMOTHERAPY REGIMENS IN PATIENTS WITH METASTATIC COLORECTAL CANCER: A META ANALYSIS SURVIVAL OUTCOMES

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Objectives: Colorectal cancer represents one of the most common cancer sites and one of the leading causes of cancer deaths in both sexes. The effects of bevacizumab, a recombinant humanized monoclonal antibody to vascular endothelial growth factor, on survival in patients with metastatic colorectal cancer have been widely evaluated. However, clinical trials which included different chemotherapy regimens have yielded divergent results, so the magnitude of benefit from adding bevacizumab remains arguable. The aim of this study was to evaluate whether the addition of bevacizumab to irinotecan based chemotherapy regimens improves survival in patients with metastatic colorectal cancer.
Materials and methods: A systematic literature search of PubMed database was performed to identify randomized controlled trials comparing irinotecan based chemotherapy regimens with and without bevacizumab in patients with metastatic colorectal cancer. The outcomes of interest were overall survival and progression free survival. Meta analysis was performed using the generic inverse variance method. Hazard ratios (HR) with 95% confidence intervals (CI) were collected from individual studies and pooled. Random effects model based on the method of DerSimonian and Laird was applied.
Results: Six clinical trials totaling 2594 patients were identified and included in this meta analysis. Adding bevacizumab to irinotecan based regimens did not show a statistically significant benefit in terms of overall survival (HR=0.87; 95% CI 0.61-1.24; p=0.44). However, a significant advantage in favour of the addition of bevacizumab was observed for progression free survival (HR=0.68; 95% CI 0.52-0.89; p=0.005).
Conclusion: Addition of bevacizumab to irinotecan based chemotherapy regimens did not show significant improvement in terms of overall survival. But, progression free survival was significantly improved in patients who received bevacizumab.

Keywords: Bevacizumab, colorectal cancer, survival, meta analysis

7. WORK RELATED RISK FACTORS FOR ACUTE MYOCARDIAL INFARCTION

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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 work related risk factors (occupation and duration of work) in patients from AMI and healthy subjects (controls) from the city of Nis.
Materials and methods. Descriptive and analytical epidemiological methods were used. The study was conducted as case-control study and included 310 participants, aged 30-65 years, matched with respect to sex and age (± 2 years).
Results. The groups were similiar by gender (p=1.000) (each group included 110 male and 45 female subjects) and by age (t=1.208, p=0.228) (cases 56,10±7,82 vs. controls 55,04±7,60). In comparation with cases, in the control group significantly less were industrial workers (p<0,005) and housewives (p<0,005). Administrative workers and employes with university degree are higher in healthy control group (p<0,005). Patients with AMI had a significantly longer duration of work compared to healthy subjects (p<0,05).
Conclusion. The results of the study have shown that industrial workers and housewives as well as individual with longer duration of work, are at risk in AMI development, which is important for future epidemiological studies and in the improvement of preventive strategies regarding AMI.

Keywords: acute myocardial infarction, risk factors, occupation, duration of work

8. TREND OF MELANOMA INCIDENCE IN THE NIŠAVA DISTRICT

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Introduction. Melanoma represents 1% to 5% of skin cancers but melanoma accounts for 65% up to 80% of the mortality rate from all skin cancers. The objective of the paper was to determine and analyze incidence of melanoma trend among the population in the Nišava District. **Method**. Descriptive study was done. Data was exctracted from the Serbian Cancer Registry for the Nišava District. Cancer diagnosis was coded according to the Tenth Revision of International Classification of Diseases-ICD, (codes C43). The observed period was 2005-2014. Crude rates (CR), age-specific and age-standardized incidence rates (ASR) were calculated per 100,000 inhabitants. Method of direct standardization was performed and world population was used as a standard. Data about population was obtained from censuses 2002 and 2011. Linear trend was calculated. **Results**. During the observation period (2005-2014), 410 new cases of melanoma were registered (226 cases or 55% were males and 184 or 45% were females). ASR of incidence was 6.9 per 100,00 in males and 5.4 in females. Male to female ratio was 1,2:1. Annual ASR of incidence in males ranged from 4.3 (2008) to 9.3 (2005). In females ASR of incidence ranged from 4 (2014) to 8.5 (2005). Linear trend of ASR of incidence in males was decreasing but non-significantly ($y=-0.143+7.7, R^2=0.069$) as well as in females ($y=-0.256+8.8$, $R^2=0.231$). The youngest male with melanoma was registered in the age group of 20-24 years and the yougest female was from the age group of 15-19 years. CR of melanoma occurrence before age of 45 was higher among females than males. CR of melanoma incidence was increasing faster in males than in females, particularly after the age of 60. The highest CR in males were in age groups 65-69 and 85+ and in females the higest CR were in 65-69 and 70-74. After the age of 75 years CR decreased with ages in both males and females but in males at the age of 85+ a rapid increase of CR was recorded. **Conclusion**. Crude rates and age-standardized incidence rates were highest in 2005 both in males and females. Males had higer incidence rates than females. Melanoma wasn′t common before age of 30. The highest incidence rates were in the municipalities Gadžin Han, Ražanj and Niš and the lowest in the municipality Merošina. Insufficiency and delay reporting in of new cases of melanoma have been observed. Adequate education of population about sun protection and screening of the melanoma could be successful methods in reducing incidence of melanoma.

Keywords: melanoma, trend, incidence, crude rates, age-standardized rates

9. MYOCARDIAL INFARCTION AMONG THE POPULATION OF NIŠAVA COUNTY

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Introduction. Coronary heart disease is a leading cause of male and female illness in the world and in Serbia. The aim of the paper is to analyze the trend of myocardial infarction incidence on the territory of Nišava county. **Methodology**. A descriptive study has been applied. Data about newly diseased have been taken from the population register for the acute coronary syndrome of Serbia, for Nišava county, for the period of time from 2006 to 2015. The rate was calculated for 100,000 citizens. The direct method of rate standardization according to world population has been applied. Data about population have been taken from 2001 and 2011 census. The linear trend has been calculated. **Results**. Total number of registered newly diseased is 8199 (4817 men and 3382 women). Men contracted illness approximately 1.4 times more than women did. Statistically significant increase of the trend of standardized incidence rate has been confirmed among both men ($y=-5.271+180$, $R^2=0.3158$) and women ($y=-4{,}2479+92$, $R^2=0.3349$). The incidence increases with age. The youngest newly disesed was from the age group of 20-24. Sudden increase of the number of newly diseased men has been registered after the age of 35, and for women after the age of 50. **Conclusion**. Myocardial infarction is a significant disease among the population of Nišava county. Primary and secondary prevention measures are necessary.

Keywords: myocardial infarction, trend, incidence